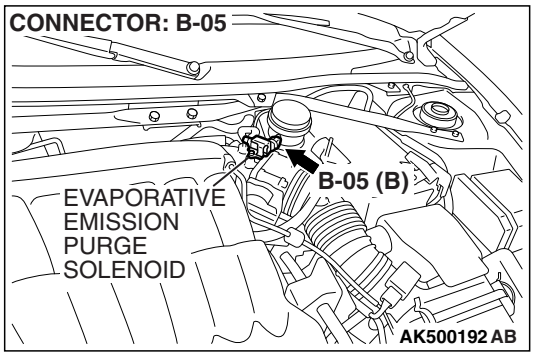
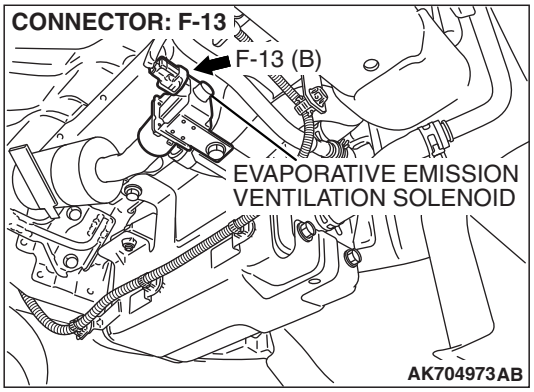
DTC P0441: Evaporative Emission Control System Incorrect Purge Flow





TECHNICAL DESCRIPTION

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

DESCRIPTIONS OF MONITOR METHODS

Fuel tank pressure decreases largely during purge-cut.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

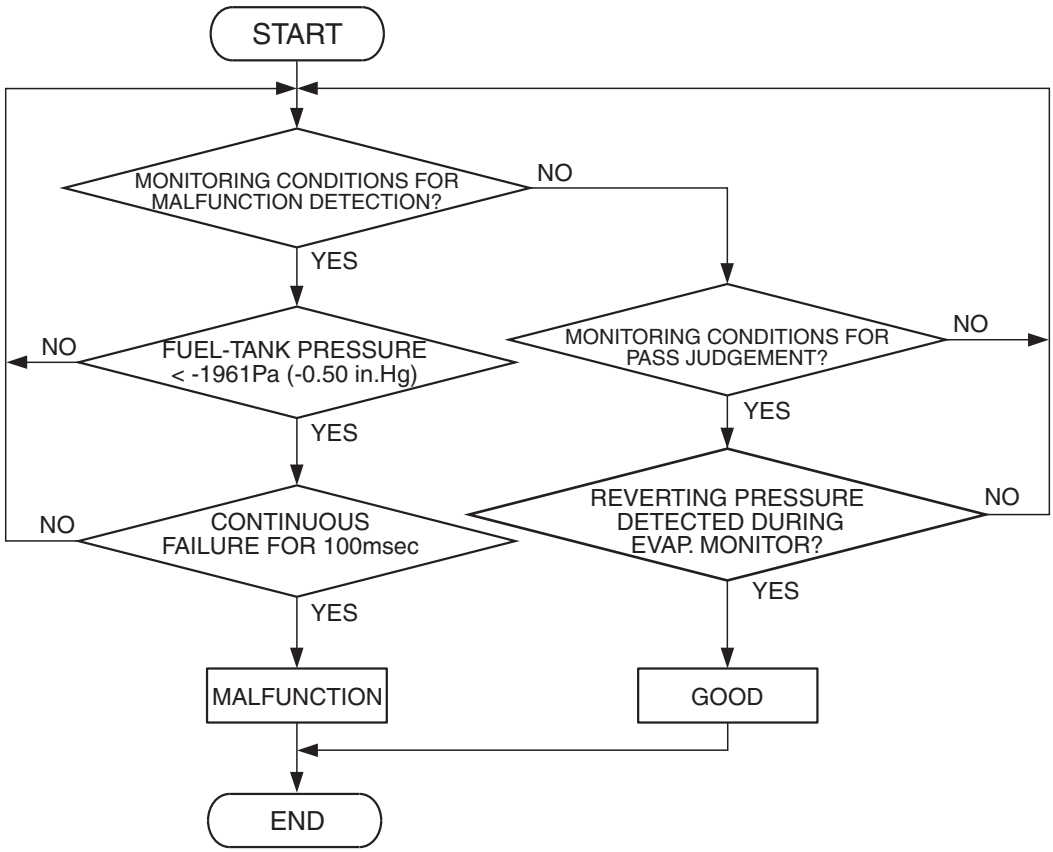
- Fuel tank pressure sensor monitor

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

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

Judgement Criterion

- The pressure in the fuel tank is −1,961 Pa (−0.58 in.Hg) or less for 0.1 second.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6.

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

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

DIAGNOSIS

Required Special Tools:

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

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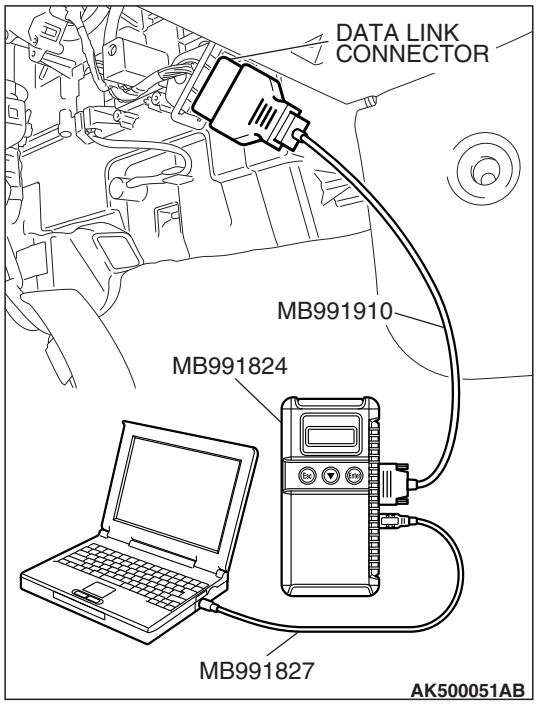


STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

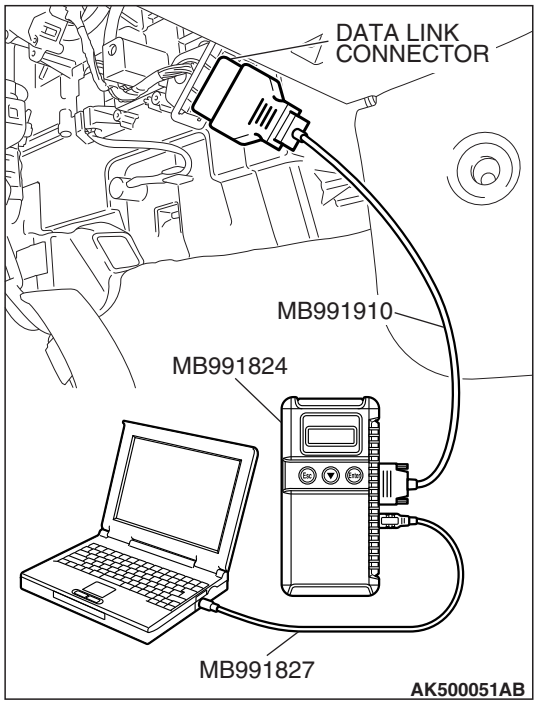
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

Q: Is DTC P0451 set?

YES : Refer to DTC P0451 – Evaporative Emission Control System Pressure Sensor Range/Performance P.13B-737.

NO : Go to Step 2.



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

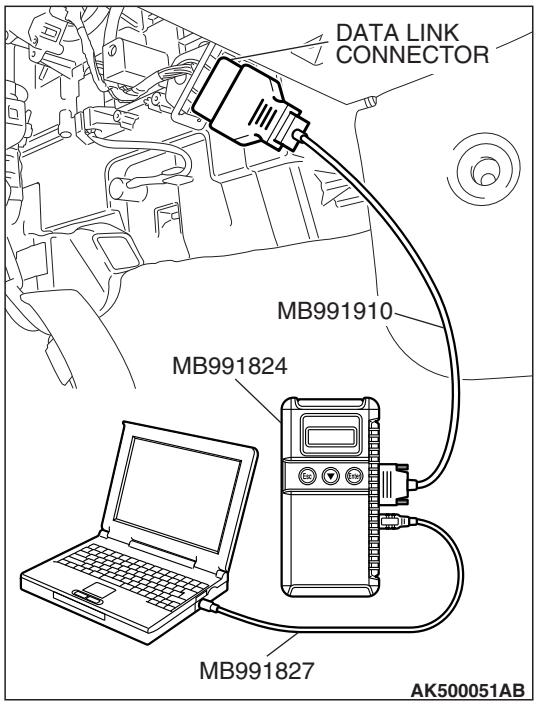
(1) Turn the ignition switch to the "ON" position.
(2) Remove the fuel cap.
(3) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
- The fuel tank differential pressures should be 1,200 and 3,800 millivolts.

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

Q: Is the fuel tank pressure between 1,200 and 3,800 millivolts?

YES : Go to Step 3.

NO : Refer to DTC P0451 – Evaporative Emission Control System Pressure Sensor Range/Performance P.13B-737.



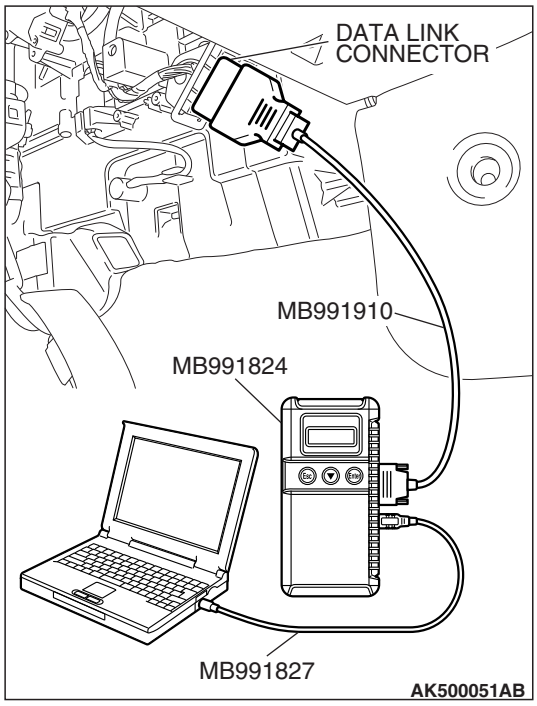
STEP 3. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid.

(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 5.



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 5.

STEP 5 Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6.

(2) Read the diagnostic trouble code.

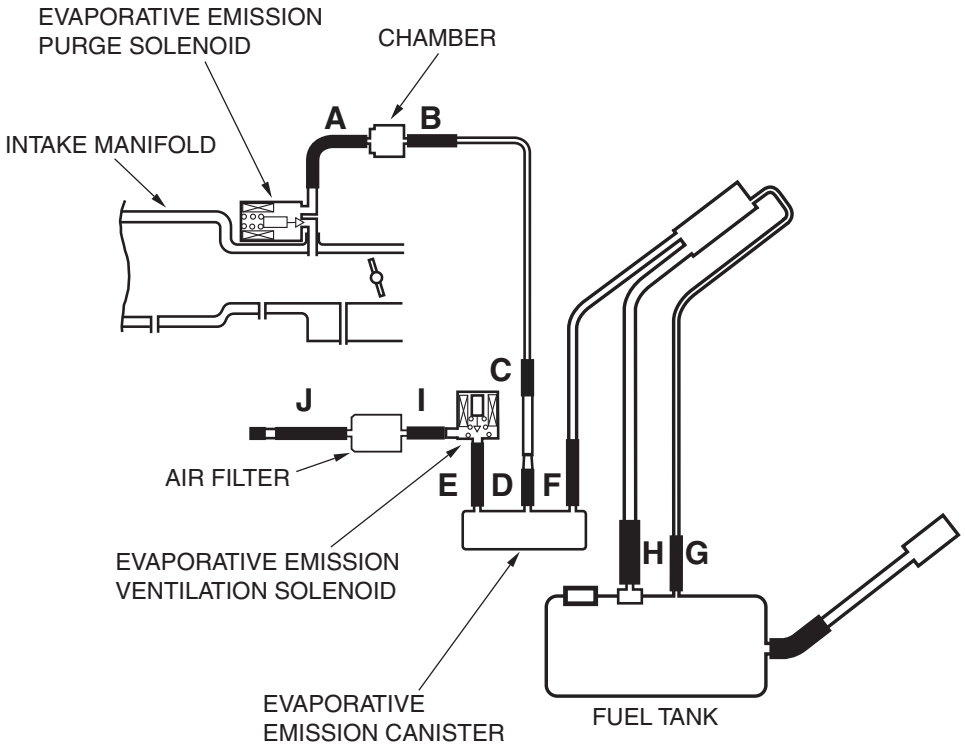
Q: Is DTC P0441 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

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

System Diagram



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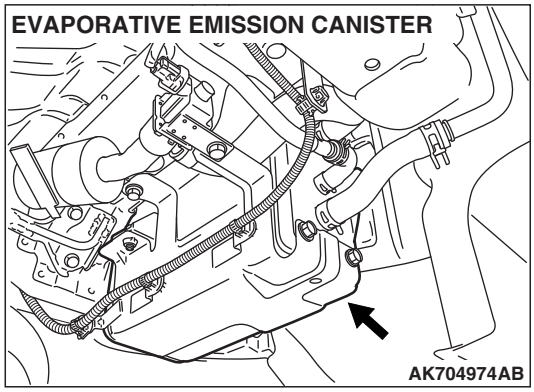

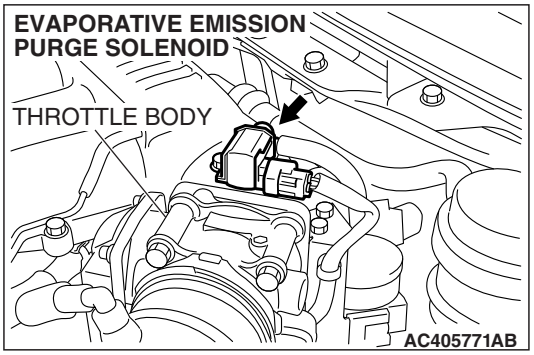

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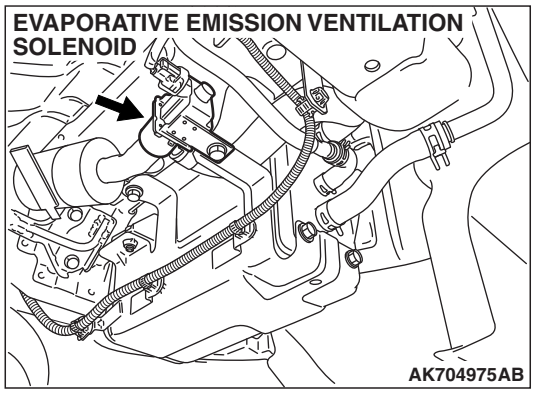


TECHNICAL DESCRIPTION

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

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

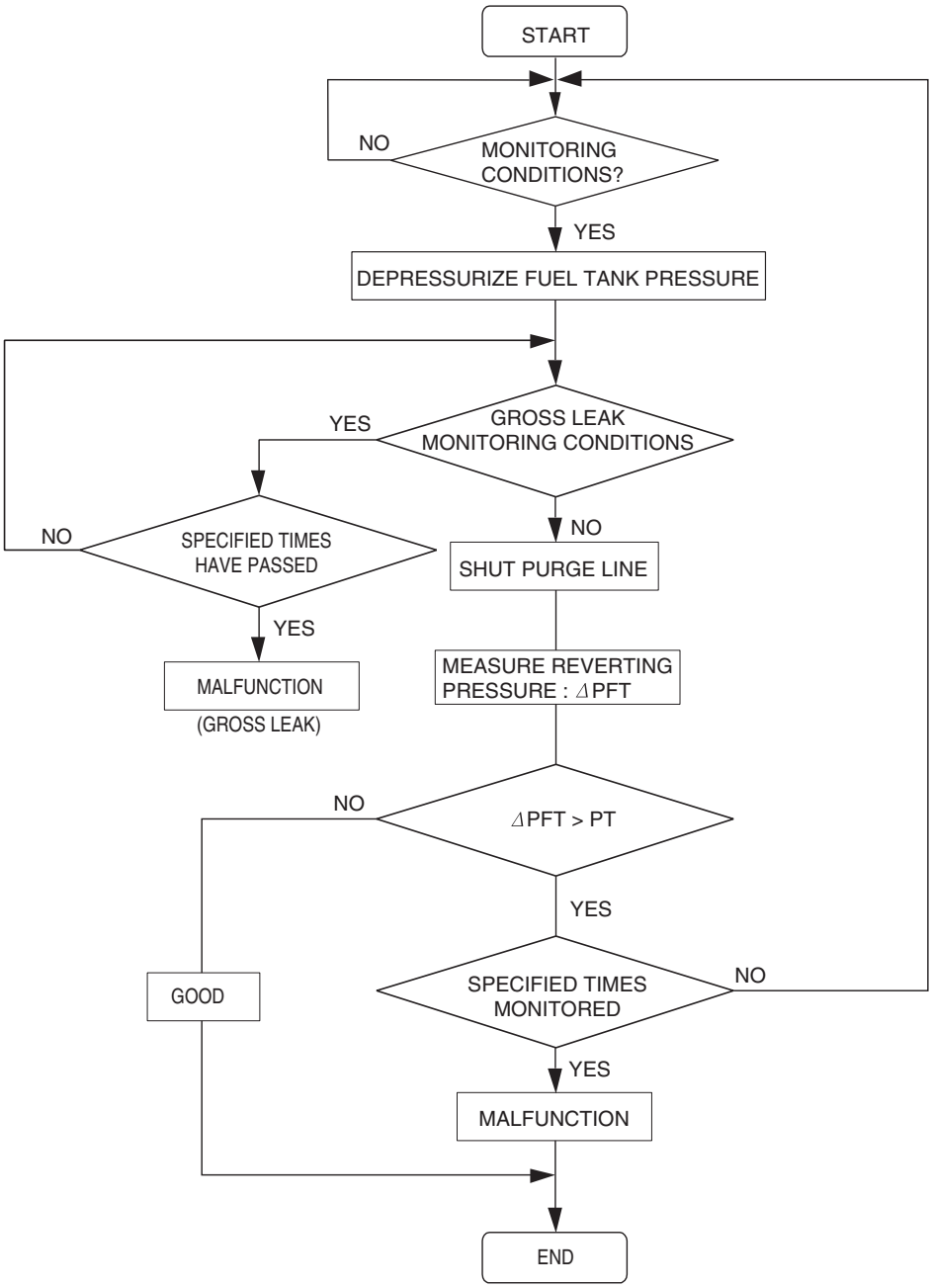
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



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DTC SET CONDITIONS

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

Check Conditions A: At Start up

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

Check Conditions B: For Test to Run

- The fuel temperature is less than 36 °C (97 °F), and less than 13 minutes have elapsed since the engine was started.
- Engine coolant temperature is greater than 60°C (140°F).
- Power steering pressure switch: "OFF"

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- Barometric pressure is greater than 76 kPa (11 psi).
- Fuel tank differential pressure sensor output voltage is 1 to 4 volts.
- Vehicle speed is greater than or equal to 20 km/h (12.4 mph).

Check Conditions C: For Test to Stop

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

Judgement Criterion

- Internal pressure of the fuel tank has changed more than 981 Pa (0.142 psi) in 20 seconds after the tank and vapor line 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.

DTC SET CONDITIONS

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

Check Conditions A: At Start up

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

Check Conditions B: For Test to Run

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

Check Conditions C: For Test to Stop

- Intake air temperature is greater than −10 °C (14°F).
- Engine coolant temperature is greater than 20 °C (68 °F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank is less than 451 Pa (0.065 psi).
- 10 seconds have elapsed since the start of the previous monitoring.
- Monitoring time: 10 – 14 minutes.

Judgement Criterion

- Internal pressure of the fuel tank has changed more than 1,922 Pa (0.29 psi) in 128 seconds after the tank and vapor line were closed.

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6.

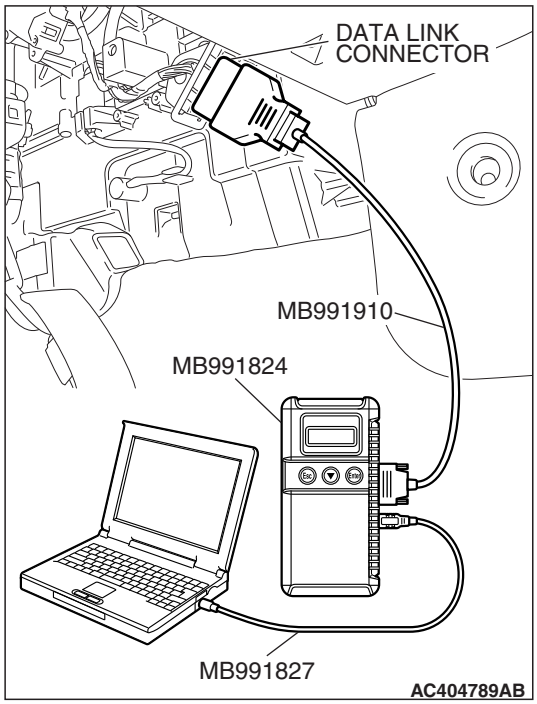
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

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

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

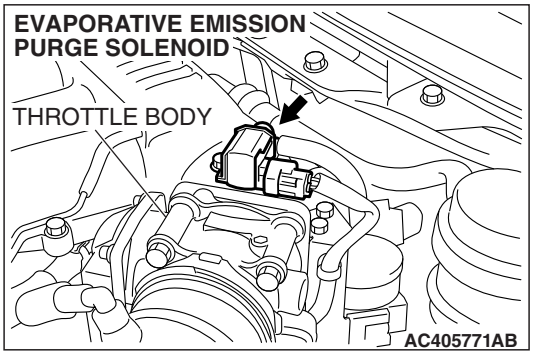
Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-43. If no other DTC's have been set, go to Step 2.

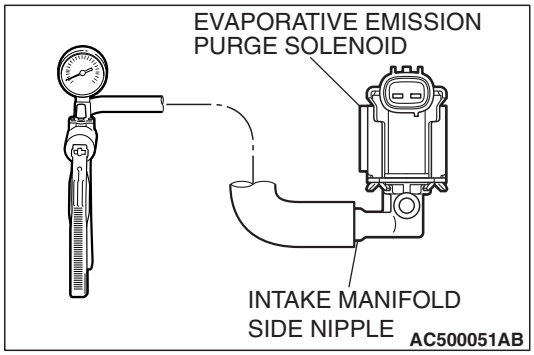
NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Explain to the customer that an improperly tightened fuel cap can cause the MIL to illuminate. Return the vehicle to the customer.

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.



(1) Remove the evaporative emission purge solenoid from the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

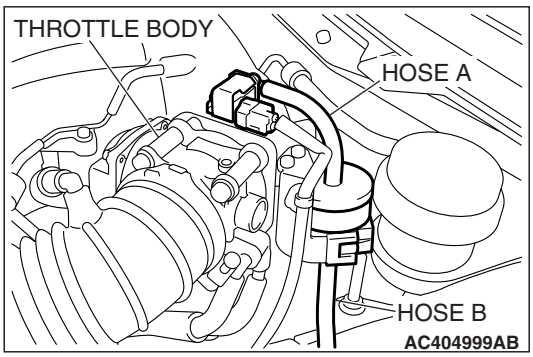


(2) Connect the hose of the hand vacuum pump to the intake manifold side nipple of the evaporative emission purge solenoid.
(3) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.
(4) Install the evaporative emission purge solenoid to the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

Q: Does the evaporative emission purge solenoid hold vacuum?

YES : Go to Step 3.
NO : Replace the evaporative emission purge solenoid. Then go to Step 14.

STEP 3. Check for leaks in evaporative emission hoses A and B.

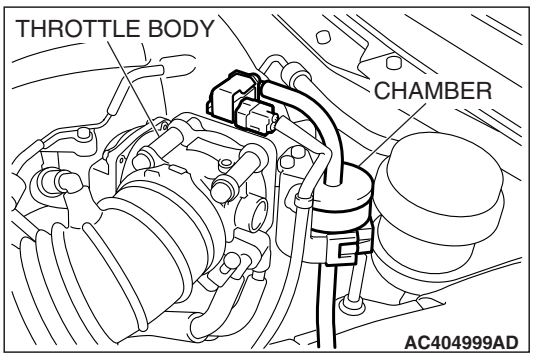


Use a hand vacuum pump to test each hose from hose A to hose B.

Q: Do the hoses hold vacuum?

YES : Go to Step 4.
NO : Replace any damaged hose. Then go to Step 14.

STEP 4. Check for leaks in the chamber.



(1) Connect a hand vacuum pump to the nipple.
(2) Plug the other nipple.
(3) Apply vacuum with the hand vacuum pump, and confirm that the applied vacuum does not fluctuate.

Q: Is the chamber in good condition?

YES : Go to Step 5.
NO : Replace the chamber. Then go to Step 14.

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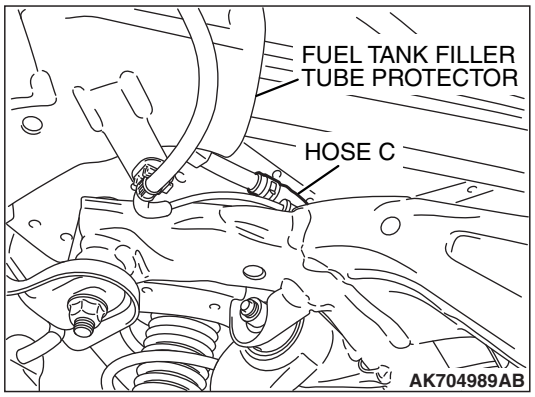
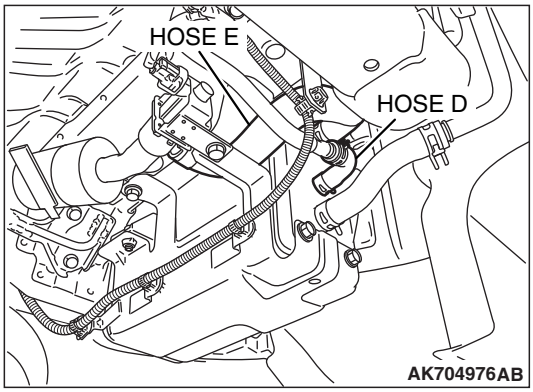




STEP 5. Check for leaks in evaporative emission hoses C through E.

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

Q: Do the hoses hold vacuum?

YES : Go to Step 6.

NO : Replace any damaged hose. Then go to Step 14.

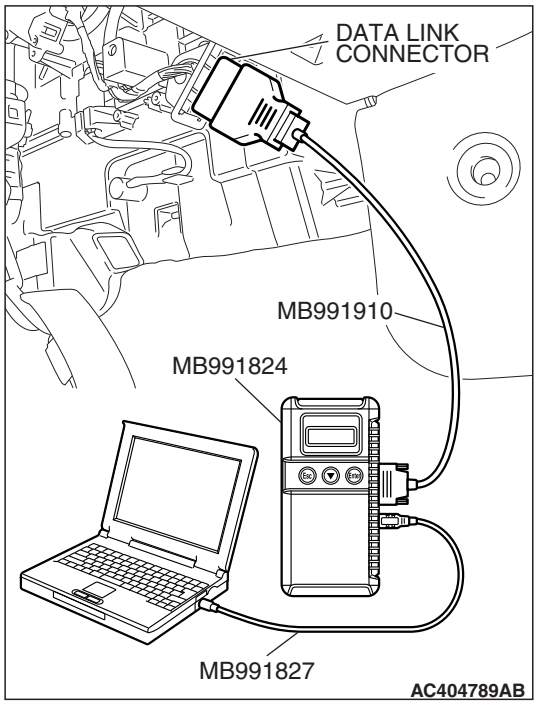
STEP 6. Using scan tool MB991958, check actuator test item 15: Evaporative emission ventilation solenoid.

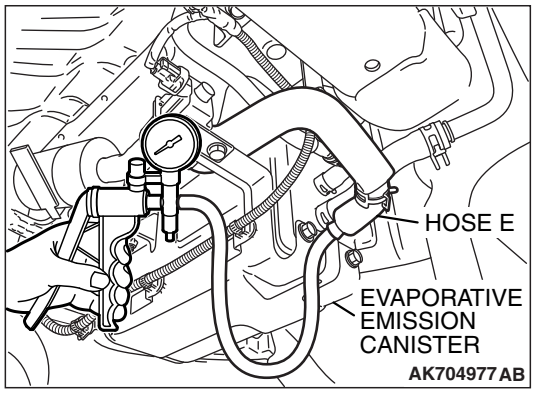
⚠ CAUTION

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) Remove the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).





(3) Disconnect the hose E and evaporative emission canister connection, and connect the hand vacuum pump to the hose E.

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

(5) Set scan tool MB991958 to actuator test mode.
- 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, and disconnect scan tool MB991958.

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

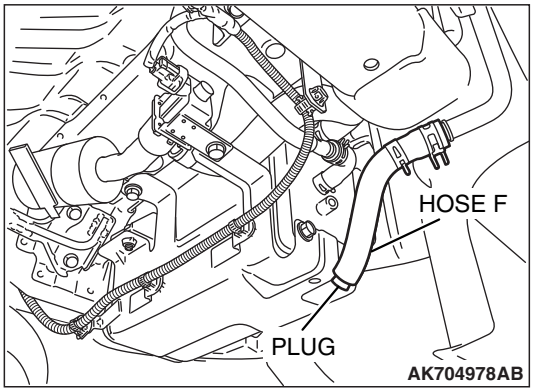
(8) Reinstall the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).

Q: Did the evaporative emission ventilation solenoid hold vacuum?

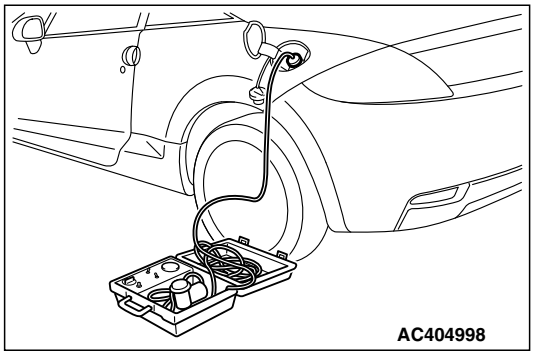
YES : Go to Step 7.

NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-112). Then go to Step 14.

STEP 7. Pressure test the evaporative emission system lines from hoses F to I.



(1) Disconnect hose F from the evaporative emission canister, and plug hose F securely.
(2) 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.
(3) Remove the fuel cap.



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

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

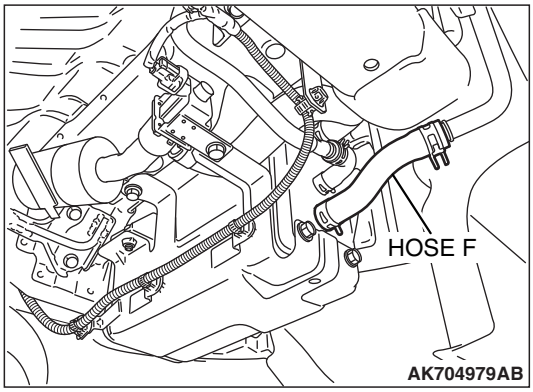
(6) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(7) Connect hose F to the evaporative emission canister.

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

YES : Go to Step 12.
NO : Go to Step 8.

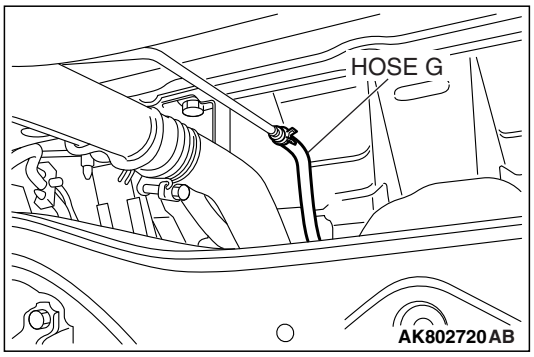
STEP 8. Check for leaks in evaporative emission hose F.

(1) Remove the fuel tank filler tube protector (Refer to GROUP 13C, Fuel Tank P.13C-11).
(2) Use a hand vacuum pump to check the hose F.



Q: Do the hoses hold vacuum?

YES : Go to Step 14.
NO : Replace any damaged hose. Then go to Step 14.



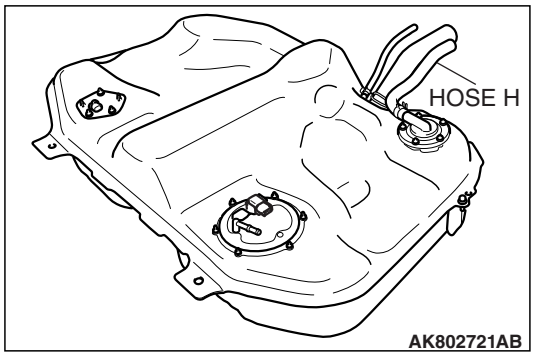
STEP 9. Check for leaks in evaporative emission hoses G.

Use a hand vacuum pump to test each hose G.

Q: Do the hoses hold vacuum?

YES : Go to Step 10.

NO : Replace any damaged hose. Then go to Step 14.



STEP 10. Check for leaks in evaporative emission hose H.

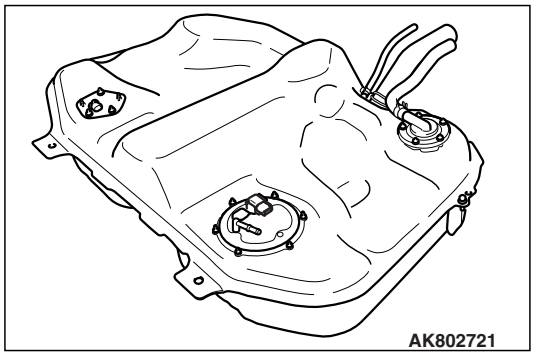
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11).

(2) Use the hand vacuum pump to check the hose H.

Q: Dose the hose hold vacuum?

YES : Go to Step 11.

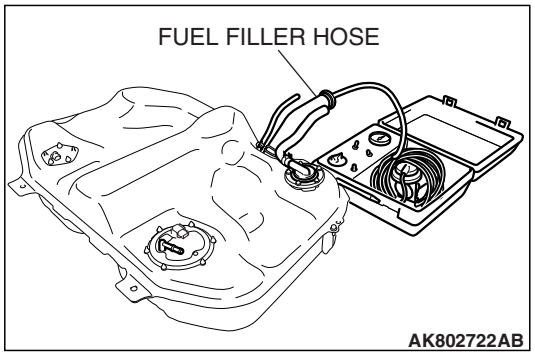
NO : Replace the hose and reinstall the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 14.



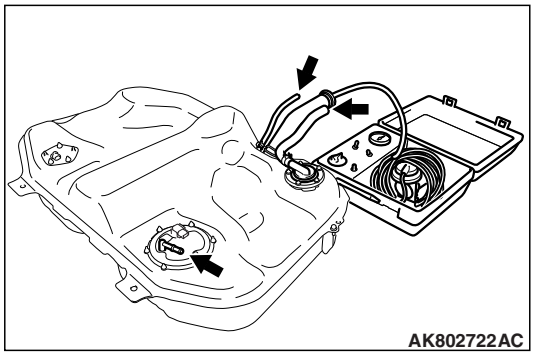
STEP 11. Check for leaks in the fuel tank.

(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.

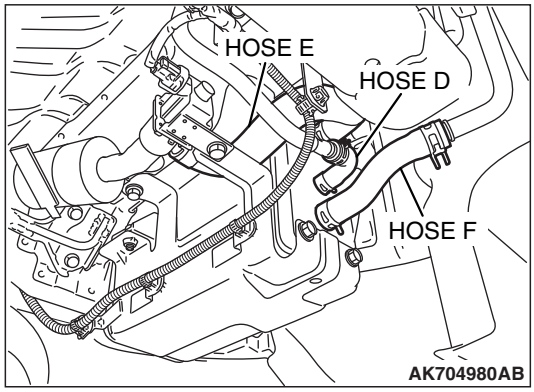
Q: Are any leaks found?

YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor (sub) or leveling valve.> : Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 14.

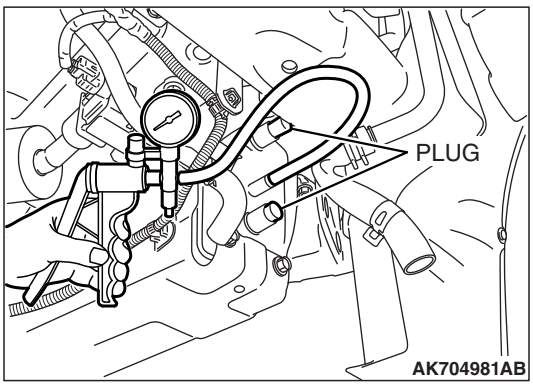
YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Go to Step 14.

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

STEP 12. Check the evaporative emission canister for vacuum leaks.



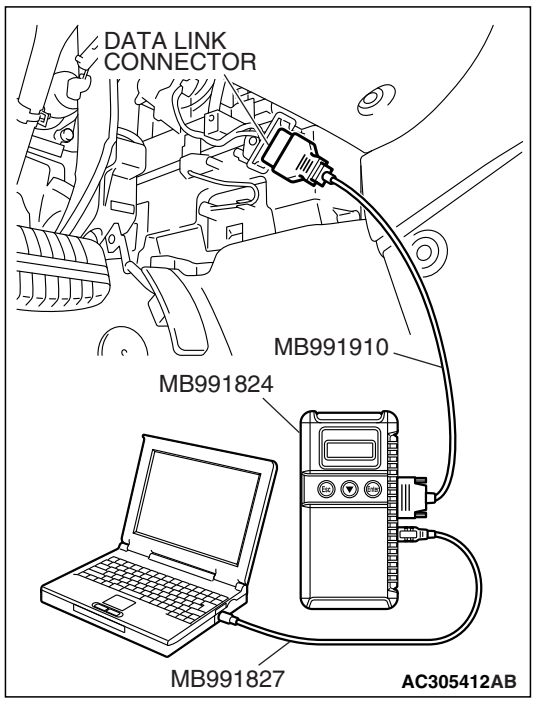
(1) Remove the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112).



(2) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(3) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(4) Disconnect the hand vacuum pump and remove the plugs, and then install the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112).

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 13.
NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112). Then go to Step 14 .



STEP 13. 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 <M/T> or PCM <A/T> automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> position.**

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

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

YES : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 14.

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 14 .

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 13.

STEP 14. Perform the OBD-II drive cycle.

(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6).
(2) Read the DTC.

Q: Is DTC P0442 set?

YES : Repeat the troubleshooting from Step 1.
NO : The procedure is complete.

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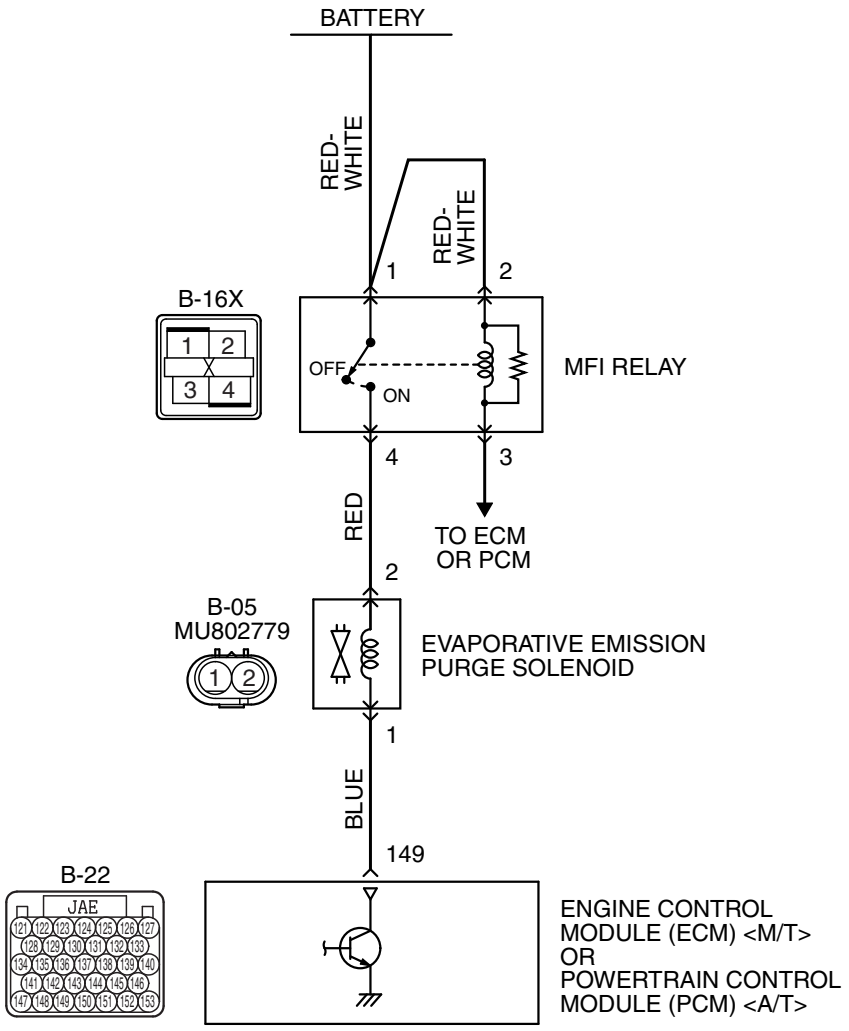
DTC P0443: Evaporative Emission Control System Purge Control Valve Circuit

Evaporative Emission Purge Solenoid Circuit



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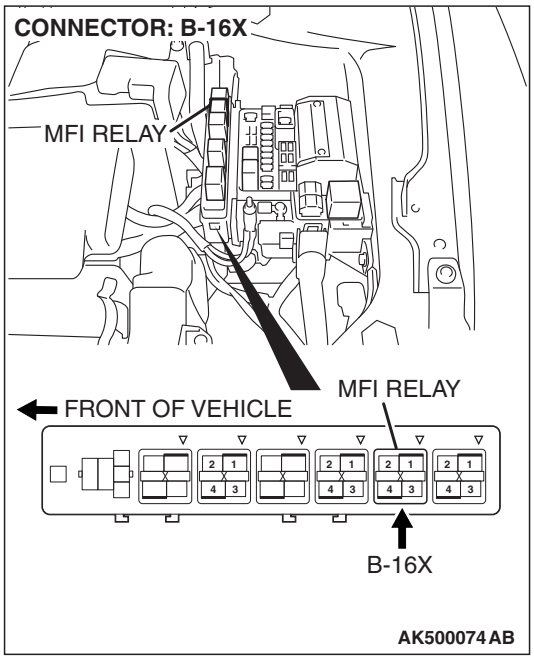
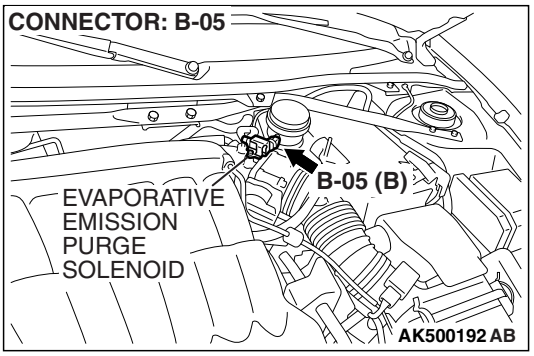
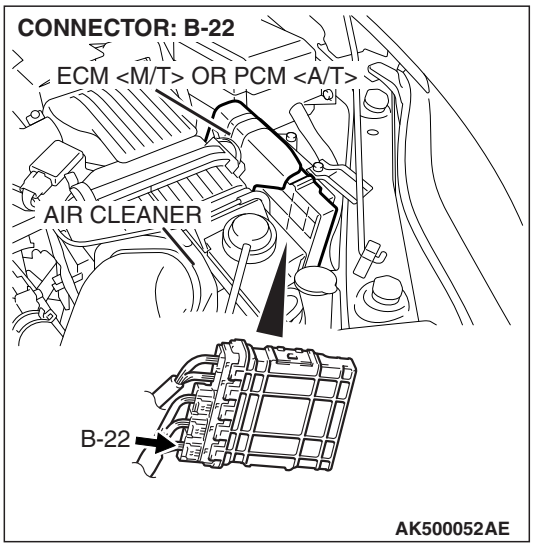
TSB Revision







CIRCUIT OPERATION

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

TECHNICAL DESCRIPTION

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

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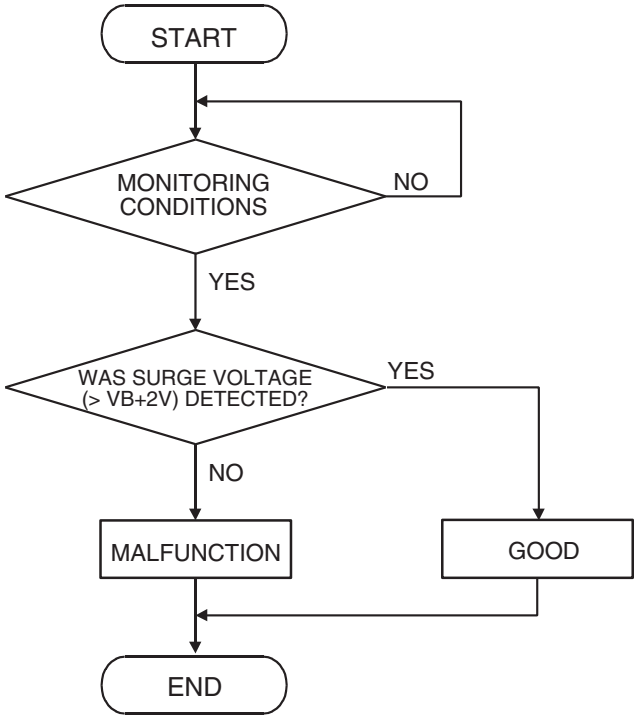
DTC SET CONDITIONS

Logic Flow Chart



AK302405

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 <M/T> or the PCM <A/T> monitors for this condition once during the drive cycle.

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

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

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

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DIAGNOSIS

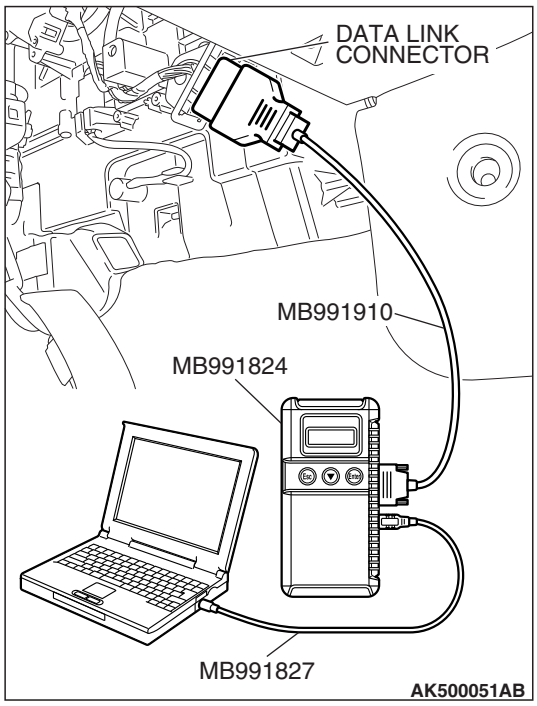
Required Special Tools:

- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991923: 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.



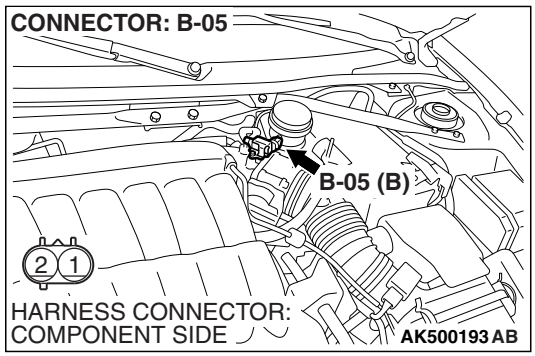
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode for item 10, Evaporative emission purge solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative 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.00-14.

NO : Go to Step 2.

STEP 2 Check harness connector B-05 at the evaporative emission purge solenoid for damage.

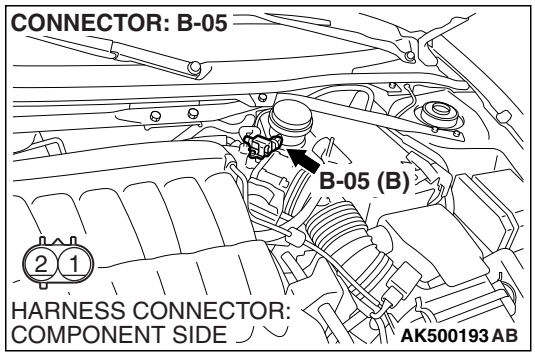


Q: Is the harness connector in good condition?

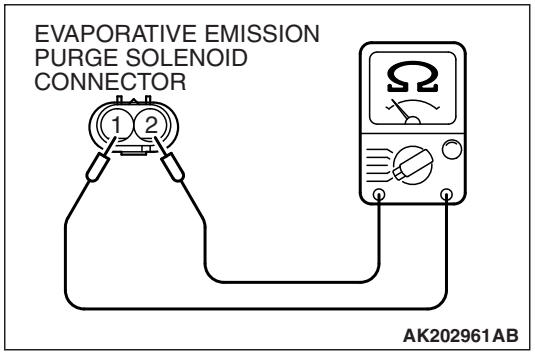
YES : Go to Step 3.

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

STEP 3 Check the evaporative emission purge solenoid.



(1) Disconnect the evaporative emission purge solenoid connector B-05.



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

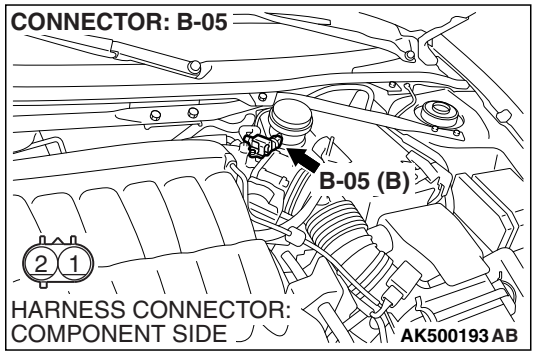
Standard value: 30 – 34 Ω [at 20°C (68°F)]

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

YES : Go to Step 4.

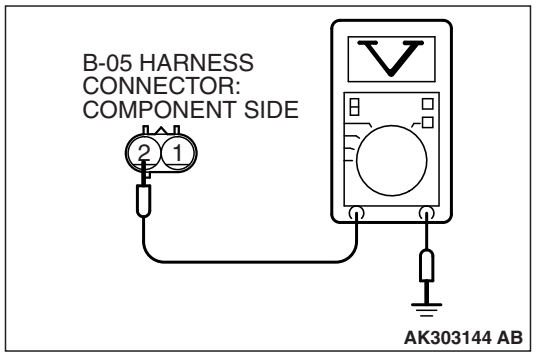
NO : Replace the evaporative emission purge solenoid. Then go to Step 12.

STEP 4. Measure the power supply voltage at evaporative emission purge solenoid harness side connector B-05.



(1) Disconnect the connector B-05 and measure at the harness side.

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



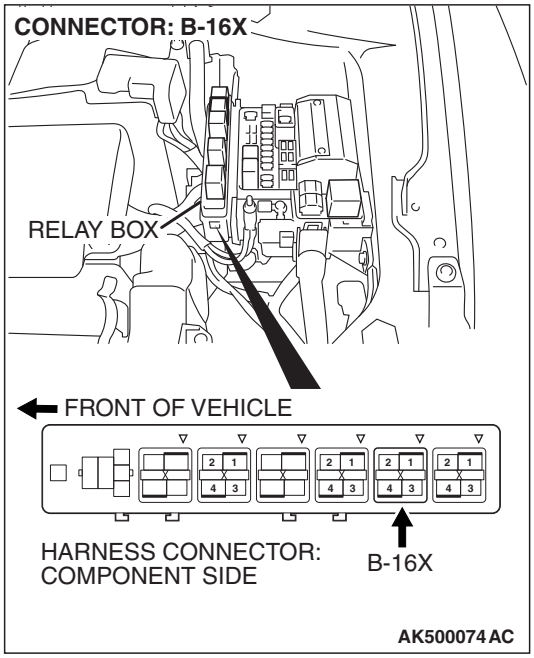
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.



STEP 5. Check harness connector B-16X at MFI relay for damage.

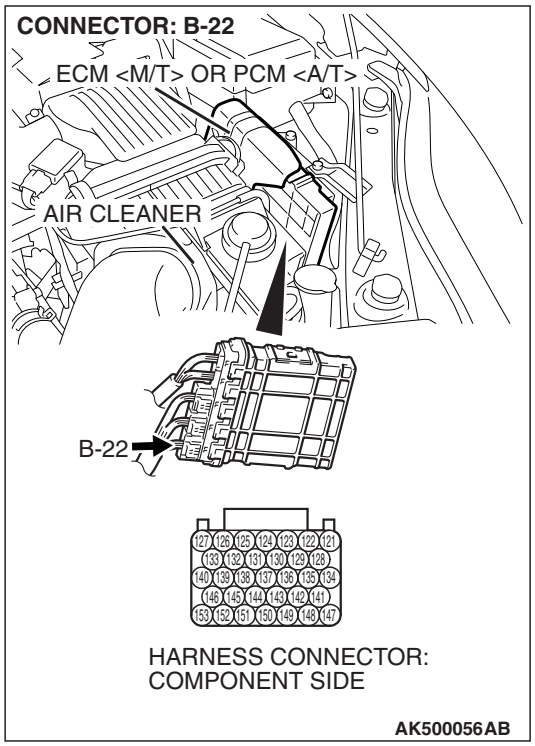
Q: Is the harness connector in good condition?

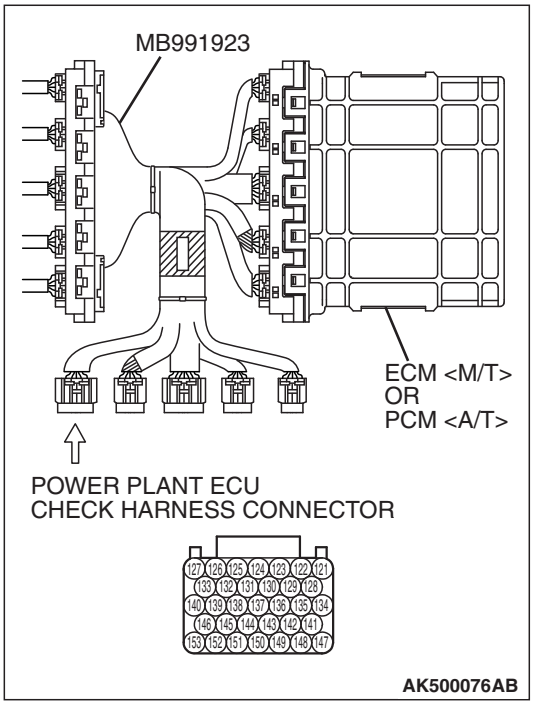
YES : Repair harness wire between MFI relay connector B-16X (terminal No. 4) and evaporative emission purge solenoid connector B-05 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.

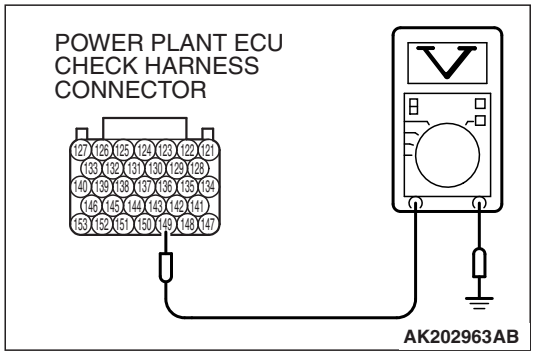
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 6. Measure the power supply voltage at ECM <M/T> or PCM <A/T> connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.







(3) Measure the voltage between terminal No. 149 and ground.
- Voltage should be battery positive voltage.

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

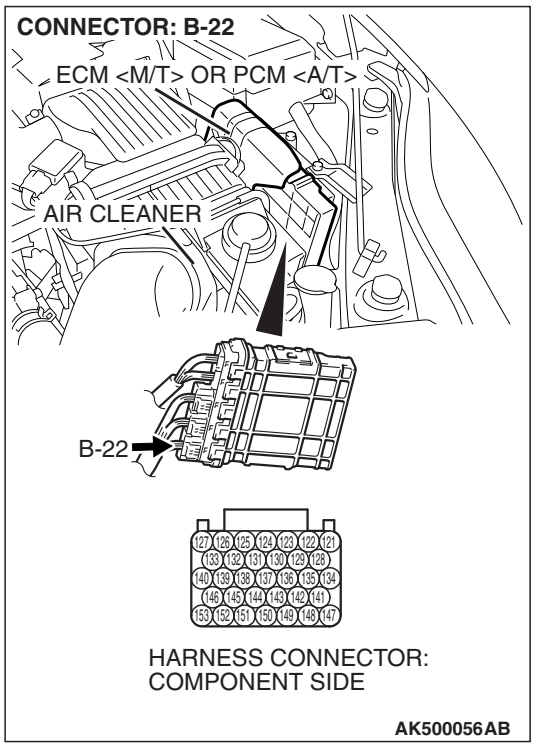
Q: Is battery positive voltage (approximately 12 volts) present?

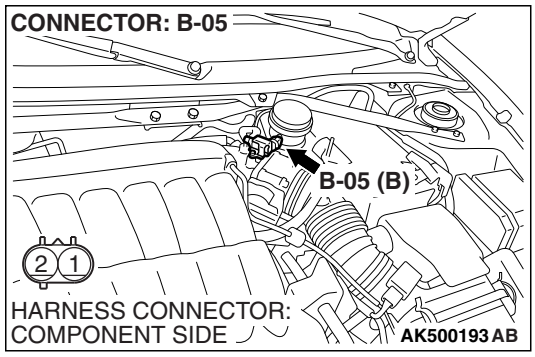
YES : Go to Step 9.
NO : Go to Step 7.

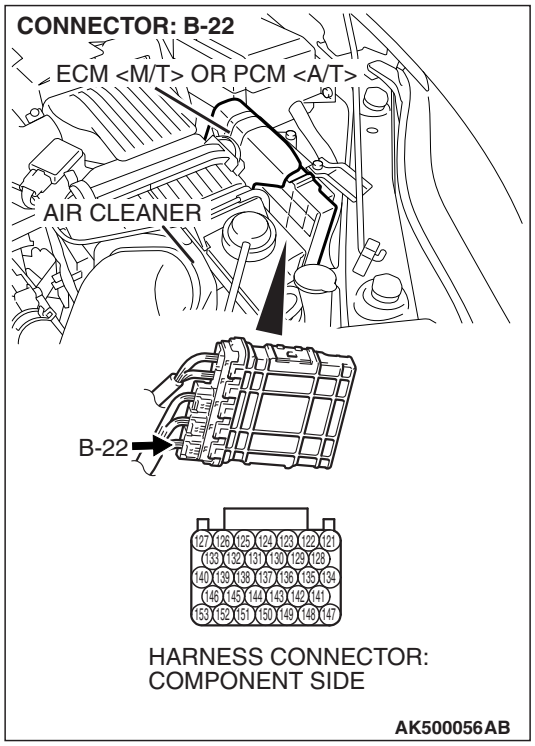
STEP 7. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.





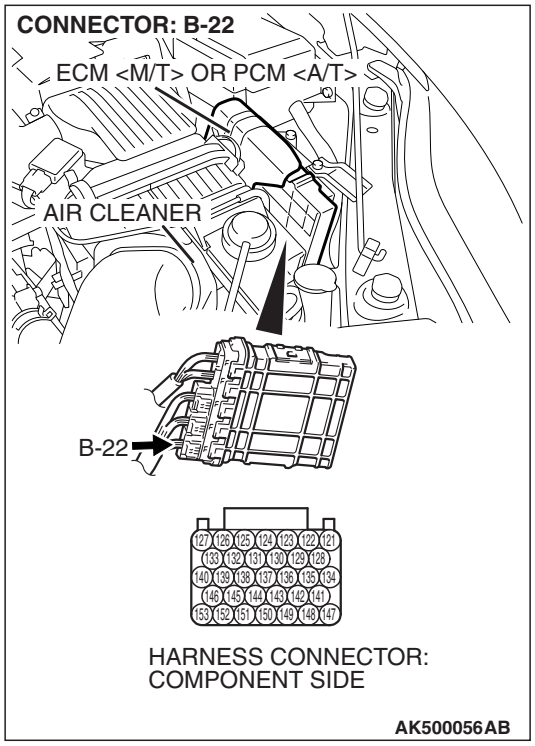


STEP 8. Check for open circuit and short circuit to ground between evaporative emission purge solenoid connector B-05 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 149).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 12.

NO : Repair it. Then go to Step 12.

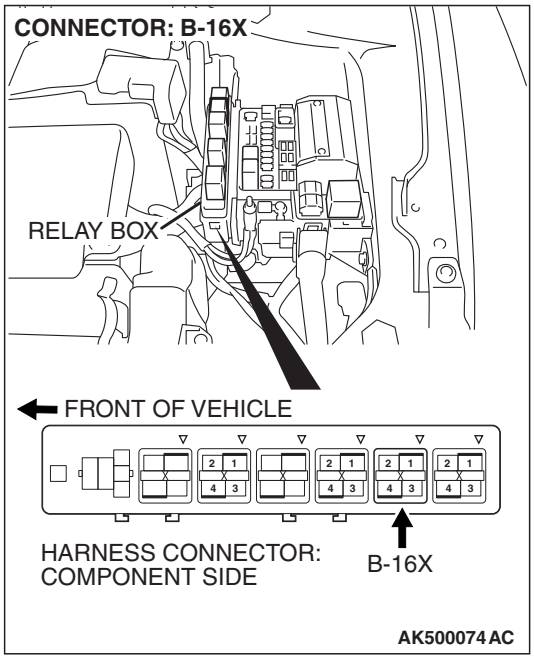


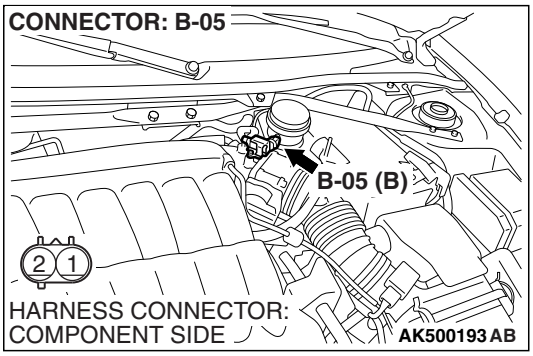
STEP 9. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

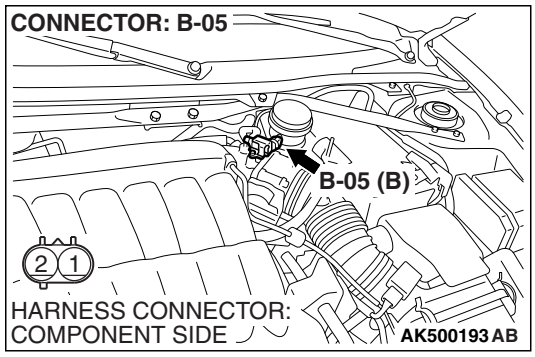
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

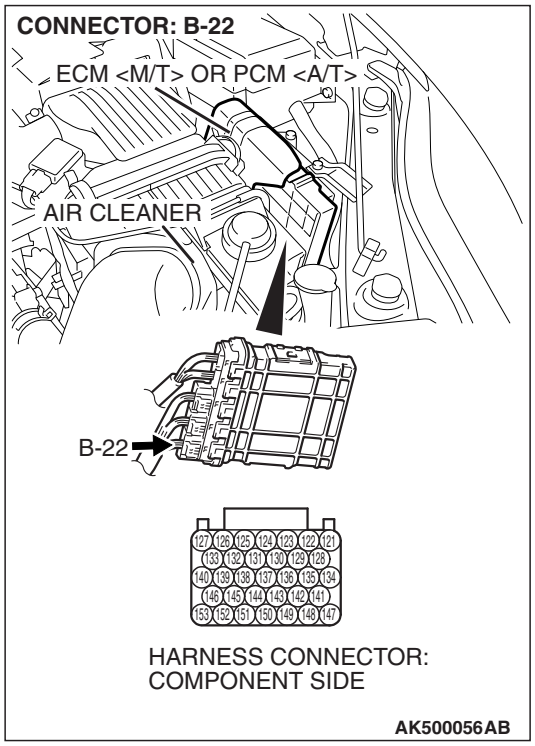




STEP 10. Check for harness damage between MFI relay connector B-16X (terminal No. 4) and evaporative emission purge solenoid connector B-05 (terminal No. 2).
Q: Is the harness wire in good condition?

YES : Go to Step 11.
NO : Repair it. Then go to Step 12.





STEP 11. Check for harness damage between evaporative emission purge solenoid connector B-05 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 149).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 12.

NO : Repair it. Then go to Step 12.

STEP 12. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

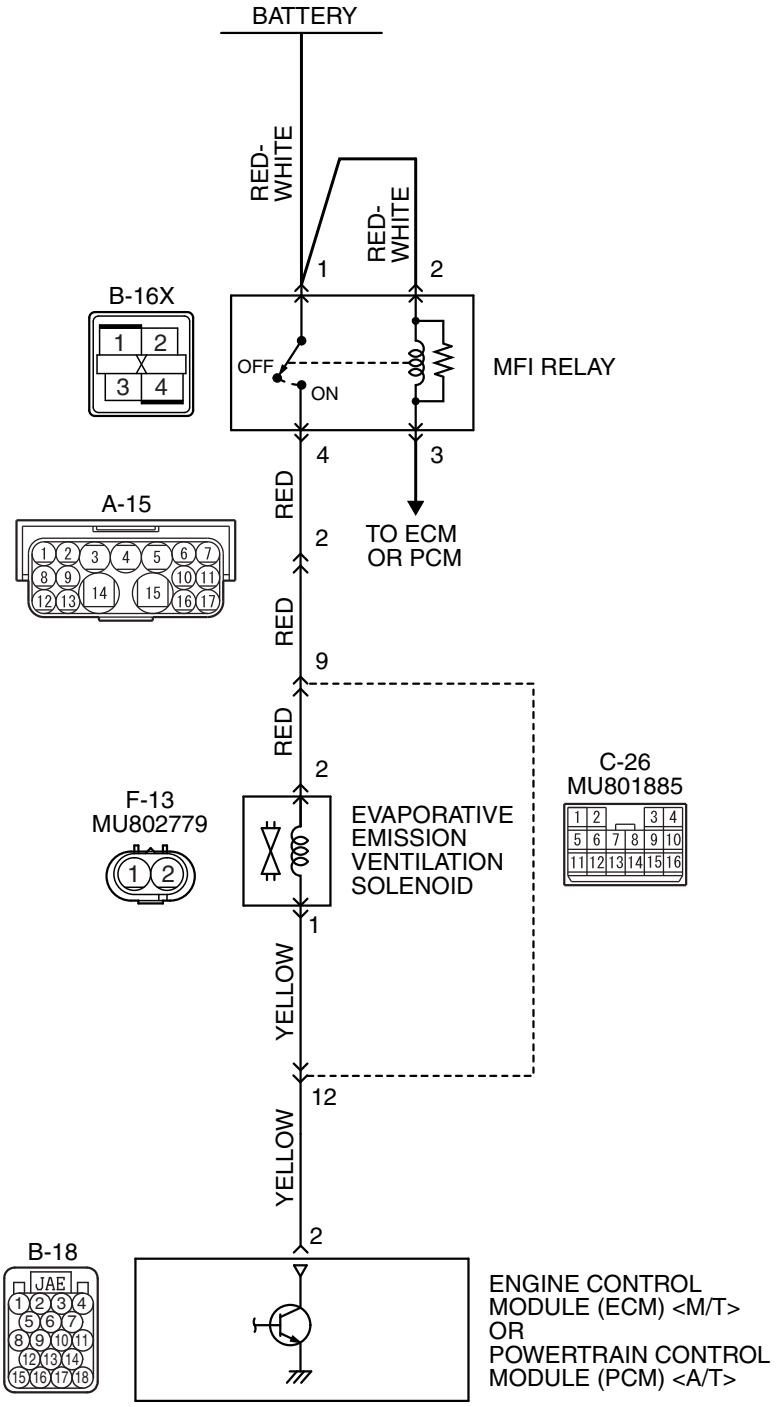
Q: Is DTC P0443 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0446: Evaporative Emission Control System Vent Control Circuit

Evaporative Emission Ventilation Solenoid Circuit



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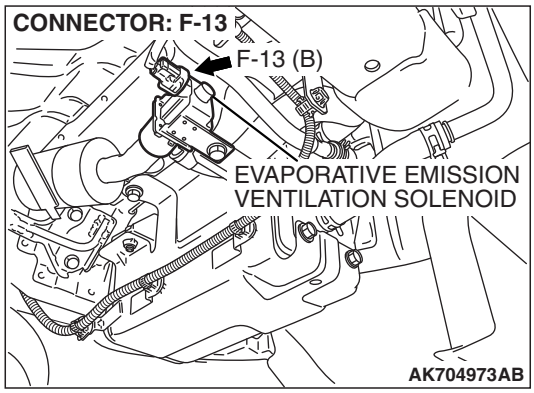
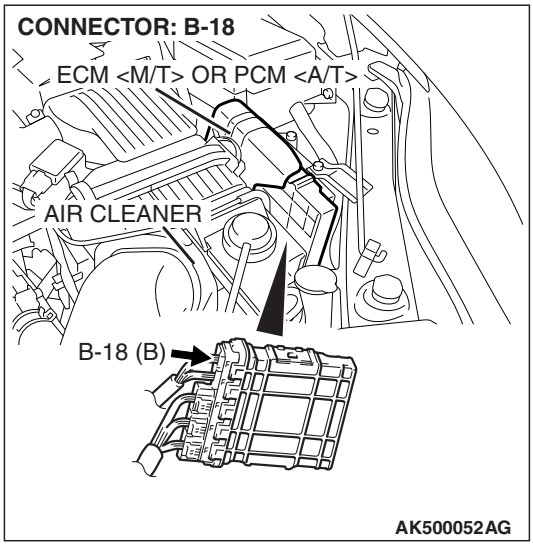
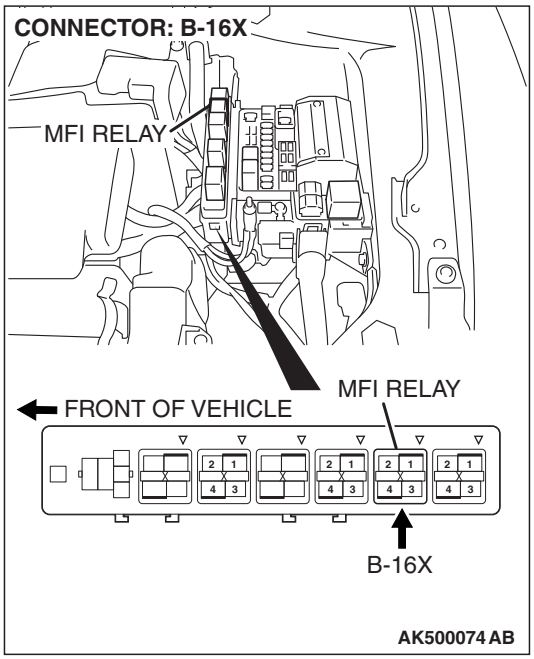
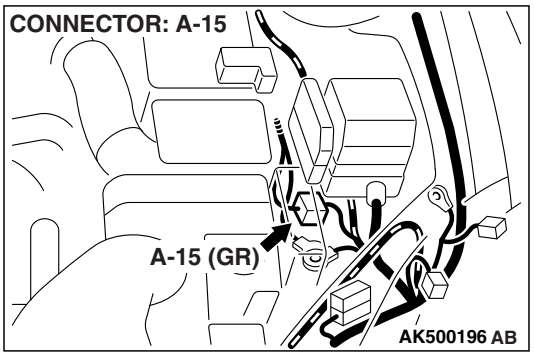
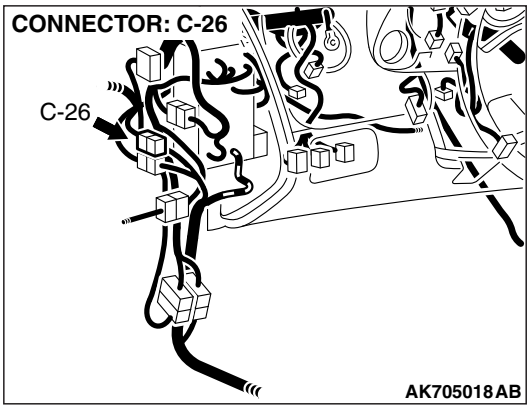










CIRCUIT OPERATION

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

TECHNICAL DESCRIPTION

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

TSB Revision

- The ECM <M/T> or the PCM <A/T> drives the evaporative emission ventilation solenoid. After the solenoid is turned off, the ECM <M/T> or the PCM <A/T> will check if the solenoid coil produces a surge voltage (battery positive voltage + 2 volts).

DESCRIPTIONS OF MONITOR METHODS

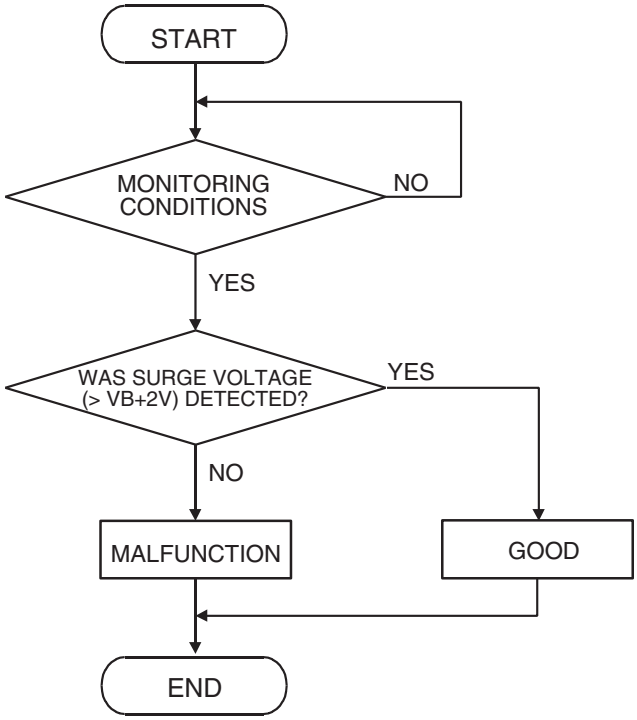
Off-surge does not occur after solenoid is operated on to off.

MONITOR EXECUTION

continuous

DTC SET CONDITIONS

Logic Flow Chart



AK302405

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.

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

- The ECM <M/T> or the PCM <A/T> 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.

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- Evaporative emission ventilation solenoid is ON.
- More than 1 second has elapsed after the above mentioned conditions have been met.

Judgement Criterion

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

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

DIAGNOSIS

Required Special Tools:

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

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

⚠ CAUTION

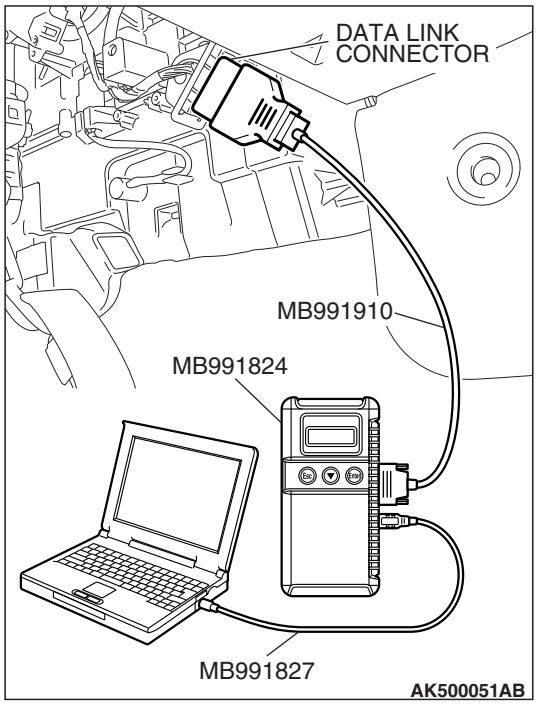
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

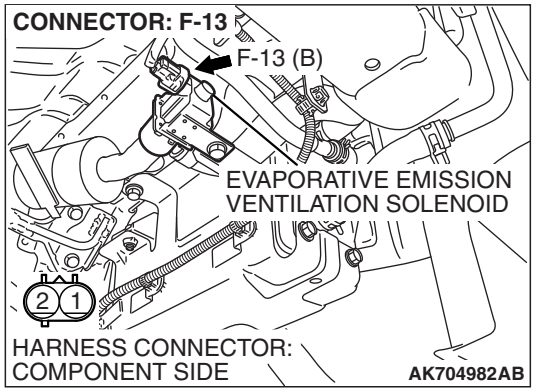
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode for item 15, Evaporative emission ventilation solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative 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.00-14.

NO : Go to Step 2.



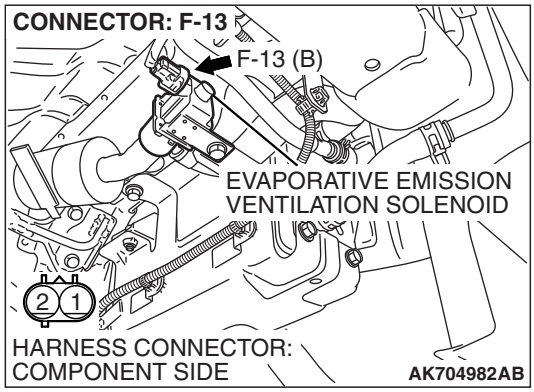


STEP 2. Check harness connector F-13 at the evaporative emission ventilation solenoid for damage.

Q: Is the harness connector in good condition?

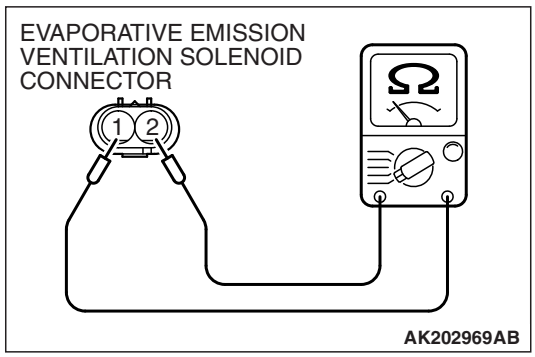
YES : Go to Step 3.

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



STEP 3. Check the evaporative emission ventilation solenoid.

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



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

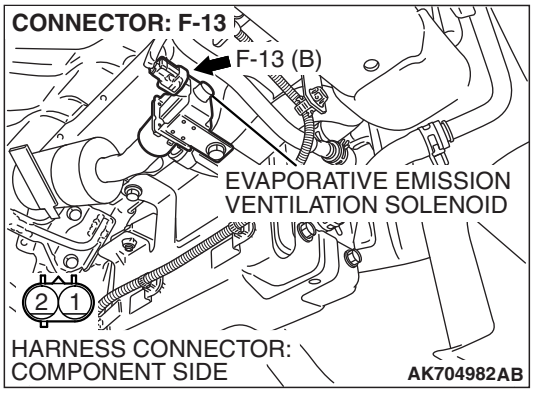
Standard value: 17 – 21 Ω [at 20°C (68°F)]

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

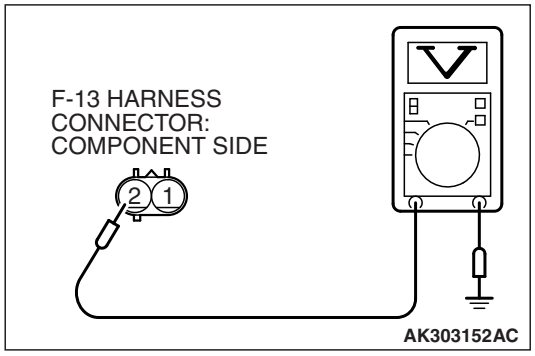
YES : Go to Step 4.

NO : Replace it. Then go to Step 12.

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



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



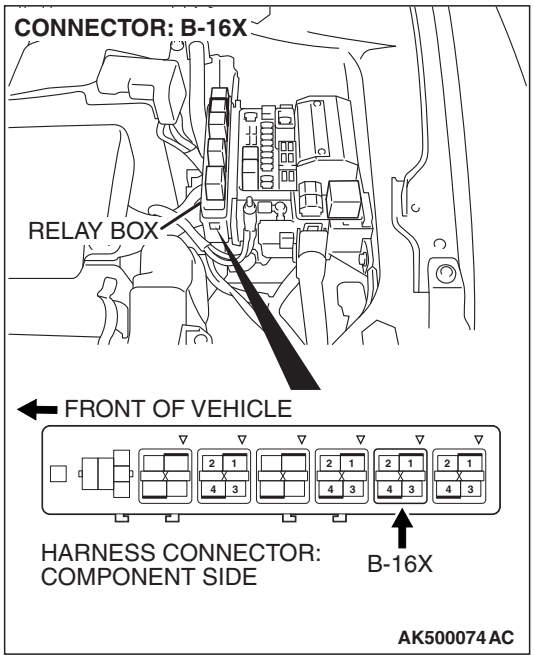
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Check harness connector B-16X at MFI relay for damage.

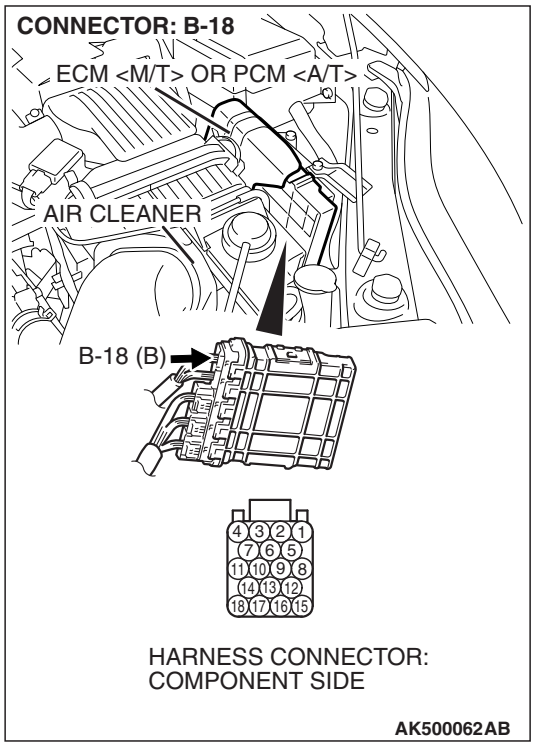


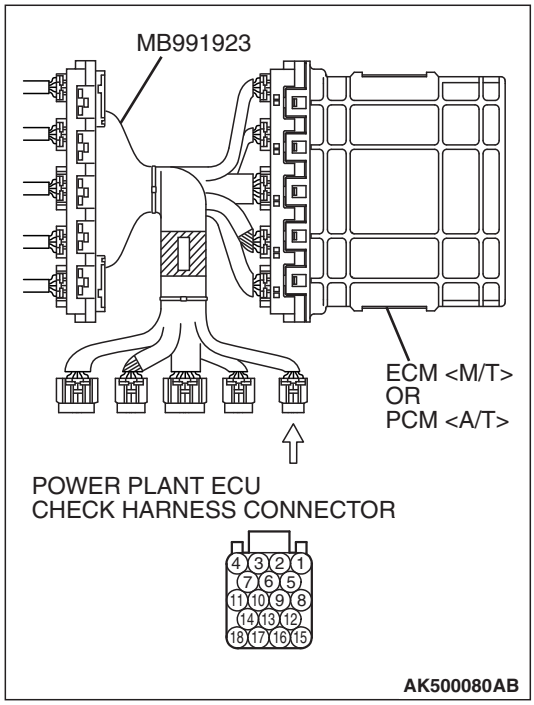
Q: Is the harness connector in good condition?

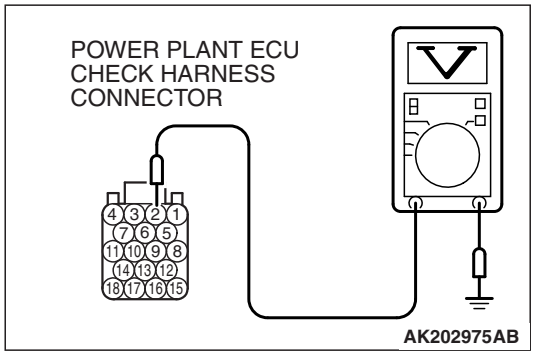
YES : Check connectors A-15 and C-26 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connectors are in good condition, repair harness wire between MFI relay connector B-16X (terminal No. 4) and evaporative emission ventilation solenoid connector F-13 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 6. Measure the power supply voltage at ECM <M/T> or PCM <A/T> connector B-18 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.







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

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

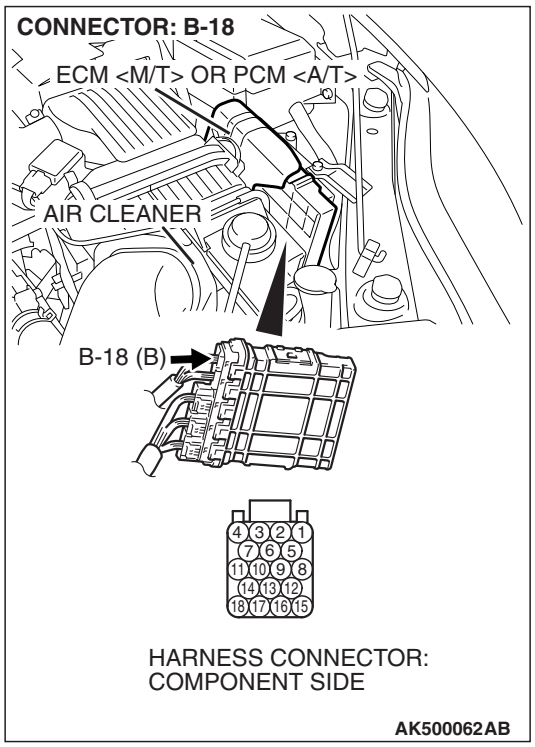
Q: Is battery positive voltage (approximately 12 volts) present?

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

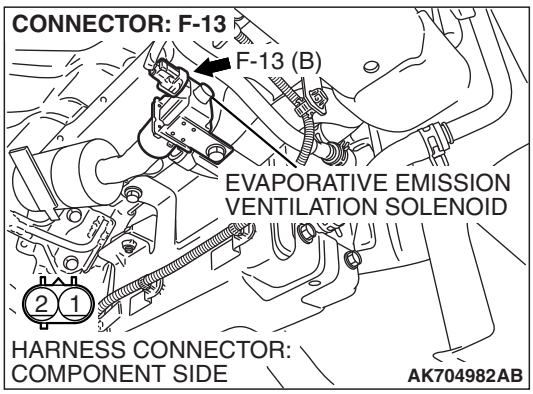
STEP 7. Check harness connector B-18 at ECM <M/T> or PCM <A/T> for damage.

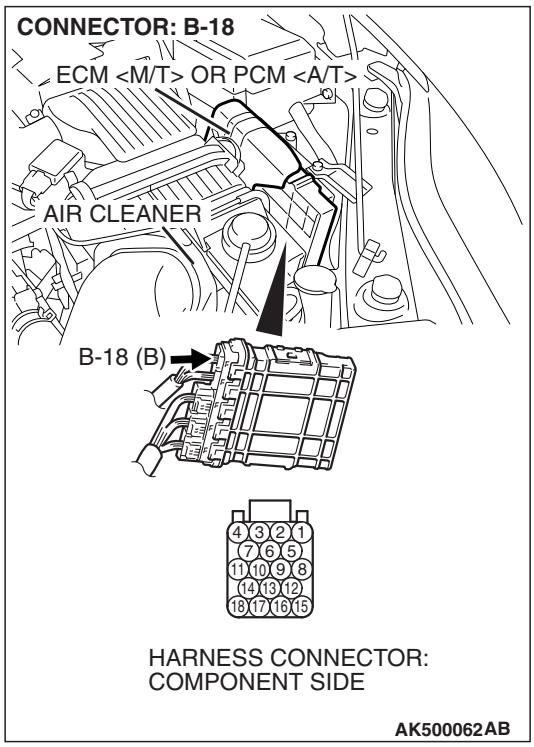
Q: Is the harness connector in good condition?

YES : Go to Step 8.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.



STEP 8. Check for open circuit and short circuit to ground between evaporative emission ventilation solenoid connector F-13 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-18 (terminal No. 2).





NOTE: Check harness after checking intermediate connector C-25. 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 : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 12.

NO : Repair it. Then go to Step 12.

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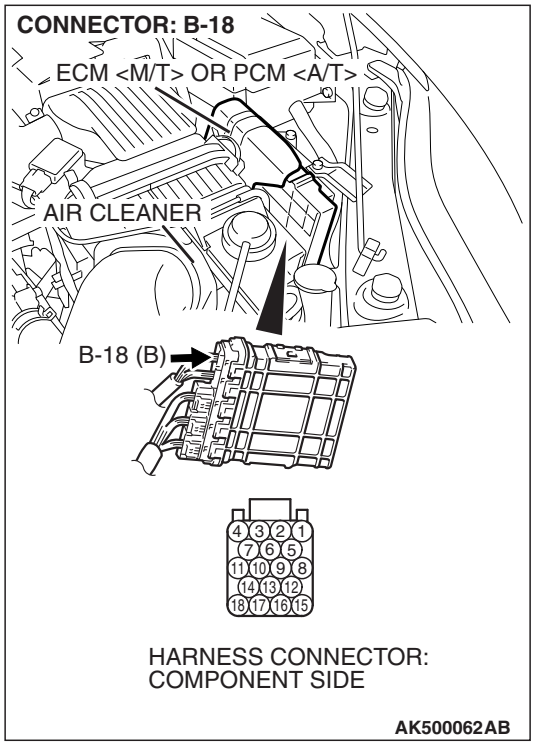


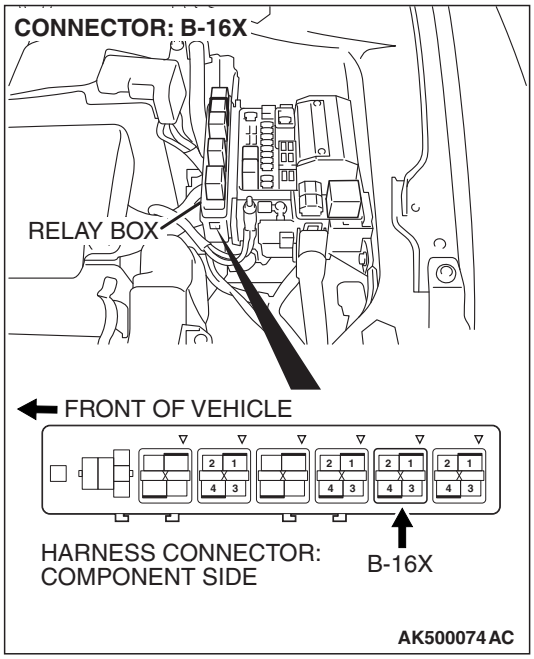
STEP 9. Check harness connector B-18 at ECM <M/T> or PCM <A/T> for damage.

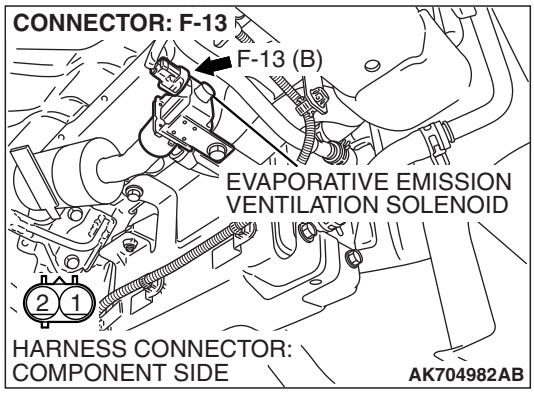
Q: Is the harness connector in good condition?

YES : Go to Step 10.

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

STEP 10. Check for harness damage between MFI relay connector B-16X (terminal No. 4) and evaporative emission ventilation solenoid connector F-13 (terminal No. 2).





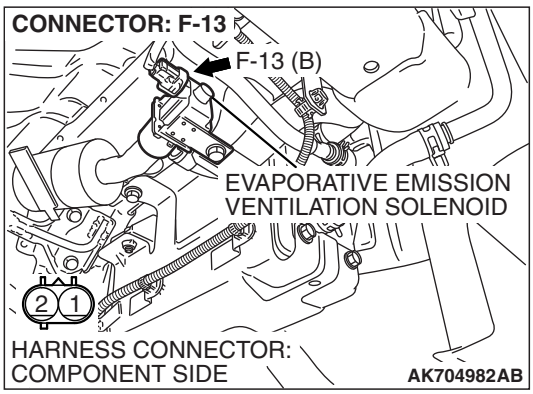
NOTE: Check harness after checking intermediate connectors A-15 and C-26. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

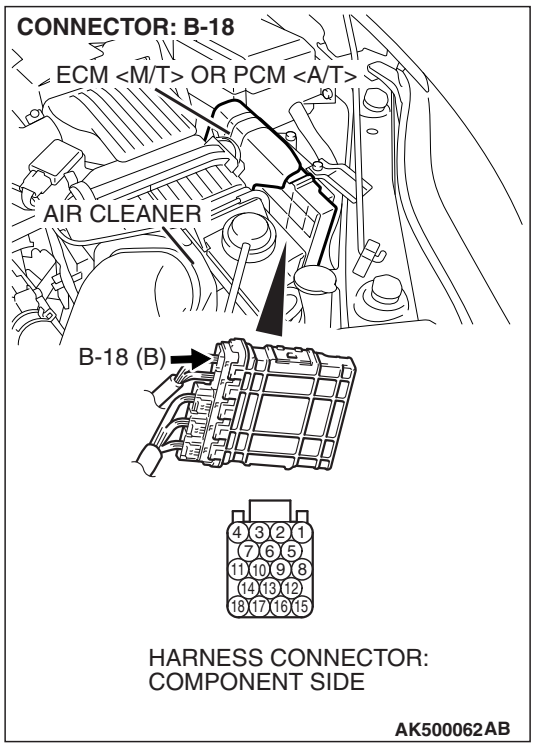
Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it. Then go to Step 12.

STEP 11. Check for harness damage between evaporative emission ventilation solenoid connector F-13 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-18 (terminal No. 2).





NOTE: Check harness after checking intermediate connector C-25. 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 : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 12.

NO : Repair it. Then go to Step 12.

STEP 12. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

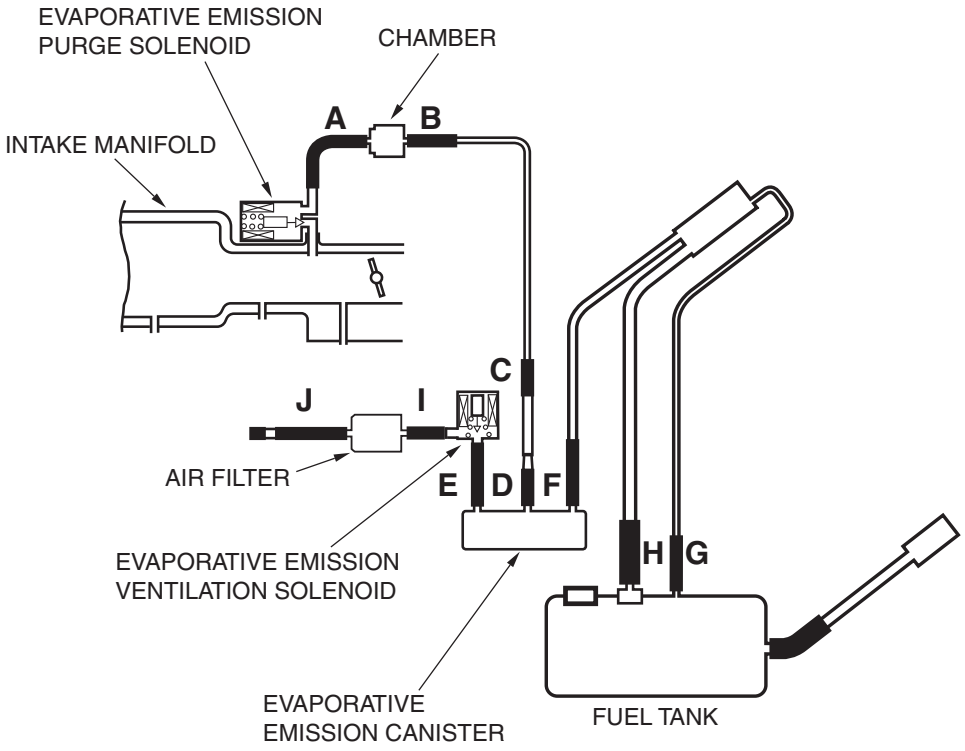
Q: Is DTC P0446 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

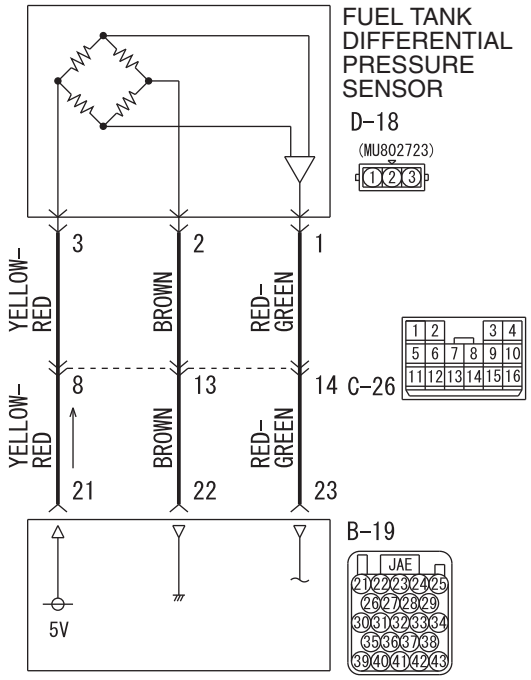
DTC P0450: Evaporative Emission Control System Pressure Sensor Malfunction

System Diagram



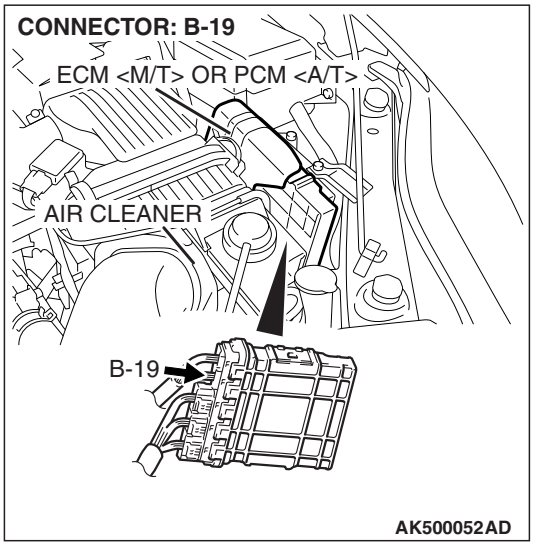
AK802719 AB

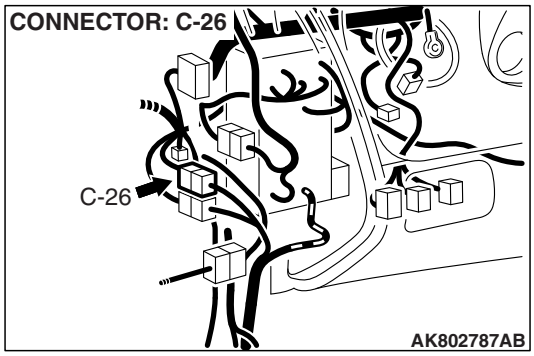
Fuel Tank Differential Pressure Sensor Circuit

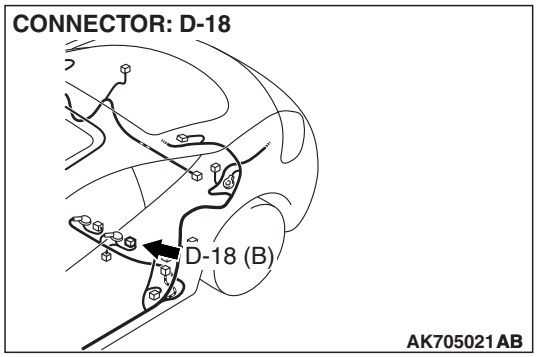


ECM <M/T> OR PCM <A/T>

AC406365AB
W6P13M000A







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CIRCUIT OPERATION

- The ECM <M/T> or PCM <A/T> (terminal 21) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal 3). The fuel tank differential pressure sensor (terminal 2) is grounded through the ECM <M/T> or PCM <A/T> (terminal 22).
- The fuel tank differential pressure sensor (terminal 1) returns a voltage signal to the ECM <M/T> or PCM <A/T> (terminal 23) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor output voltage.
- The ECM <M/T> or PCM <A/T> determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Continuous.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

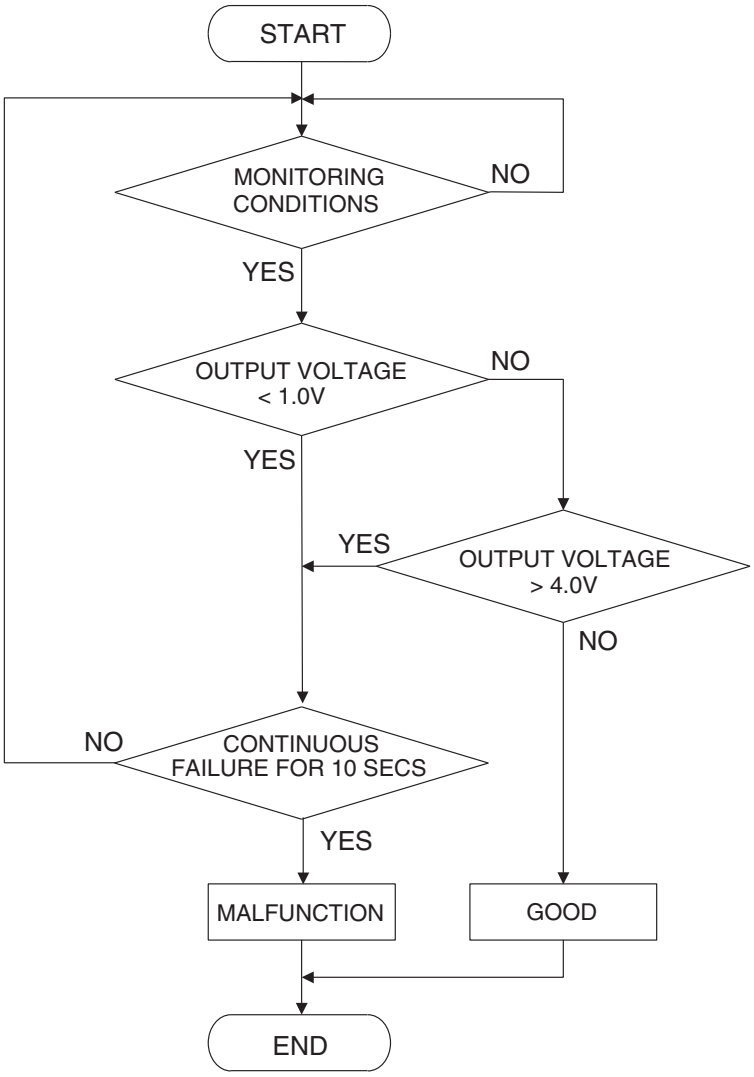
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RATIONALITY - HIGH/LOW



AC401446

DTC SET CONDITIONS

Check Conditions

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

Judgement Criterion

- When the evaporative emission purge solenoid is off, the fuel differential pressure sensor output voltage remains 1.0 volt or less for ten seconds.

Check Conditions

- Intake air temperature is between 5°C (41°F) and 45°C (113°F) or greater.
- Engine speed is 1,594 r/min or greater.
- Volumetric efficiency is between 20 and 70 percent.

Judgement Criterion

- When the evaporative emission purge solenoid valve is fully operational (100 percent ratio), the fuel differential pressure sensor output voltage remains at 4.0 volts or greater for ten seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6.

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

- Malfunction of the fuel tank differential pressure sensor.

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

OVERVIEW OF TROUBLESHOOTING

- DTC P0450 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> failure.
- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (TANK PRS SNSR 73). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

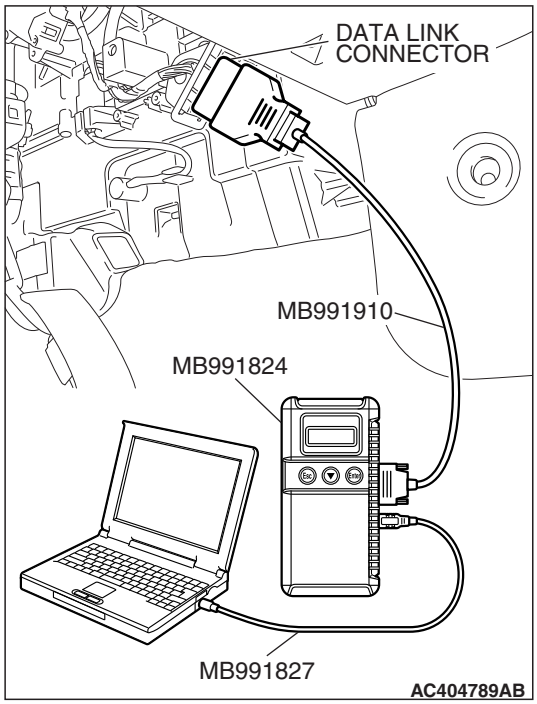
Required Special Tools:

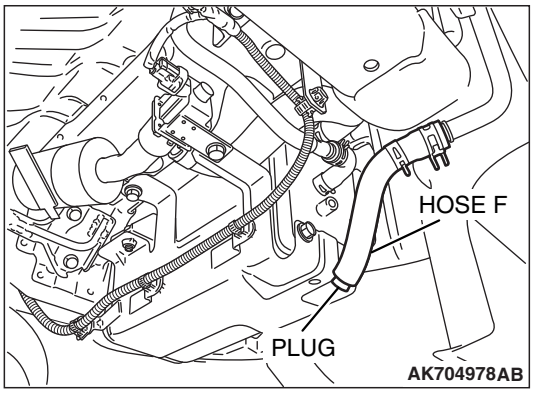
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991658: Test Harness Set
- MB991923: Power Plant ECU Check Harness

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

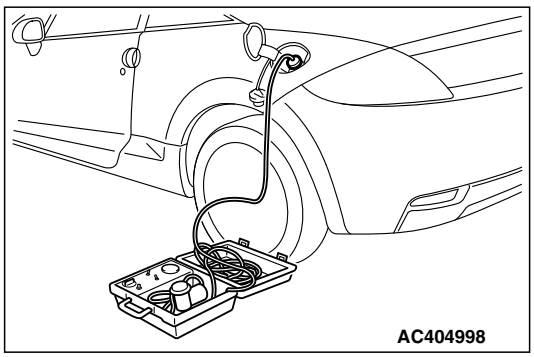
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
- The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

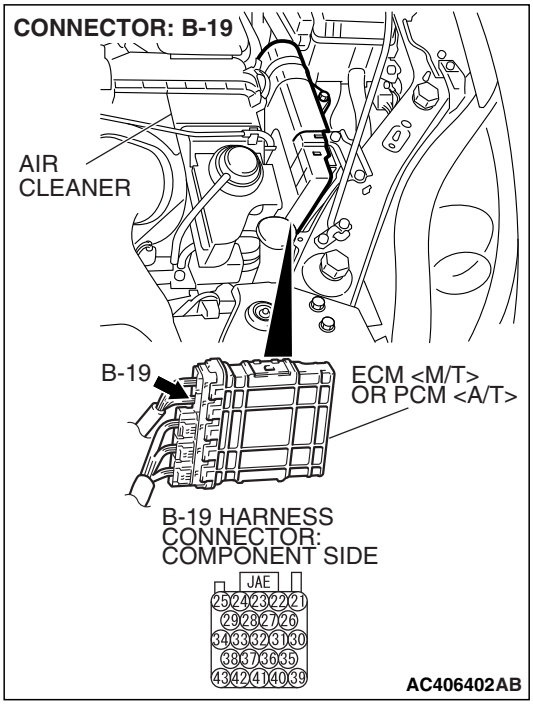
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

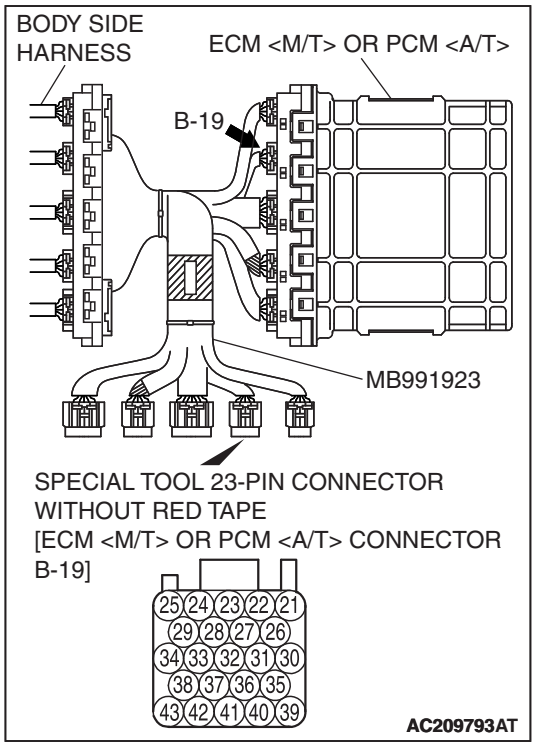
NO : Go to Step 2.

TSB Revision

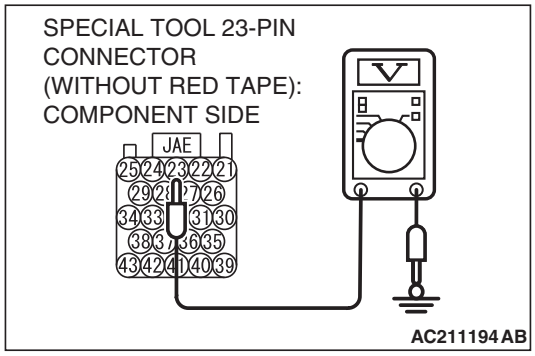
STEP 2. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 23 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

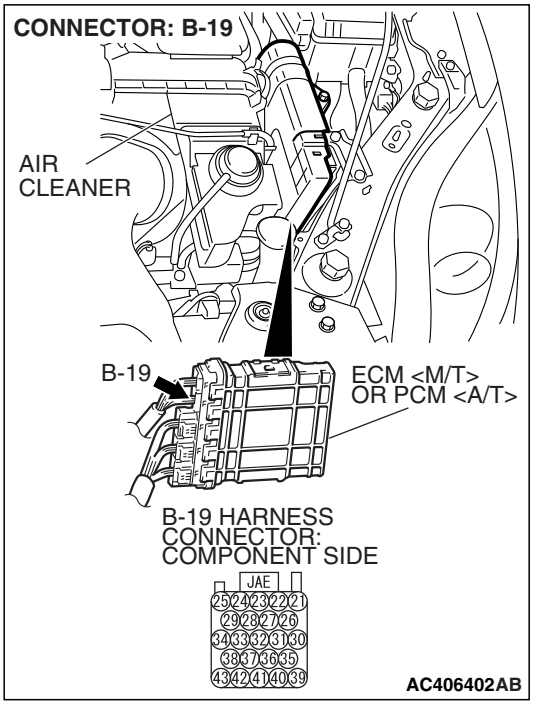
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

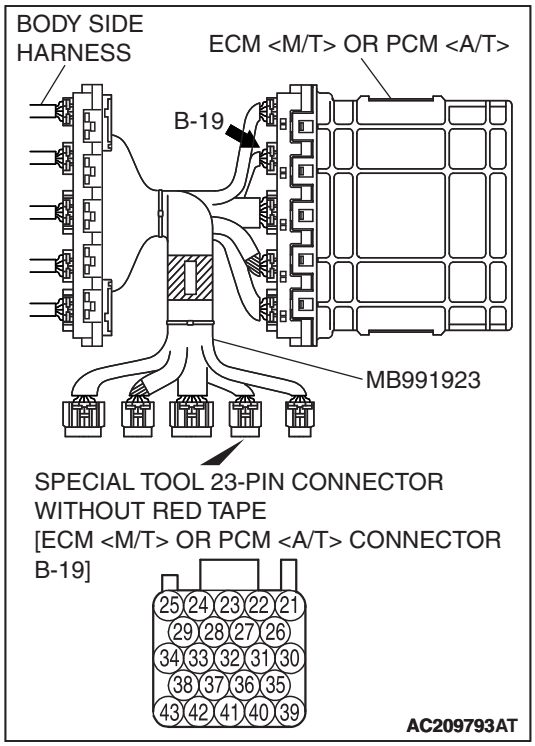
Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 16.
NO : Go to Step 3.

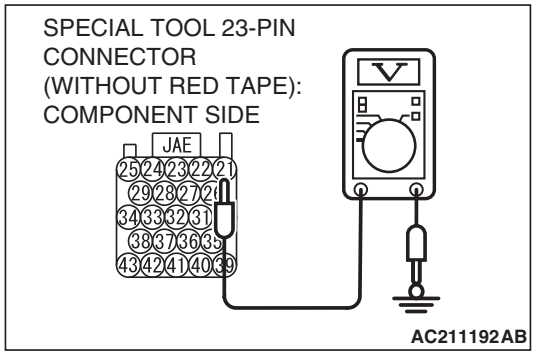
STEP 3. Measure the 5-volt reference signal at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between terminal 21 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

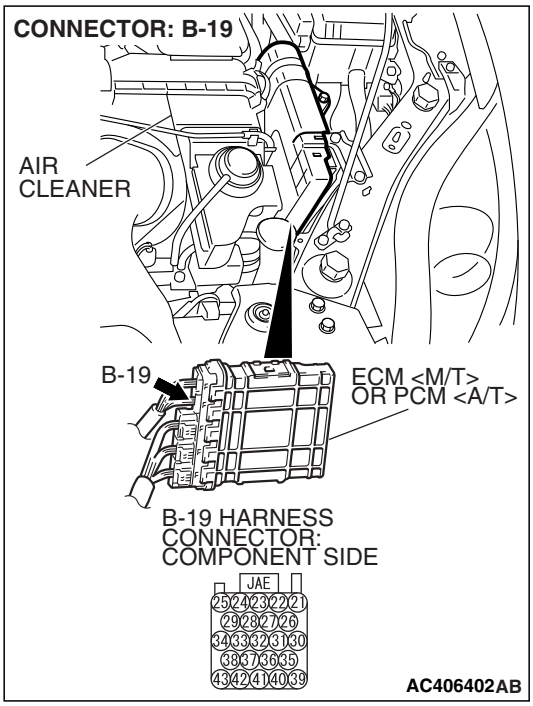
Q: Is the measured voltage between 4.9 and 5.1 volts?

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

STEP 4. Check ECM <M/T> or PCM <A/T> connector B-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

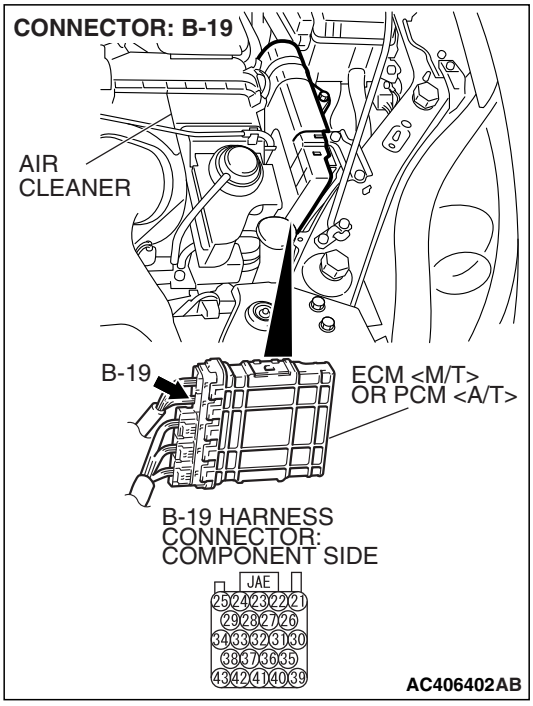
Q: Are the connector and terminals in good condition?

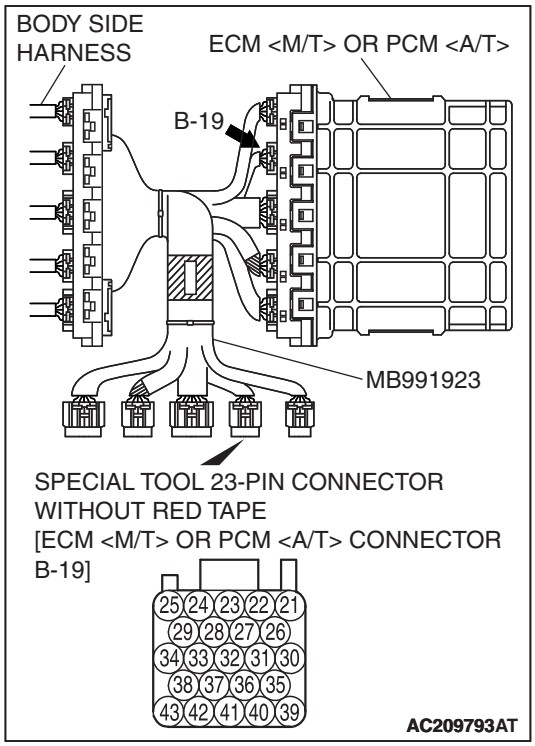
YES : Go to Step 16.
NO : Repair or replace the faulty components. (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.



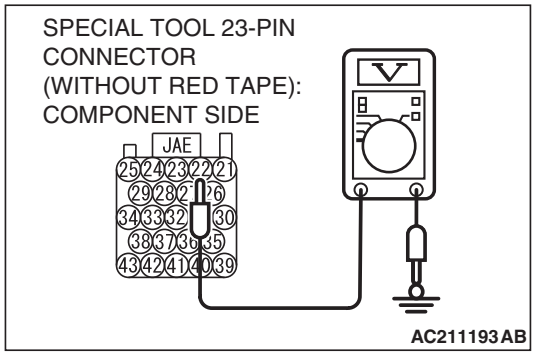
STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 22 and ground.
- The voltage should measure 0.5 volt or less.

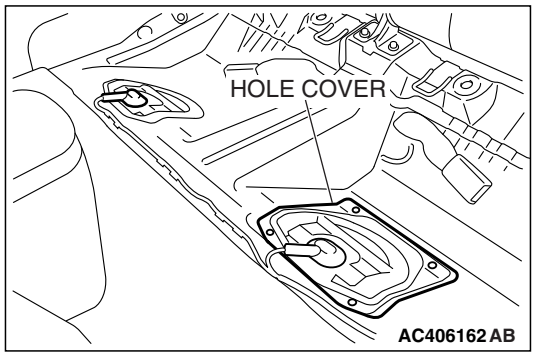
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

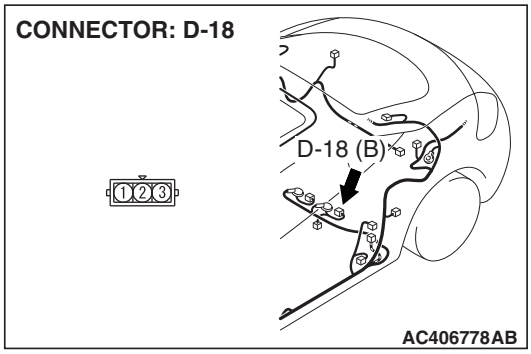
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 6.
NO : Go to Step 9.

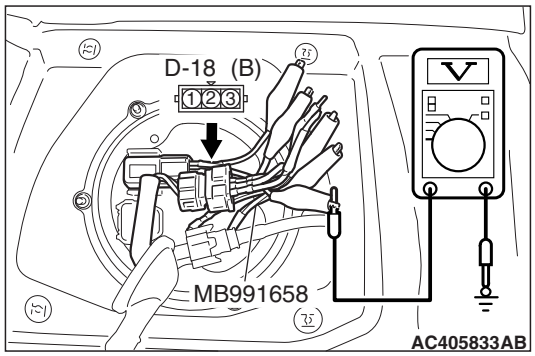
STEP 6. Measure the signal voltage at intermediate connector D-18.

(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).
(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.
(5) Turn the ignition switch to the "ON" position.
(6) Remove the fuel cap.
(7) Measure the voltage between connector D-18 terminal 1 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

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

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

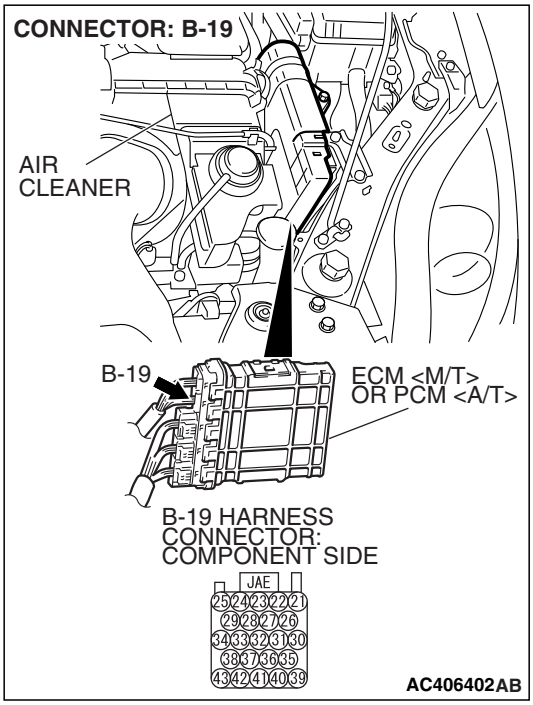
YES : Go to Step 7.
NO : Go to Step 15.

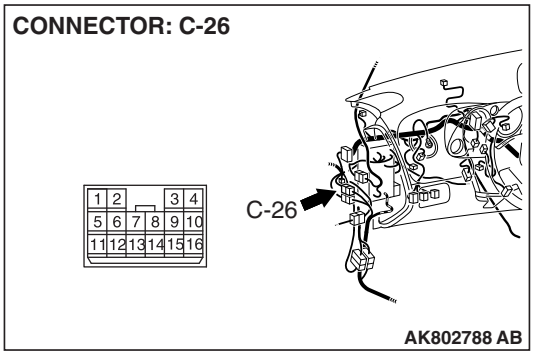
STEP 7. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

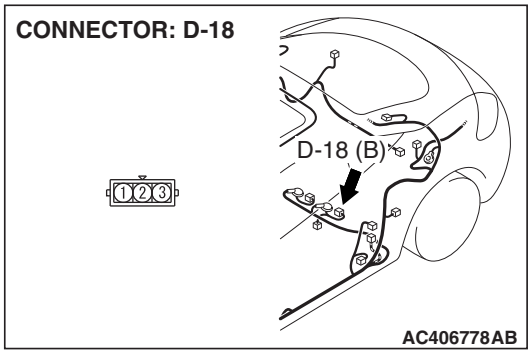
Q: Are the connectors and terminals in good condition?

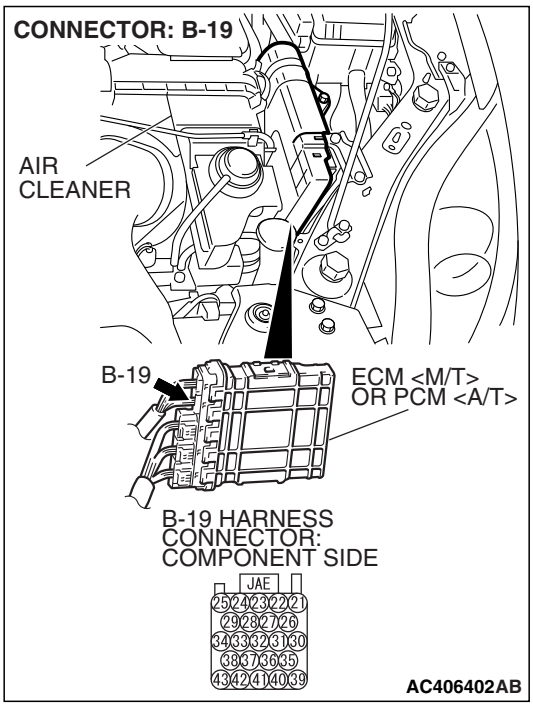
YES : Go to Step 8.

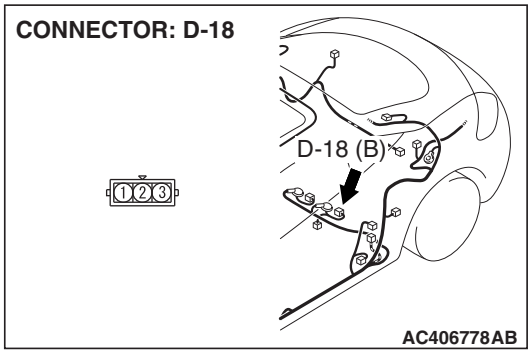
NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.











STEP 8. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 23 and fuel tank differential pressure sensor connector D-18 terminal 1 for damage.

Q: Is the harness wire in good condition?

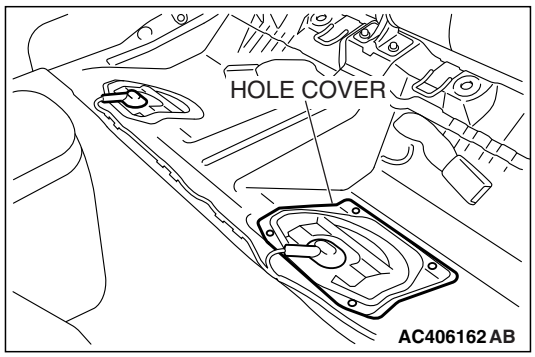
YES : This malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

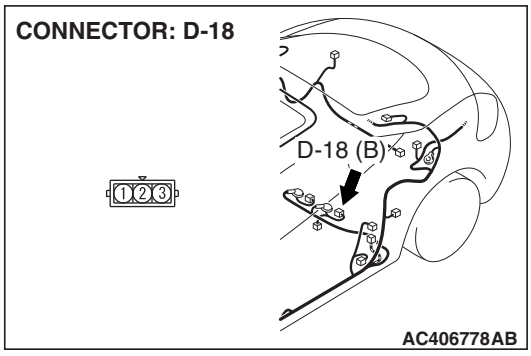
NO : Repair the damaged harness wire. Then go to Step 17.

STEP 9. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-18.

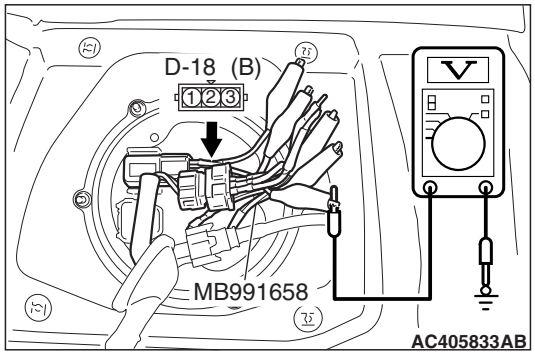
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

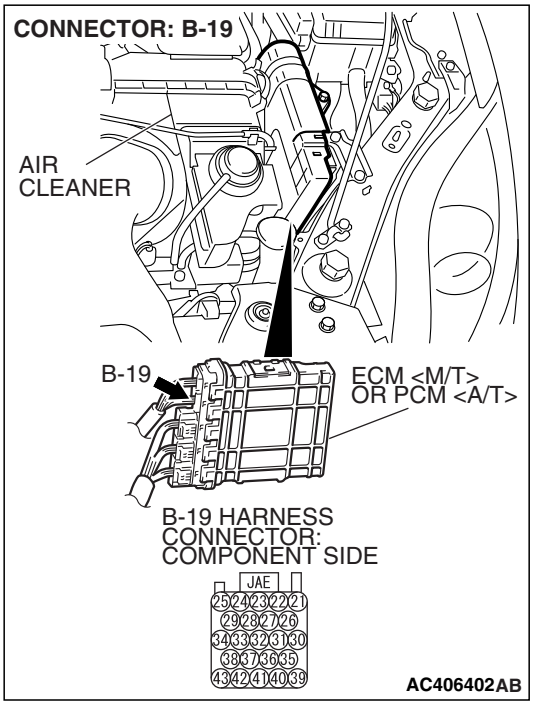
(6) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

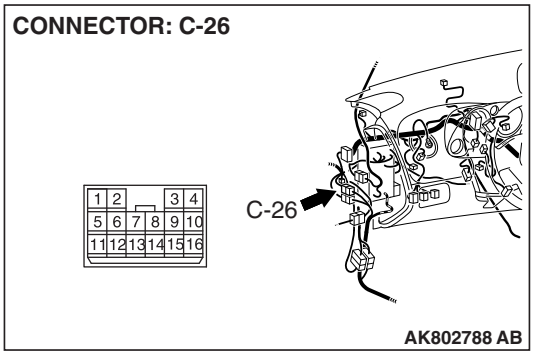
(7) Turn the ignition switch to the "LOCK" (OFF) position.

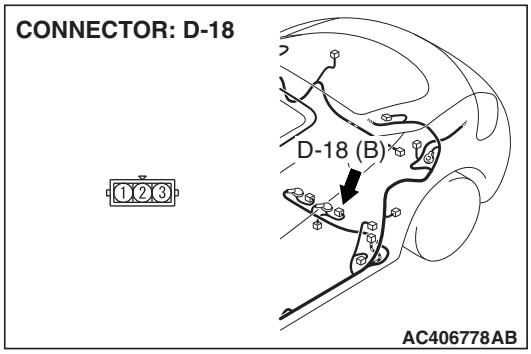
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 12.

NO : Go to Step 10.





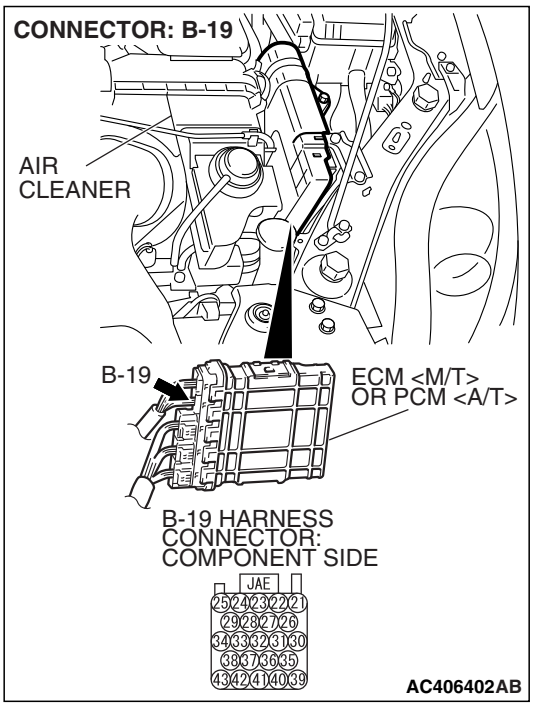


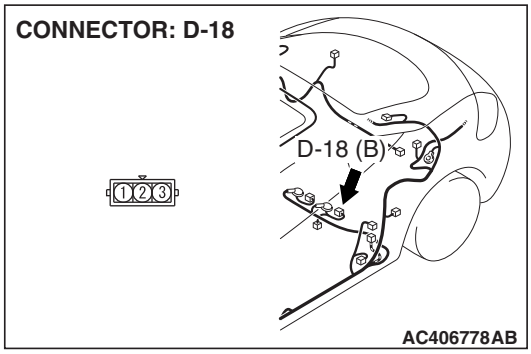
STEP 10. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.





STEP 11. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 21 and fuel tank differential pressure sensor connector D-18 terminal 3 for damage.

Q: Are the harness wires in good condition?

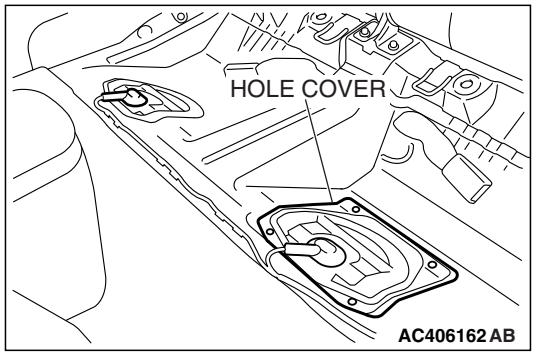
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Repair the damaged harness wires. Then go to Step 17.

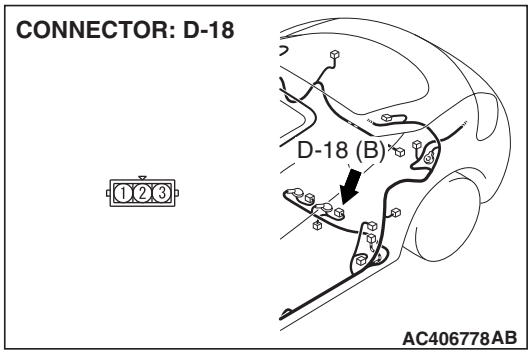
STEP 12. Measure the fuel tank differential pressure sensor return voltage at fuel tank differential pressure sensor connector D-18.

(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.



(3) Disconnect fuel tank differential pressure sensor connector D-18.

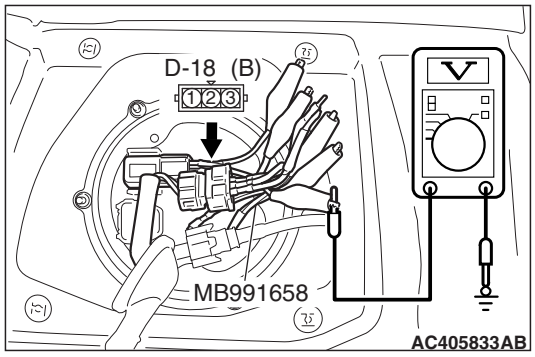


(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

(6) Measure the voltage between terminal 2 and ground.
- The voltage should measure 0.5 volt or less.

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



Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

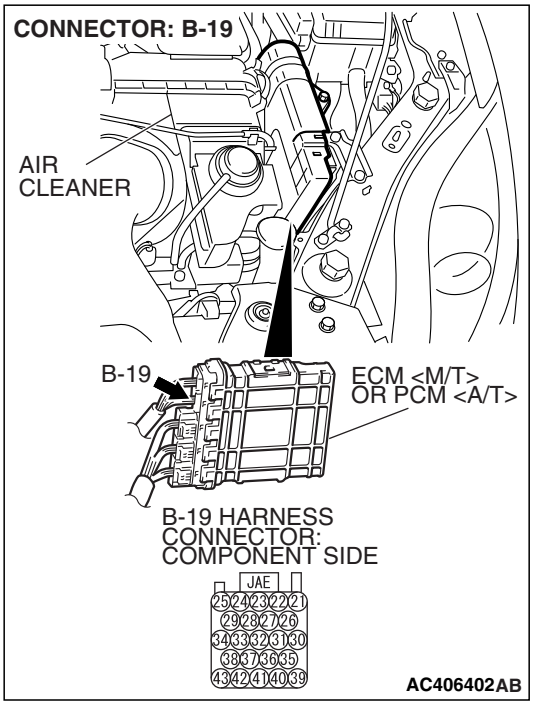
NO : Go to Step 17.

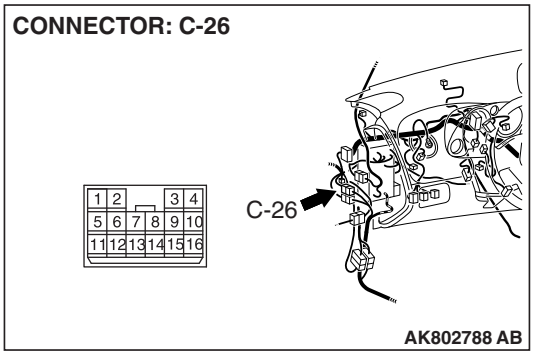
STEP 13. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

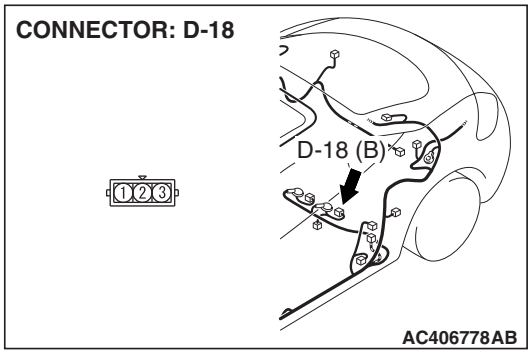
Q: Are the connectors and terminals in good condition?

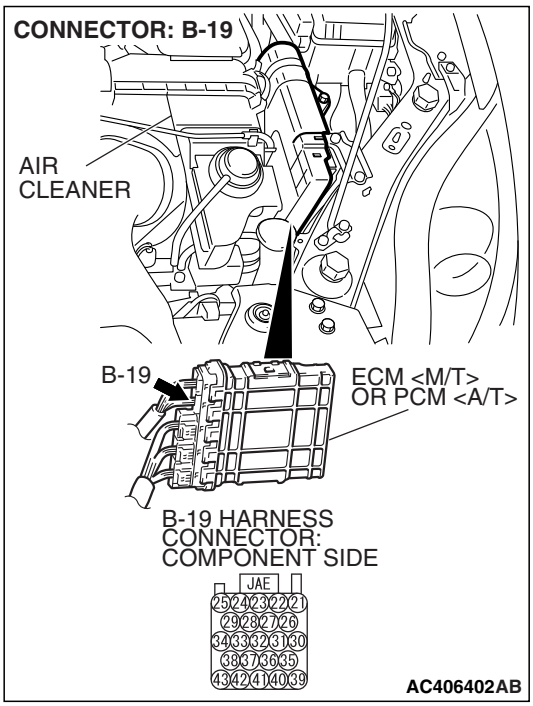
YES : Go to Step 14.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.







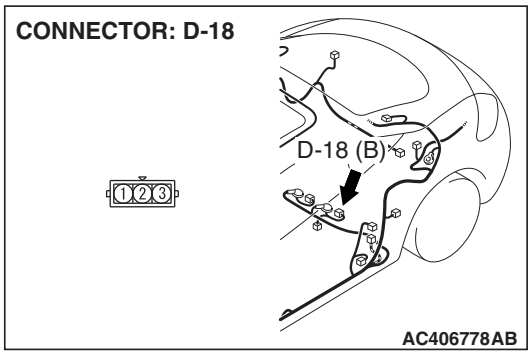


STEP 14. Check the harness wires between ECM <M/T> or PCM <A/T> connector B-19 terminal 22 and fuel tank differential pressure sensor connector D-18 terminal 2 for damage.

Q: Are the harness wires in good condition?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Repair the damaged harness wires. Then go to Step 17.

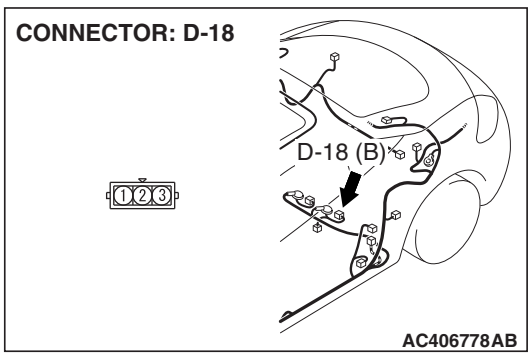


STEP 15. Check fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor. Then go to Step 17.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.

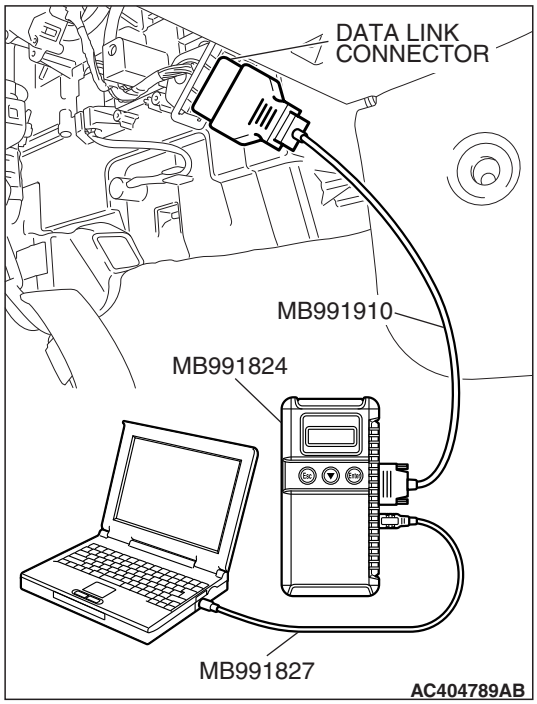


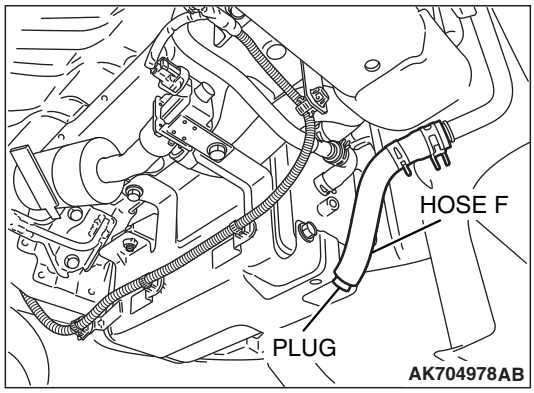
STEP 16. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

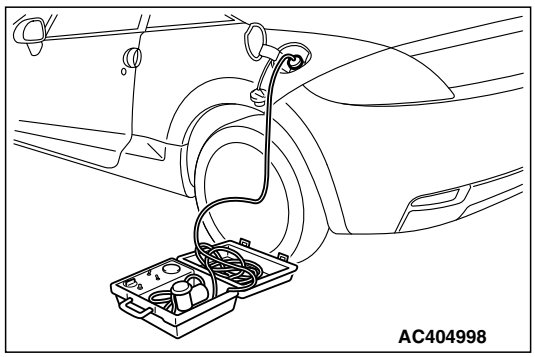
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
    - Item 52, Fuel Tank Differential Pressure Sensor.
        - The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
    - The fuel tank pressure reading should increase.
(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

STEP 17. Perform the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6).

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

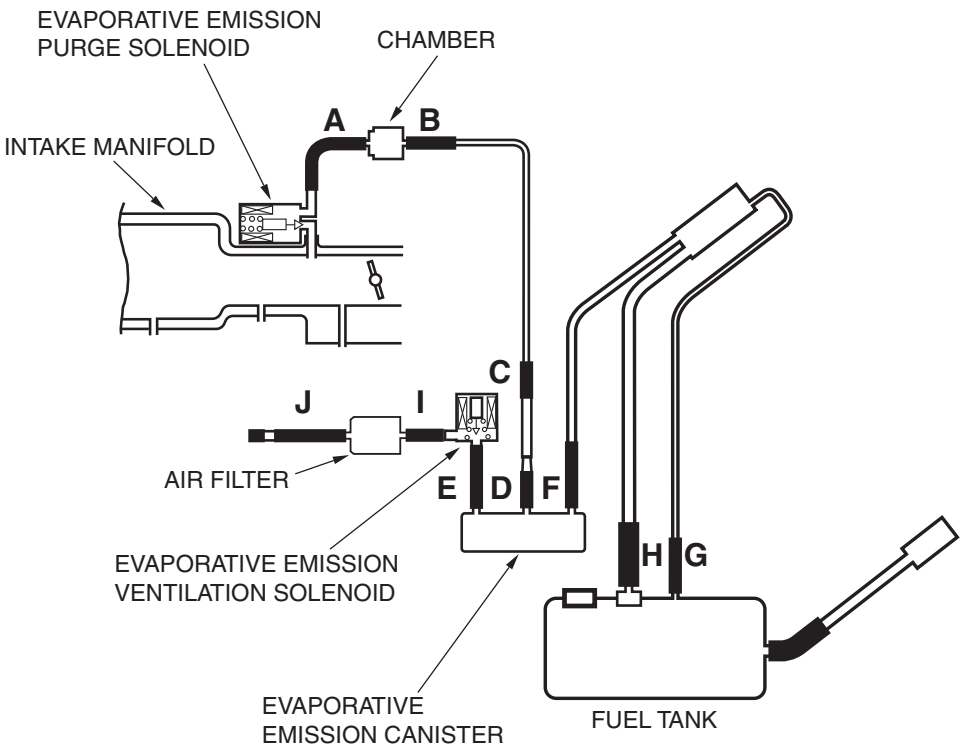
Q: Is DTC P0450 set?

YES : Repeat the troubleshooting from Step 2.

NO : The procedure is complete.

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

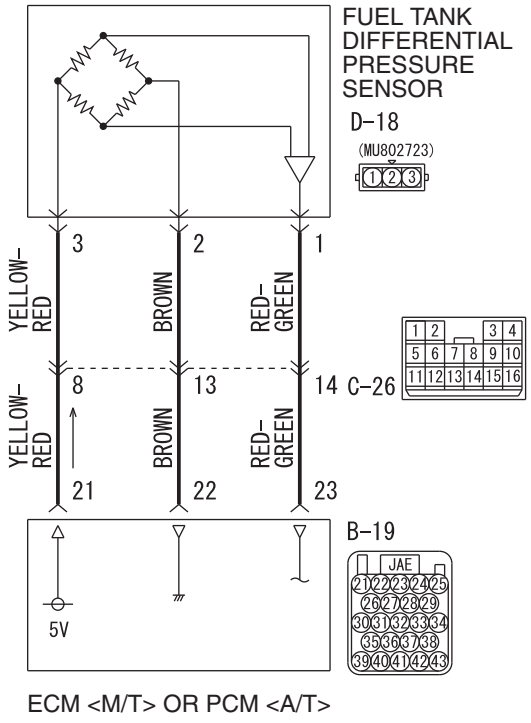
System Diagram



AK802719 AB

TSB Revision

Fuel Tank Differential Pressure Sensor Circuit



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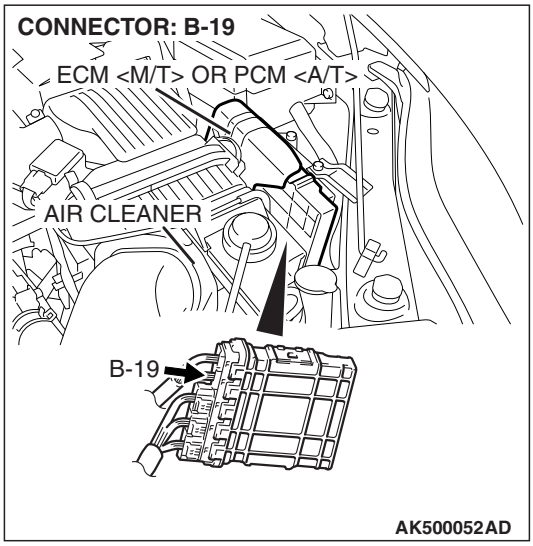
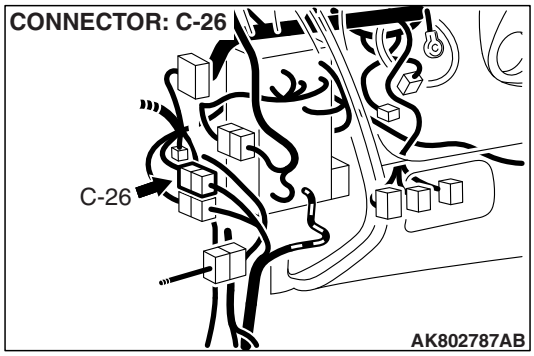
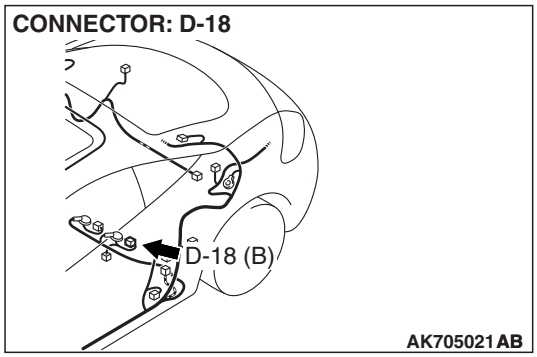






TSB Revision

CIRCUIT OPERATION

- The ECM <M/T> or PCM <A/T> (terminal 21) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal 3). The fuel tank differential pressure sensor (terminal 2) is grounded through the ECM <M/T> or PCM <A/T> (terminal 22).
- The fuel tank differential pressure sensor (terminal 1) returns a voltage signal to the ECM <M/T> or PCM <A/T> (terminal 23) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor signal voltage.
- The ECM <M/T> or PCM <A/T> determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Continuous.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

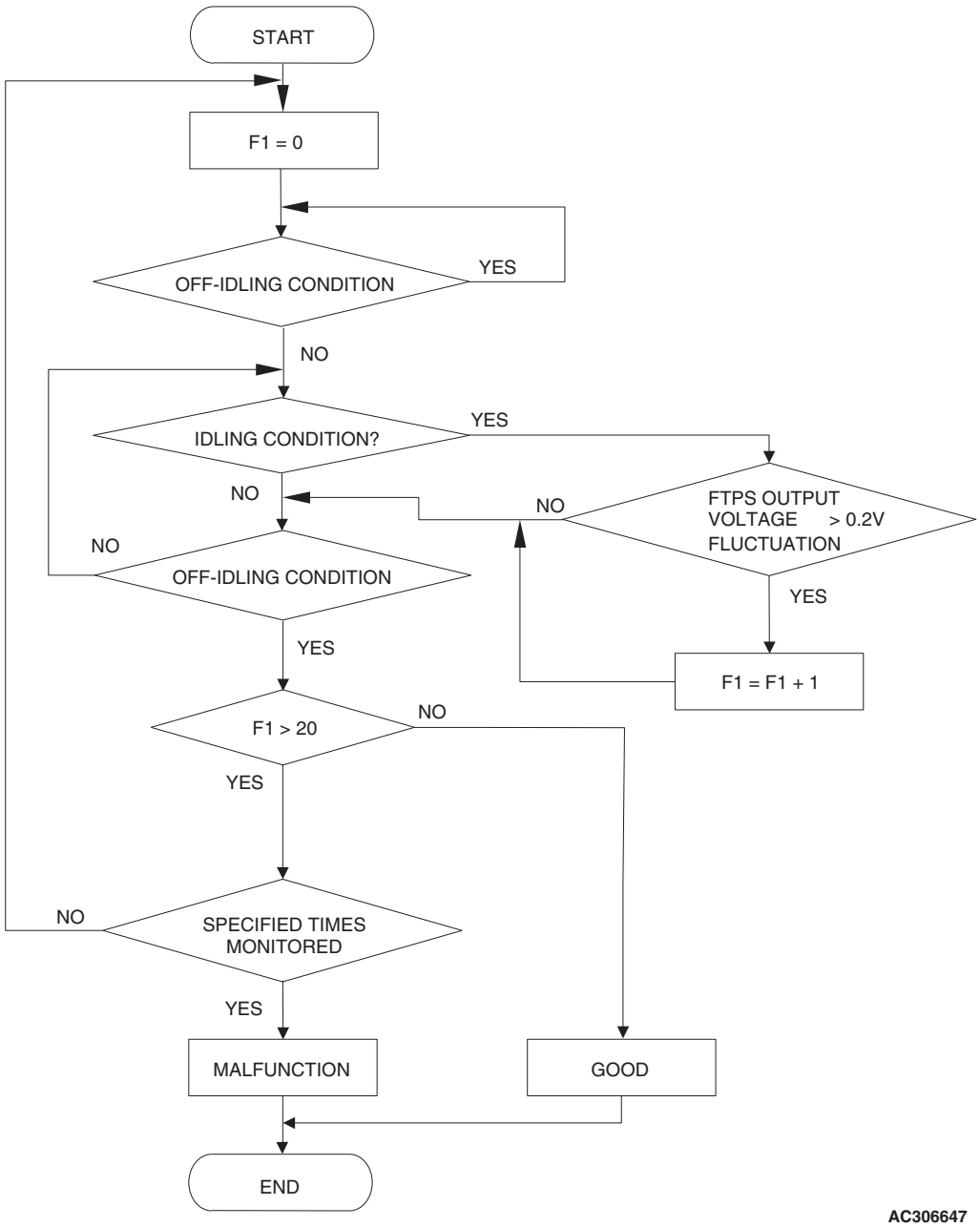
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RATIONALITY - NOISE



DTC SET CONDITIONS

Check Conditions

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

Judgement Criteria

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

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

TSB Revision

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

- *Vehicle speed is 50 km/h (31 mph) or greater.*

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 16 P.13B-6.

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

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

OVERVIEW OF TROUBLESHOOTING

- DTC P0451 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> failure.
- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (TANK PRS SNSR 73). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

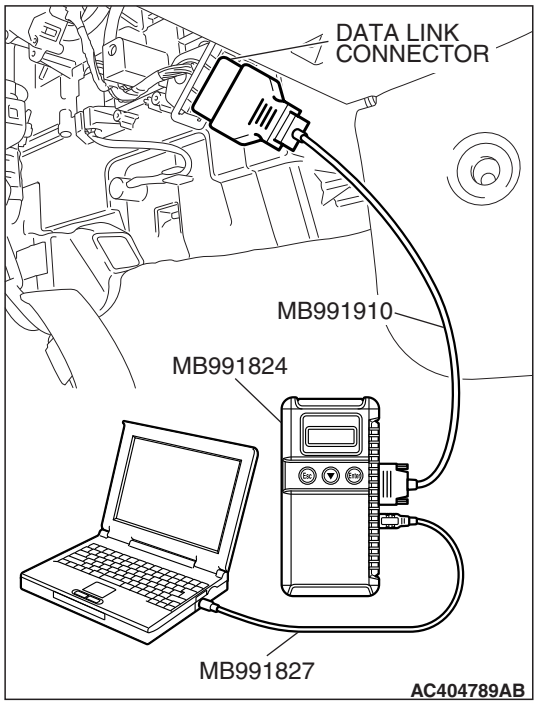
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991658: Test Harness Set
- MB991923: Power Plant ECU Check Harness

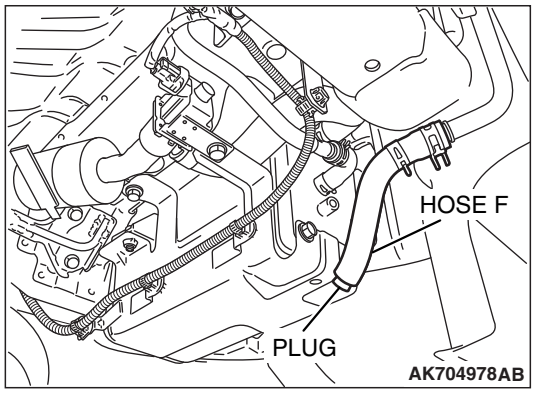
STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

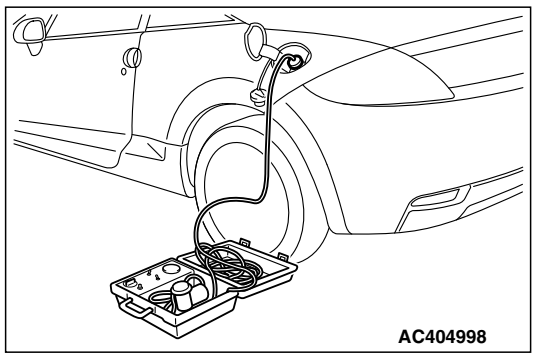
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
- The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

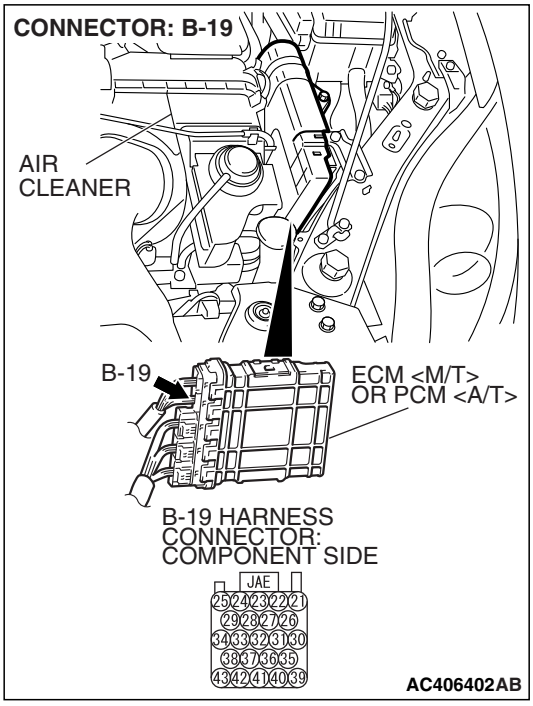
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

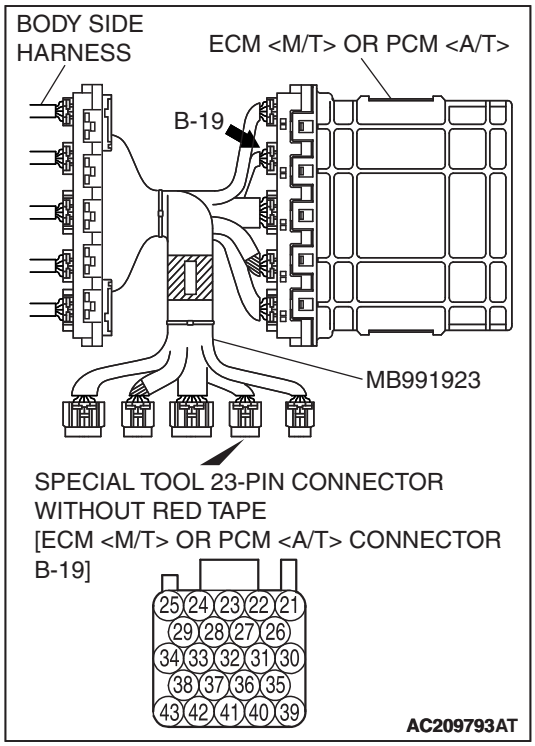
NO : Go to Step 2.

TSB Revision

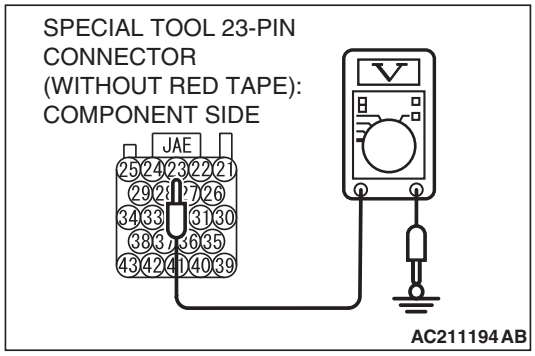
STEP 2. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 23 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

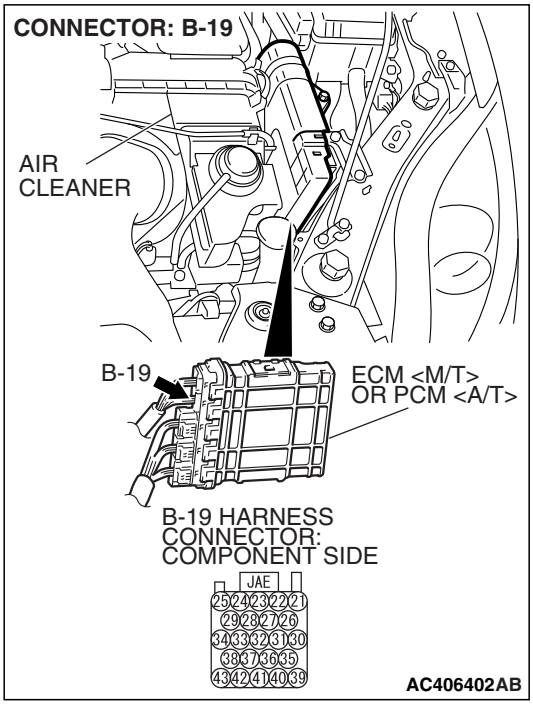
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

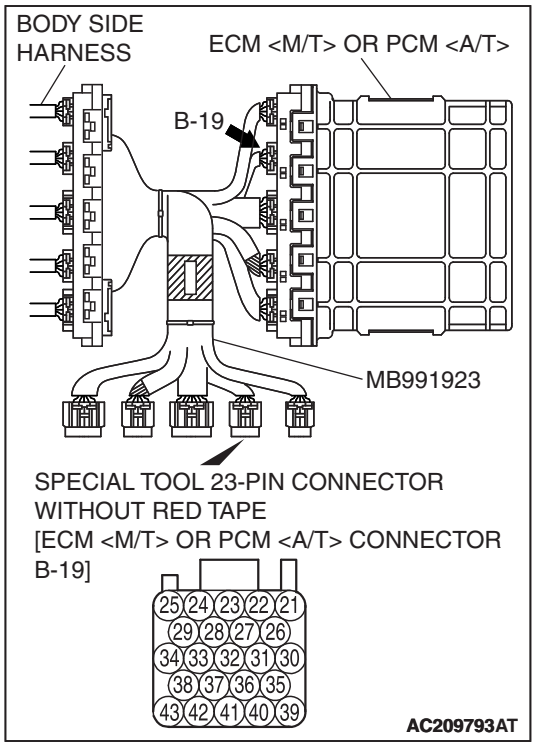
Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 16.
NO : Go to Step 3.

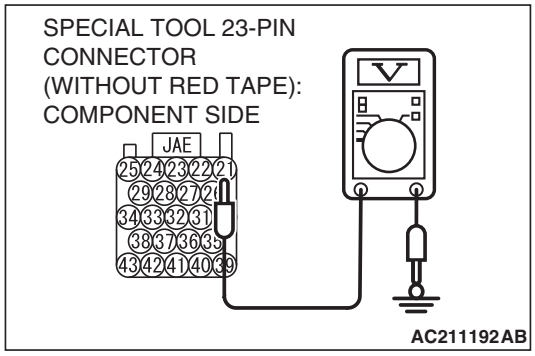
STEP 3. Measure the 5-volt reference signal at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between terminal 21 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

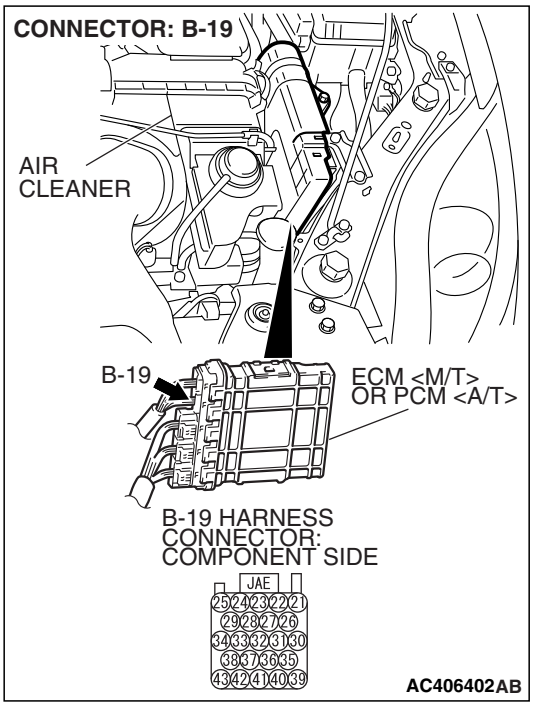
Q: Is the measured voltage between 4.9 and 5.1 volts?

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

STEP 4. Check ECM <M/T> or PCM <A/T> connector B-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

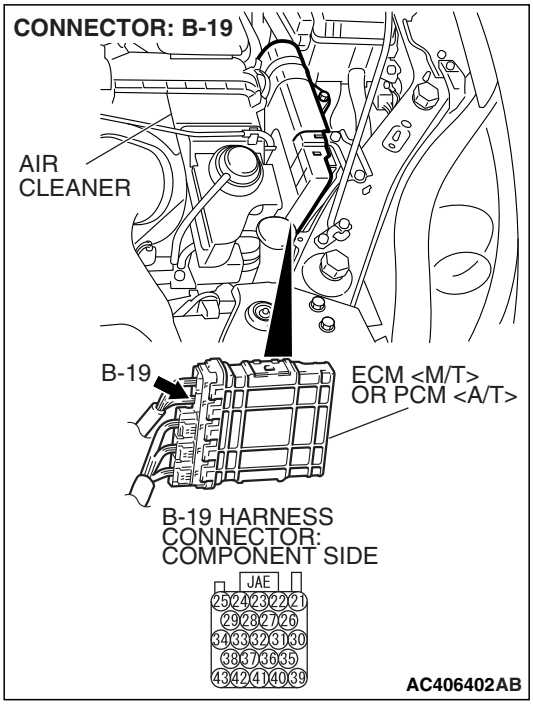
Q: Are the connector and terminals in good condition?

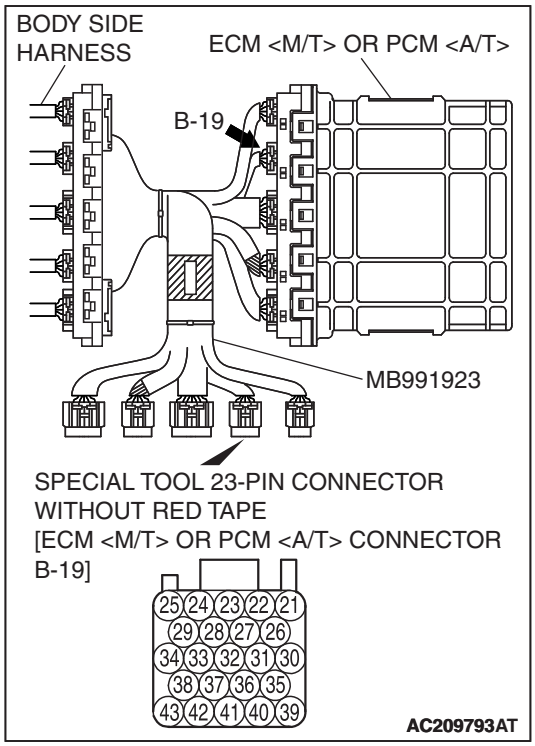
YES : Go to Step 16.
NO : Repair or replace the faulty components. (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.



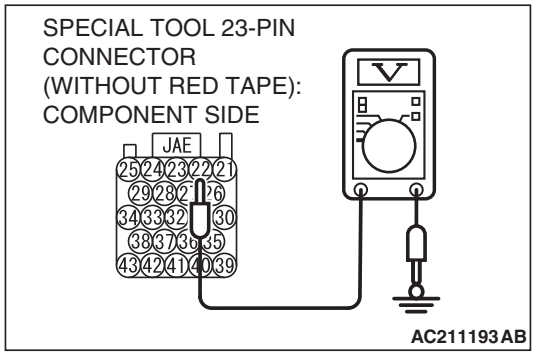
STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 22 and ground.
- The voltage should measure 0.5 volt or less.

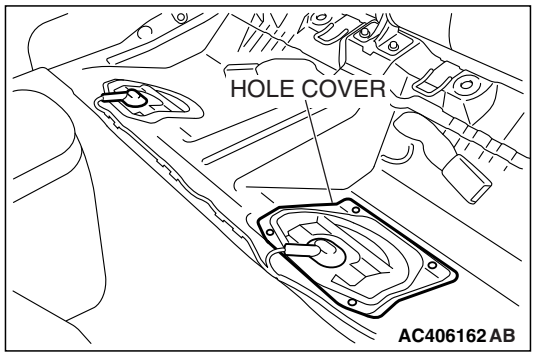
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

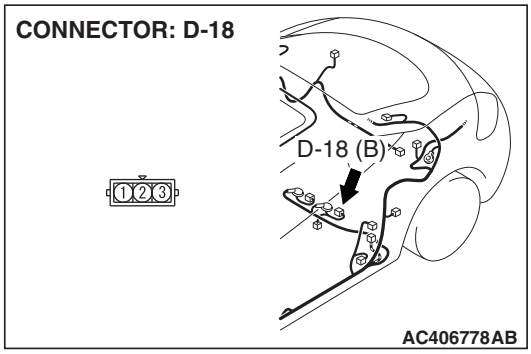
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 6.
NO : Go to Step 9.

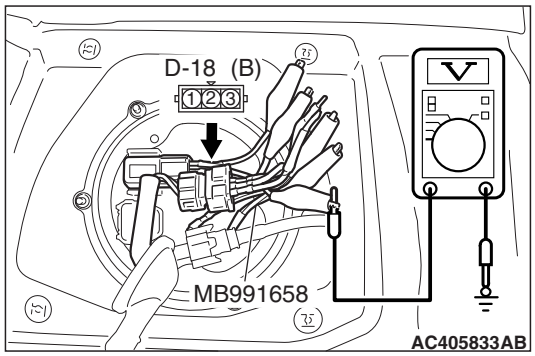
STEP 6. Measure the signal voltage at intermediate connector D-18.

(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).
(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.
(5) Turn the ignition switch to the "ON" position.
(6) Remove the fuel cap.
(7) Measure the voltage between connector D-18 terminal 1 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

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

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

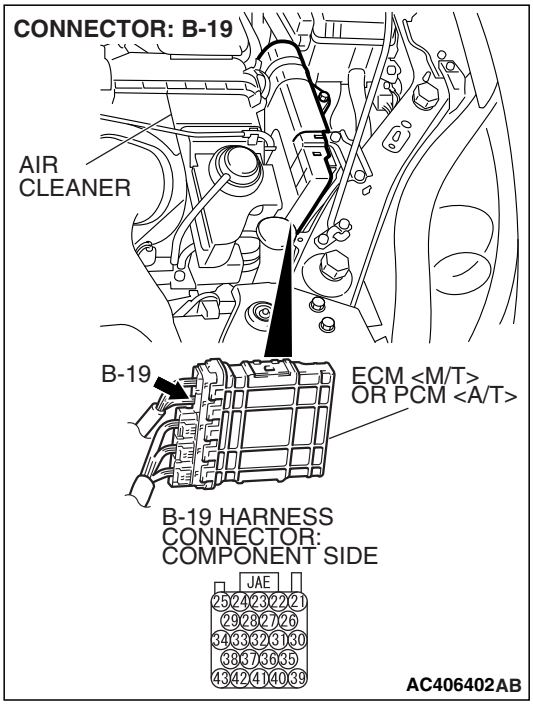
YES : Go to Step 7.
NO : Go to Step 15.

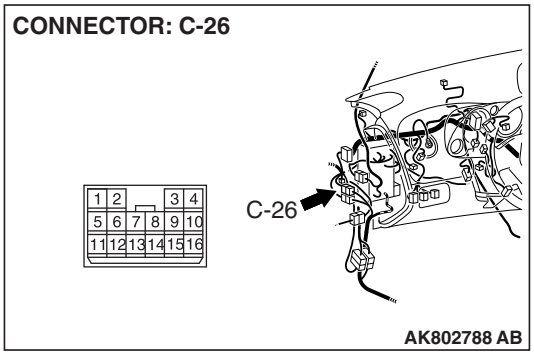
STEP 7. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

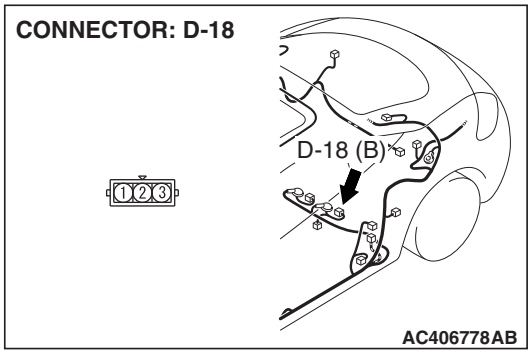
Q: Are the connectors and terminals in good condition?

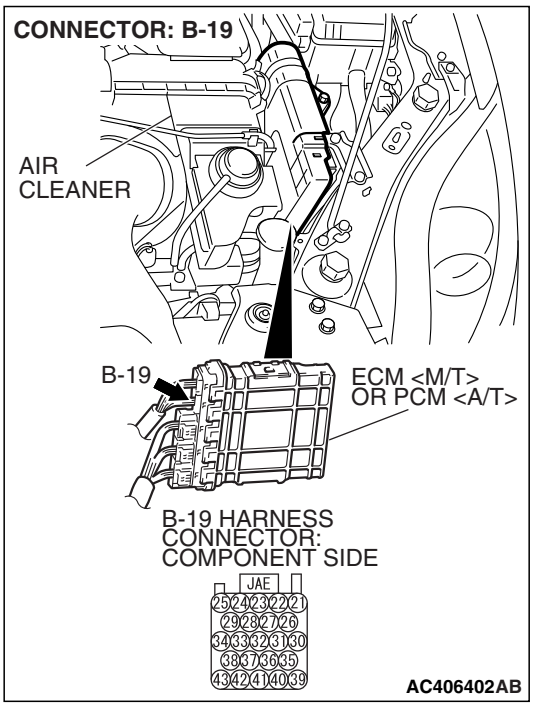
YES : Go to Step 8.

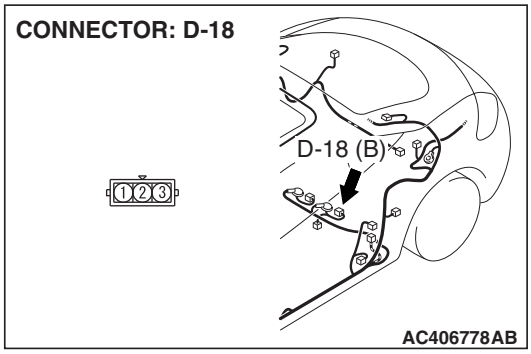
NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.











STEP 8. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 23 and fuel tank differential pressure sensor connector D-18 terminal 1 for damage.

Q: Is the harness wire in good condition?

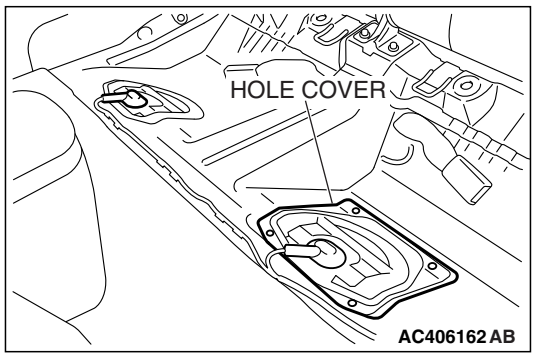
YES : This malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

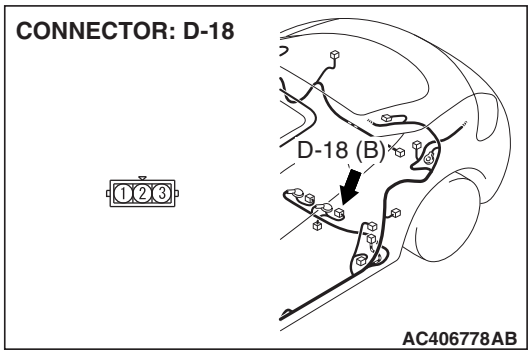
NO : Repair the damaged harness wire. Then go to Step 17.

STEP 9. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-18.

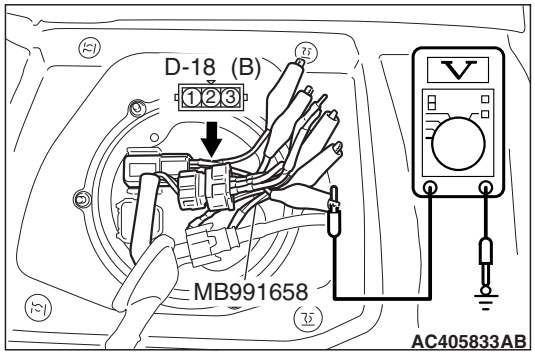
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

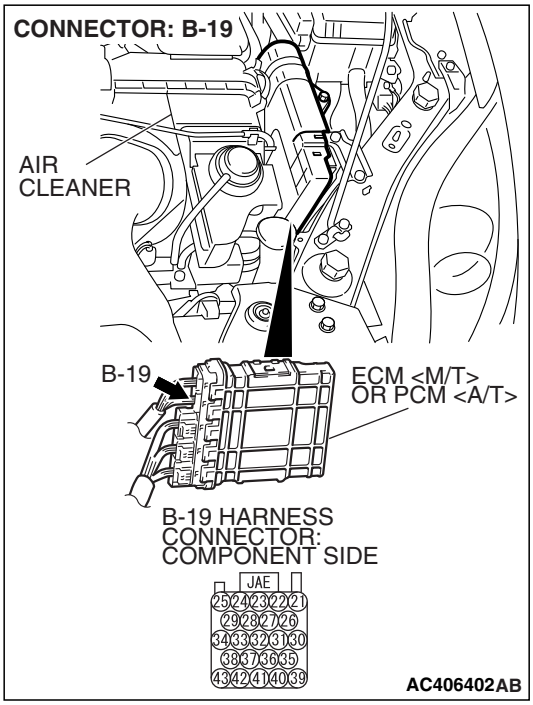
(6) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

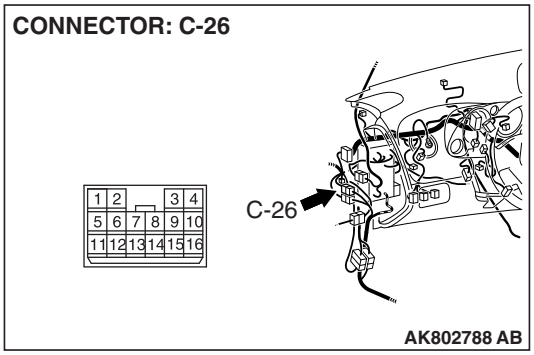
(7) Turn the ignition switch to the "LOCK" (OFF) position.

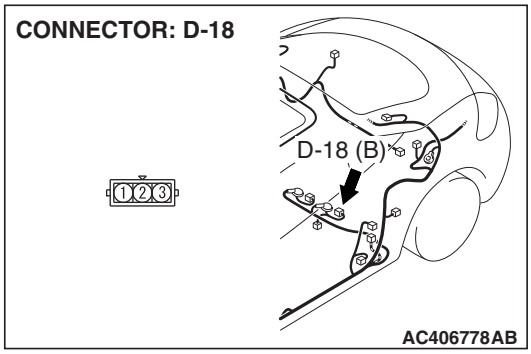
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 12.

NO : Go to Step 10.





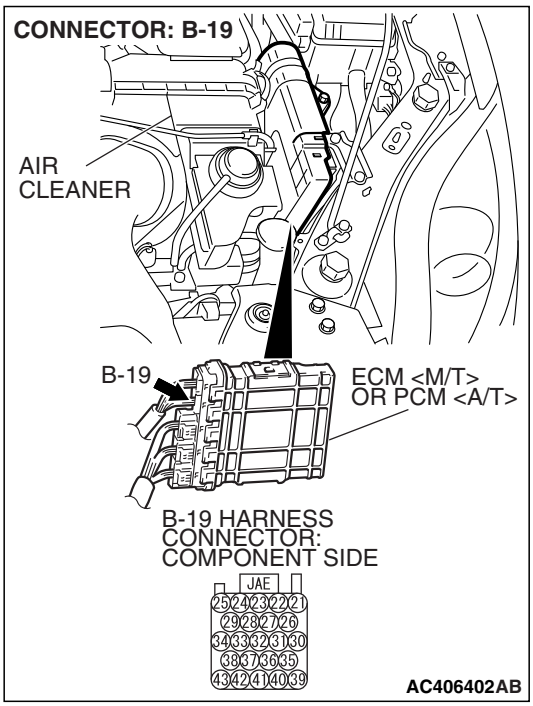


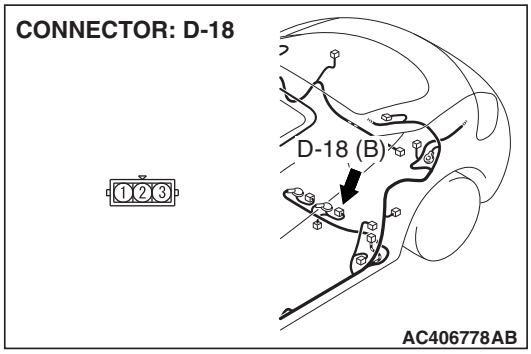
STEP 10. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.





STEP 11. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 21 and fuel tank differential pressure sensor connector D-18 terminal 3 for damage.

Q: Are the harness wires in good condition?

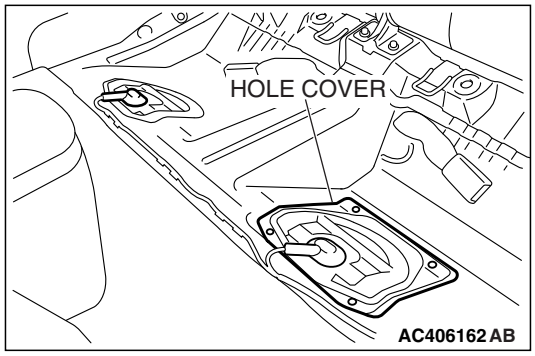
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

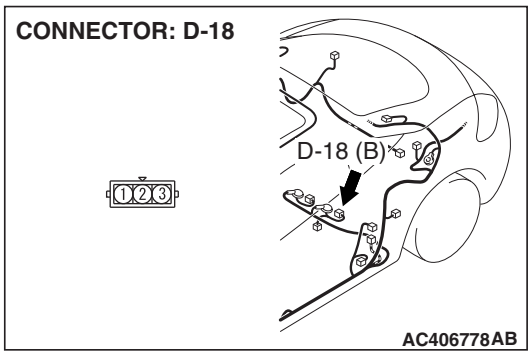
NO : Repair the damaged harness wires. Then go to Step 17.

STEP 12. Measure the fuel tank differential pressure sensor return voltage at fuel tank differential pressure sensor connector D-18.

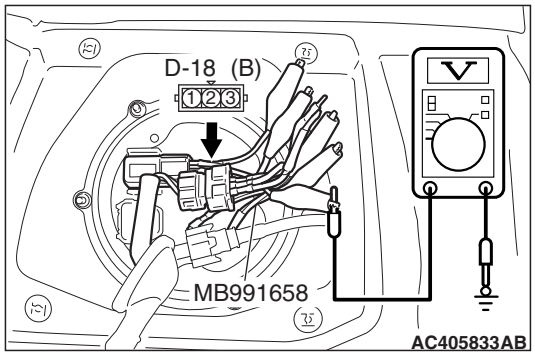
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

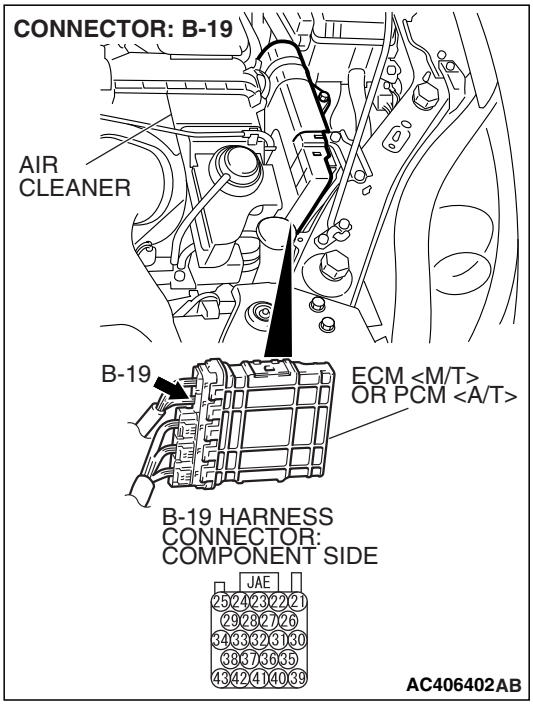
(6) Measure the voltage between terminal 2 and ground.
- The voltage should measure 0.5 volt or less.

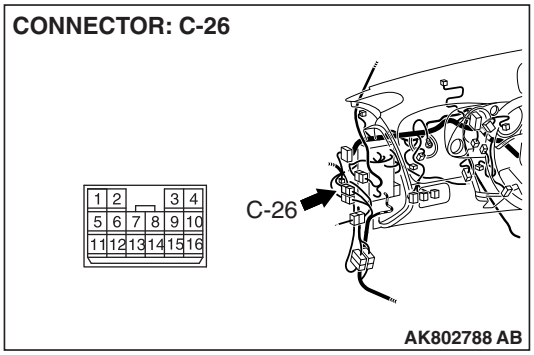
(7) Turn the ignition switch to the "LOCK" (OFF) position.

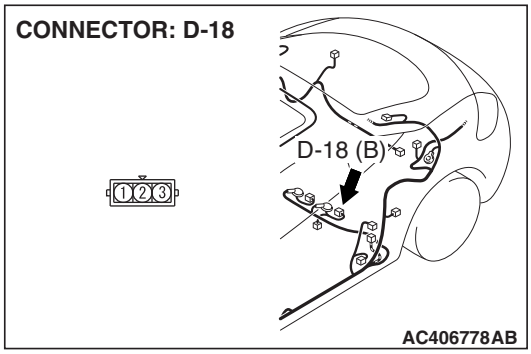
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

NO : Go to Step 17.





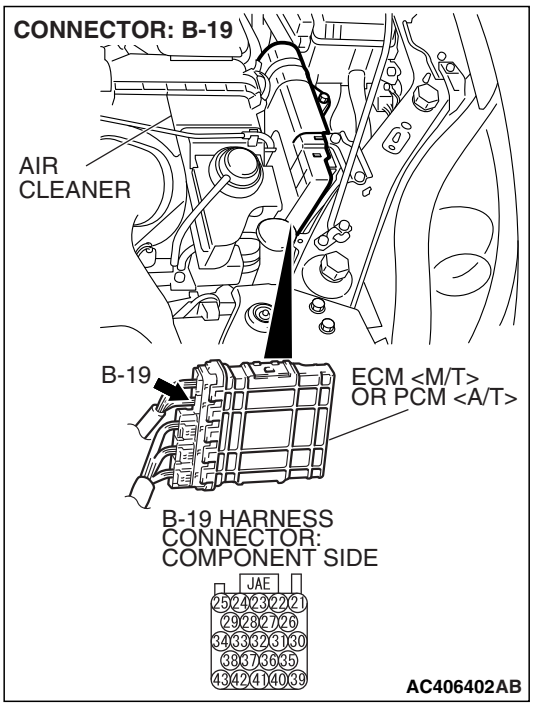


STEP 13. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.

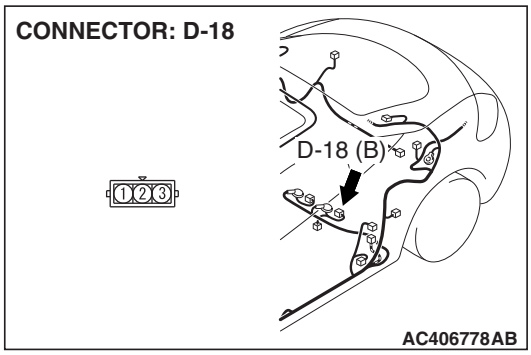


STEP 14. Check the harness wires between ECM <M/T> or PCM <A/T> connector B-19 terminal 22 and fuel tank differential pressure sensor connector D-18 terminal 2 for damage.

Q: Are the harness wires in good condition?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Repair the damaged harness wires. Then go to Step 17.

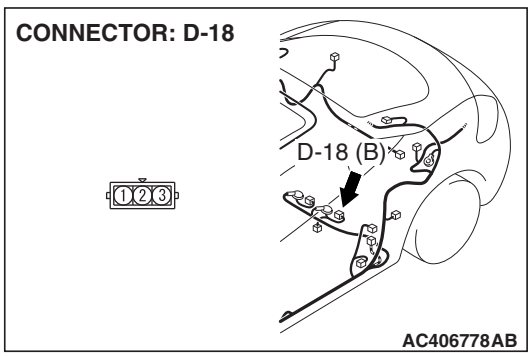


STEP 15. Check fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor. Then go to Step 17.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.

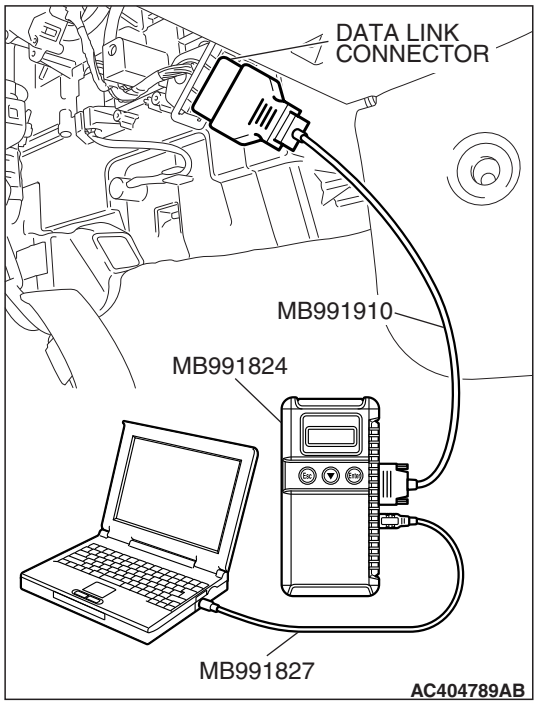


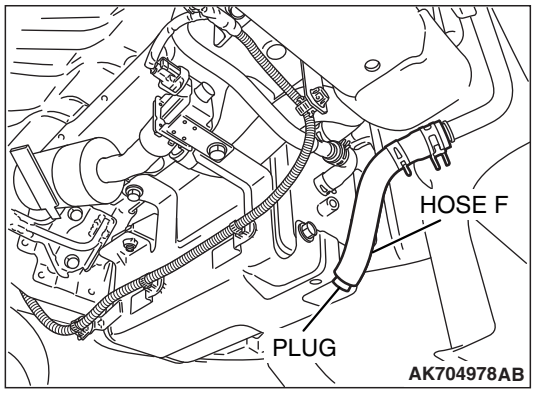
STEP 16. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

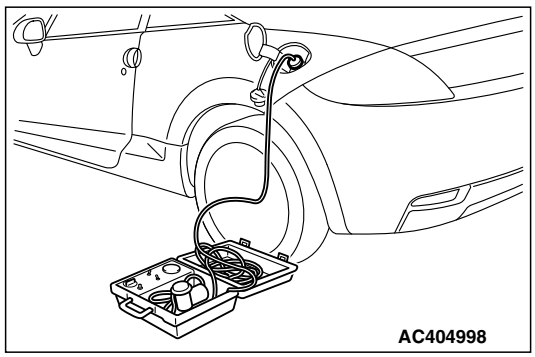
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
    - Item 52, Fuel Tank Differential Pressure Sensor.
        - The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
    - The fuel tank pressure reading should increase.
(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

STEP 17. Perform the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 16 P.13B-6).

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

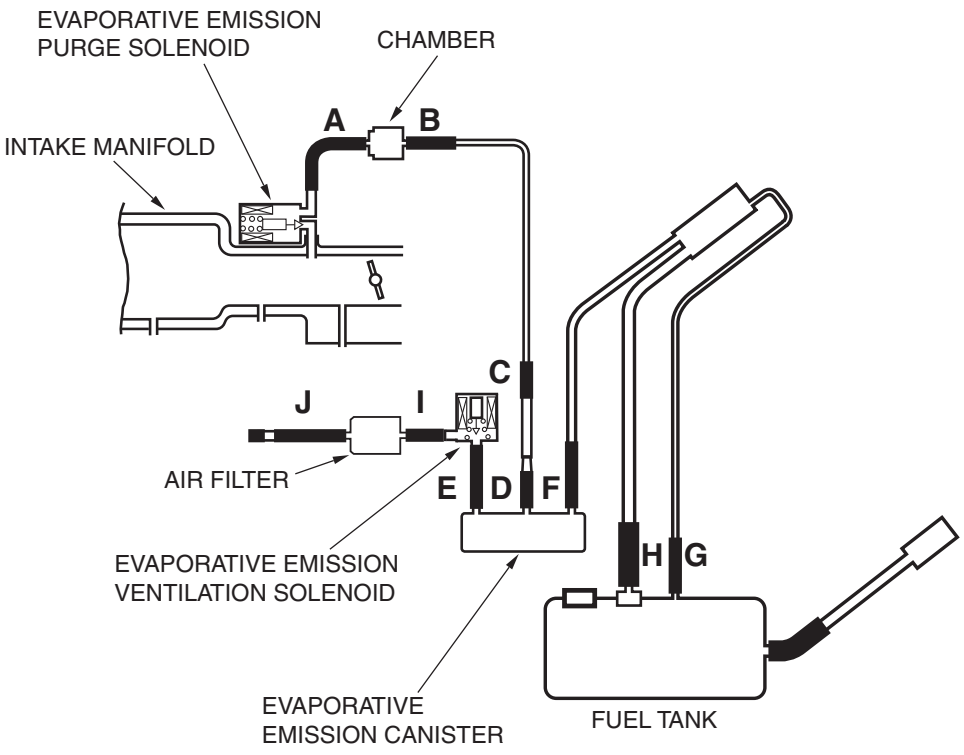
Q: Is DTC P0451 set?

YES : Repeat the troubleshooting from Step 2.

NO : The procedure is complete.

DTC P0452: Evaporative Emission Control System Pressure Sensor Low Input

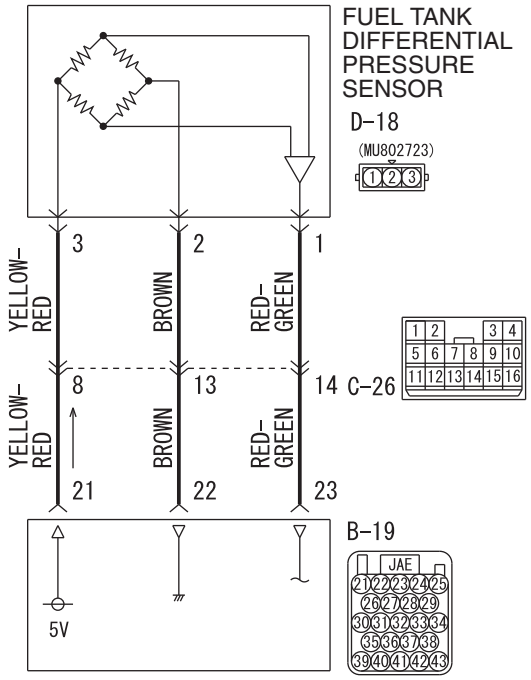
System Diagram



AK802719 AB

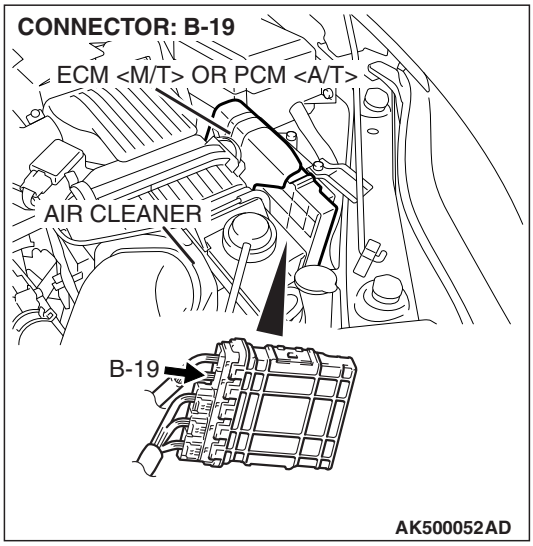
TSB Revision

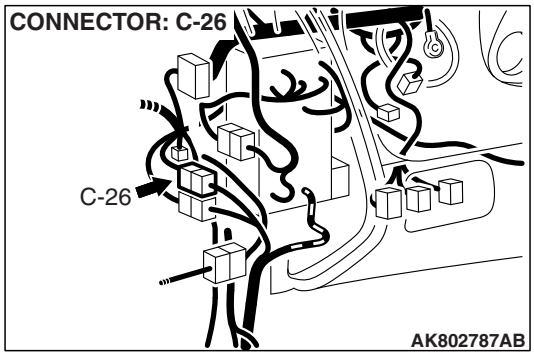
Fuel Tank Differential Pressure Sensor Circuit

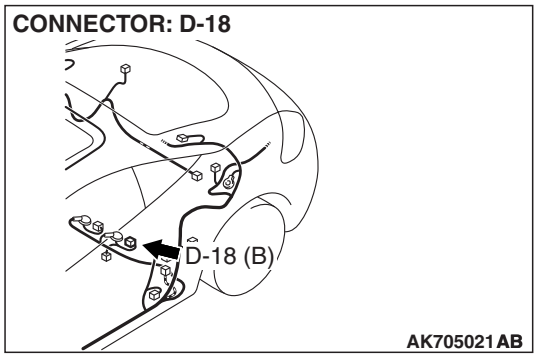


ECM <M/T> OR PCM <A/T>

AC406365AB
W6P13M000A







TSB Revision

CIRCUIT OPERATION

- The ECM <M/T> or PCM <A/T> (terminal 21) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal 3). The fuel tank differential pressure sensor (terminal 2) is grounded through the ECM <M/T> or PCM <A/T> (terminal 22).
- The fuel tank differential pressure sensor (terminal 1) returns a voltage signal to the ECM <M/T> or PCM <A/T> (terminal 23) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor output voltage.
- The ECM <M/T> or PCM <A/T> determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Continuous.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

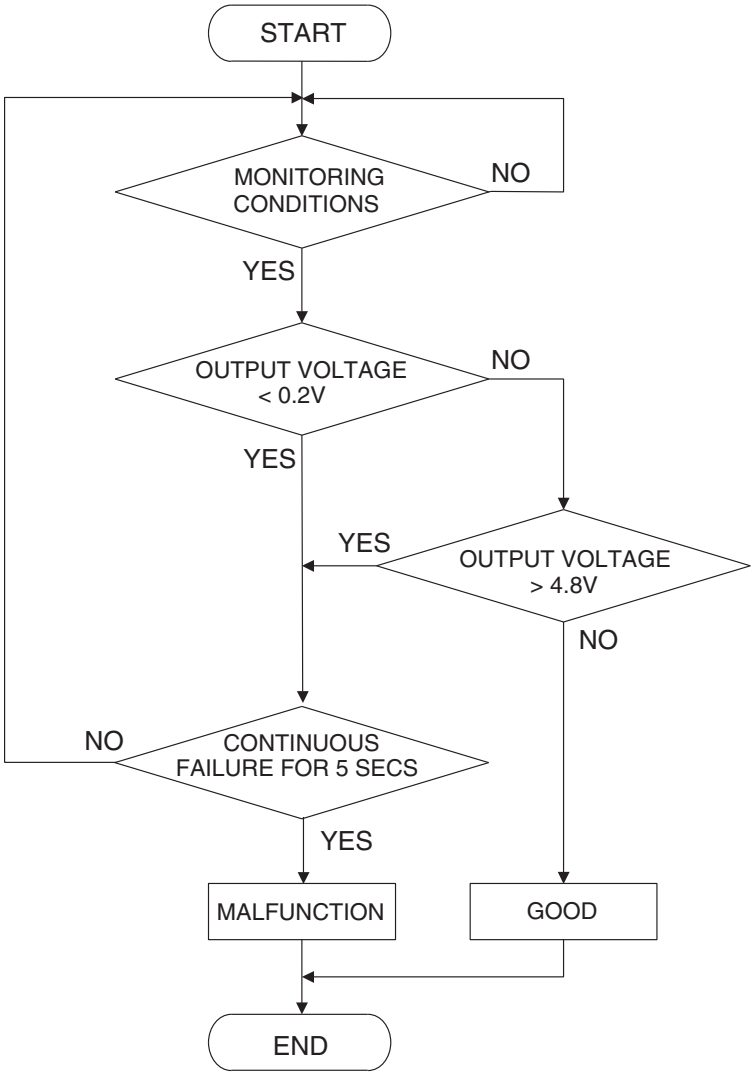
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RANGE CHECK - MIN. / MAX.



AC407445

DTC SET CONDITIONS

Check Condition

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

Judgement Criterion

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

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

OVERVIEW OF TROUBLESHOOTING

- DTC P0452 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> failure.

- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (TANK PRS SNSR 73). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

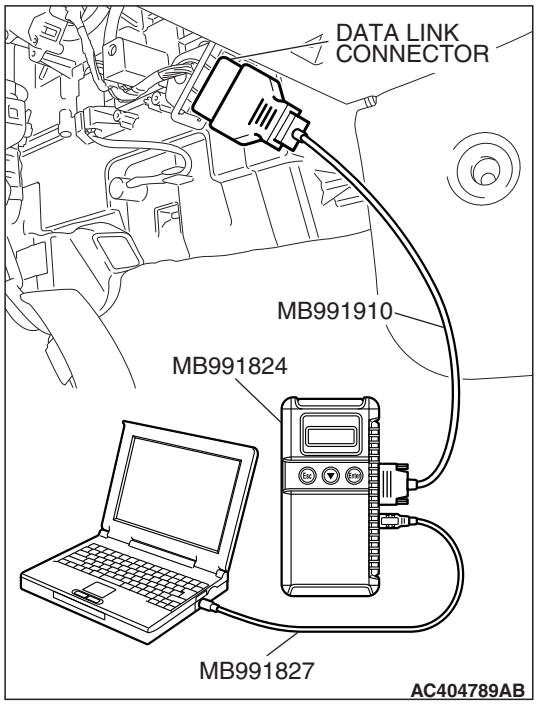
Required Special Tools:

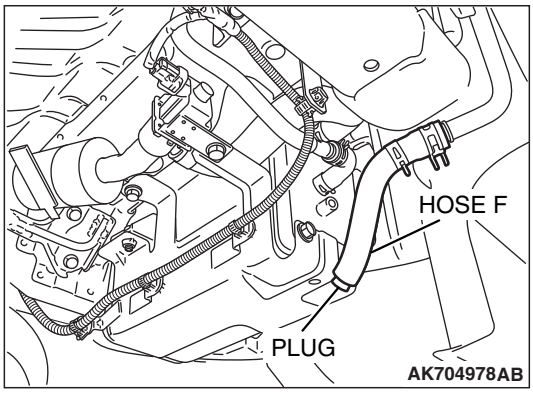
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991658: Test Harness Set
- MB991923: Power Plant ECU Check Harness

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

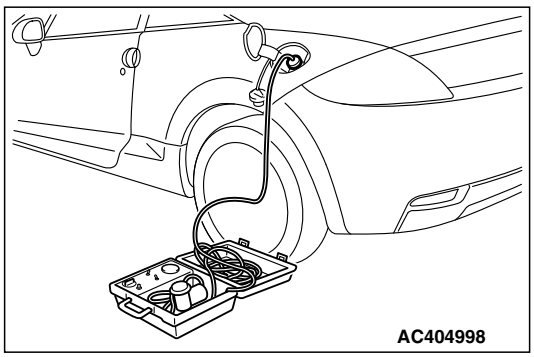
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
- The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

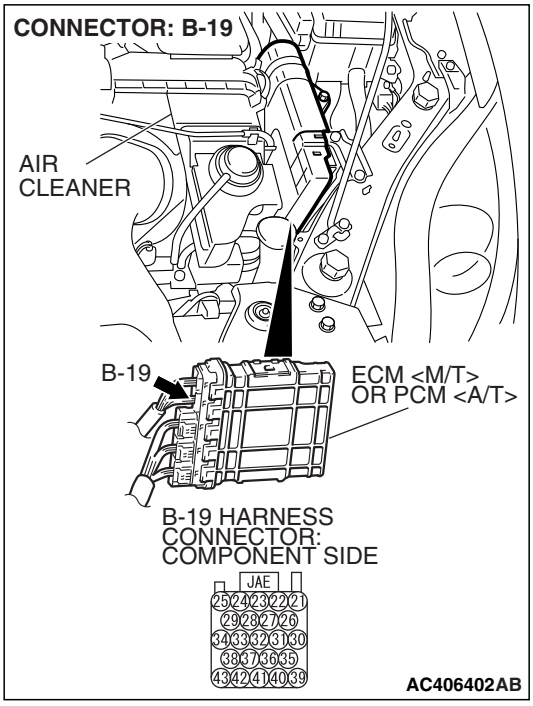
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

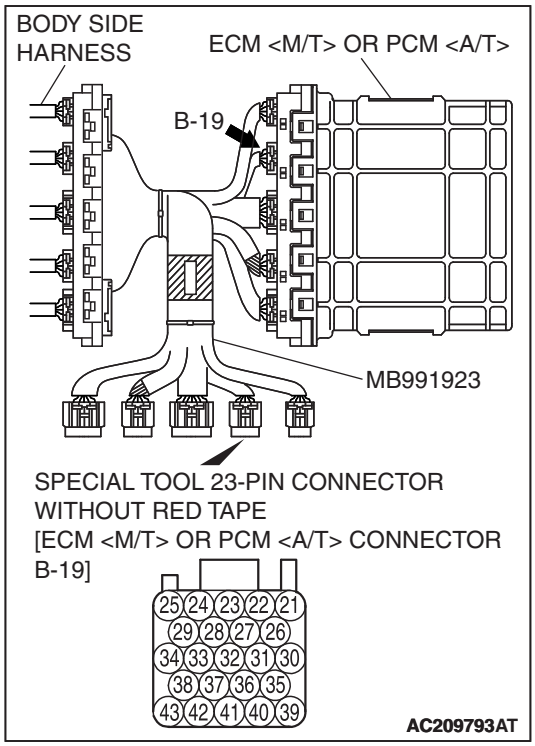
NO : Go to Step 2.

TSB Revision

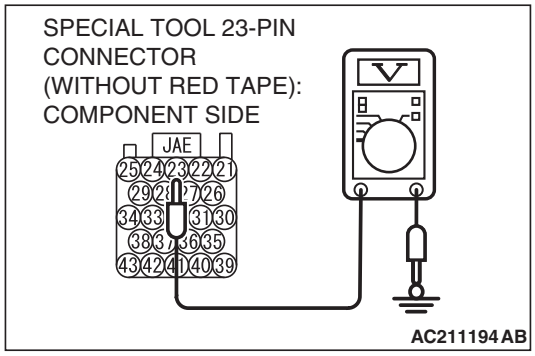
STEP 2. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 23 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

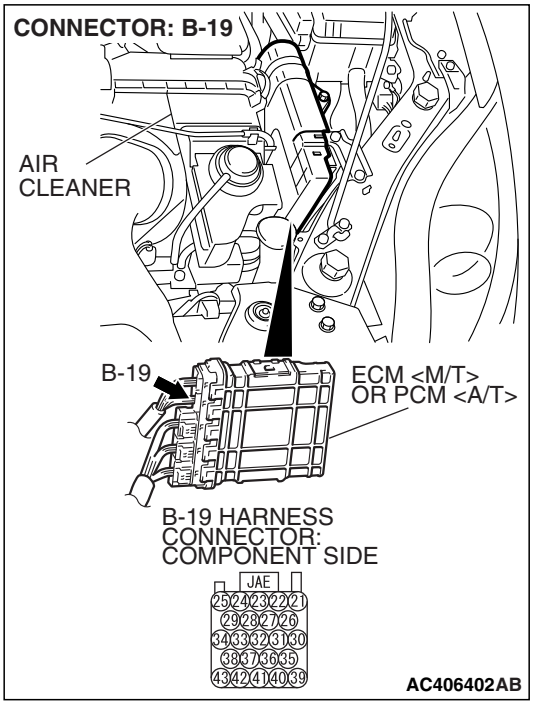
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 16.
NO : Go to Step 3.

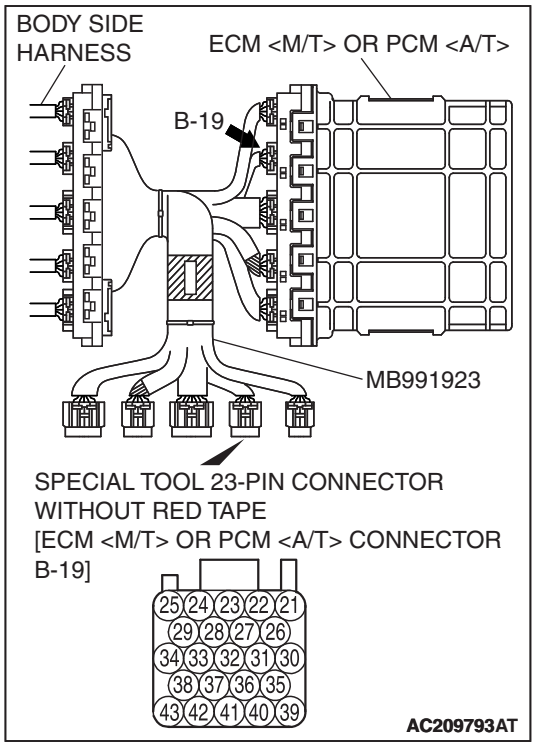
STEP 3. Measure the 5-volt reference signal at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

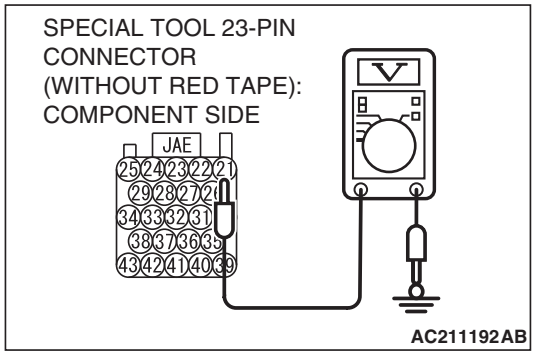
(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.



(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.

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





(4) Measure the voltage between terminal 21 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

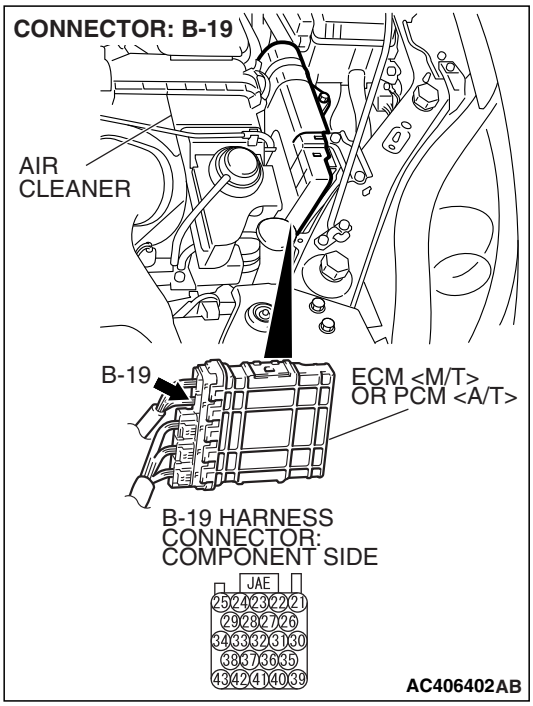
Q: Is the measured voltage between 4.9 and 5.1 volts?

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

STEP 4. Check ECM <M/T> or PCM <A/T> connector B-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

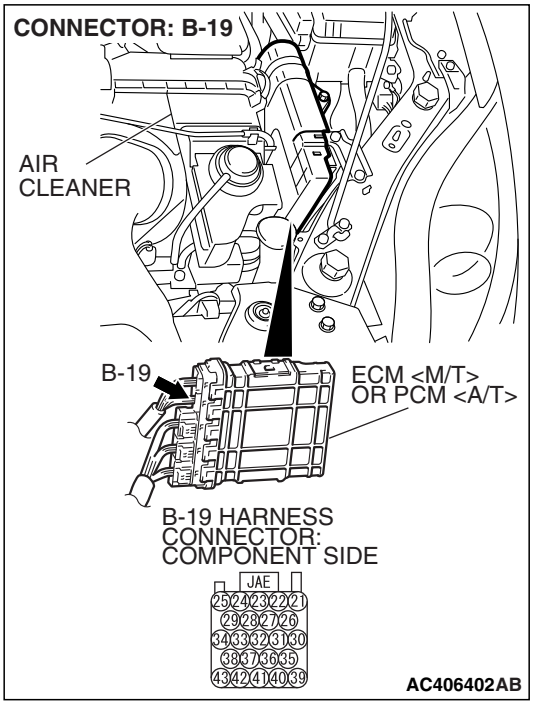
Q: Are the connector and terminals in good condition?

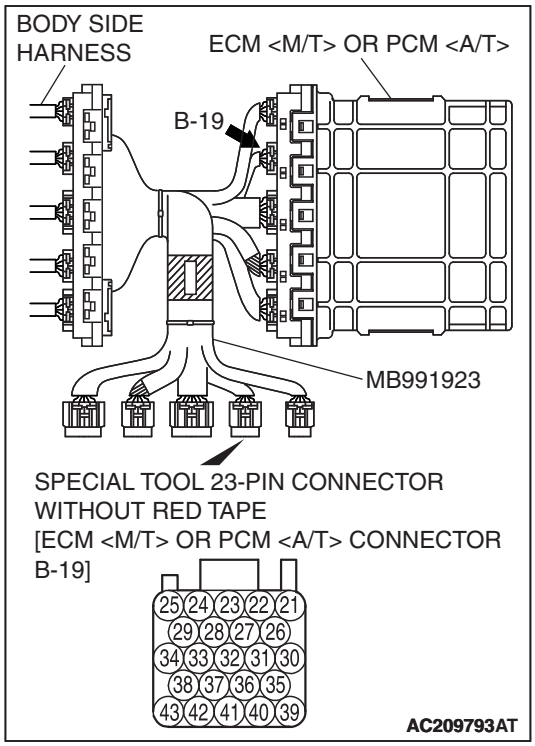
YES : Go to Step 16.
NO : Repair or replace the faulty components. (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.



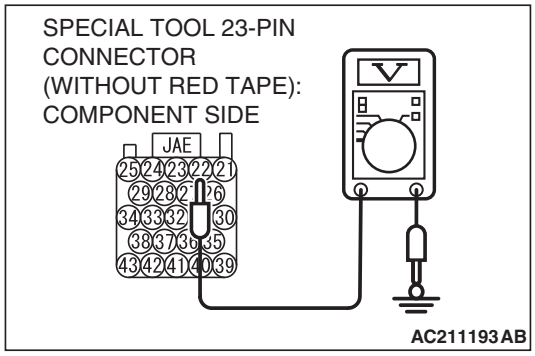
STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 22 and ground.
- The voltage should measure 0.5 volt or less.

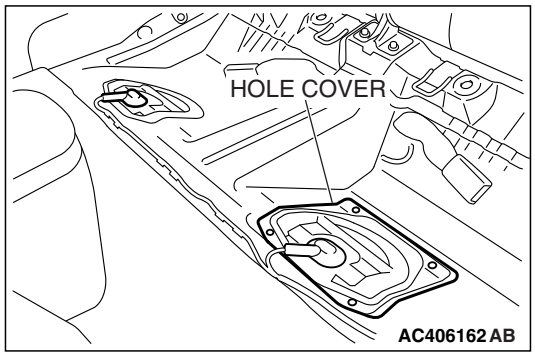
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

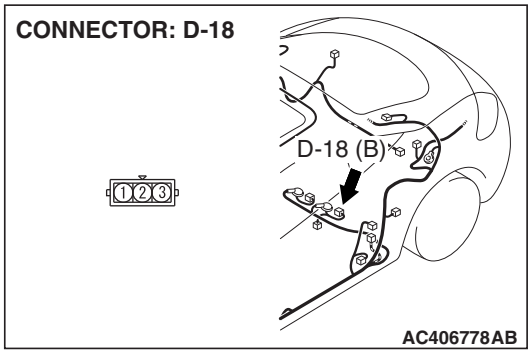
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 6.
NO : Go to Step 9.

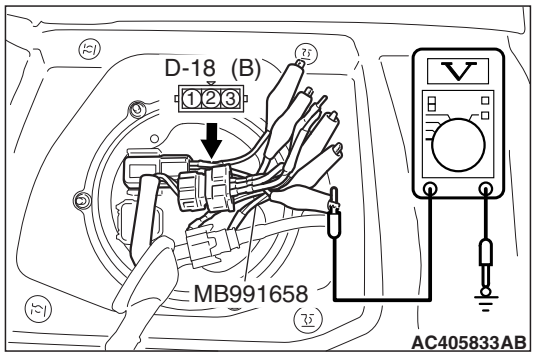
STEP 6. Measure the signal voltage at intermediate connector D-18.

(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).
(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.
(5) Turn the ignition switch to the "ON" position.
(6) Remove the fuel cap.
(7) Measure the voltage between connector D-18 terminal 1 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

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

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

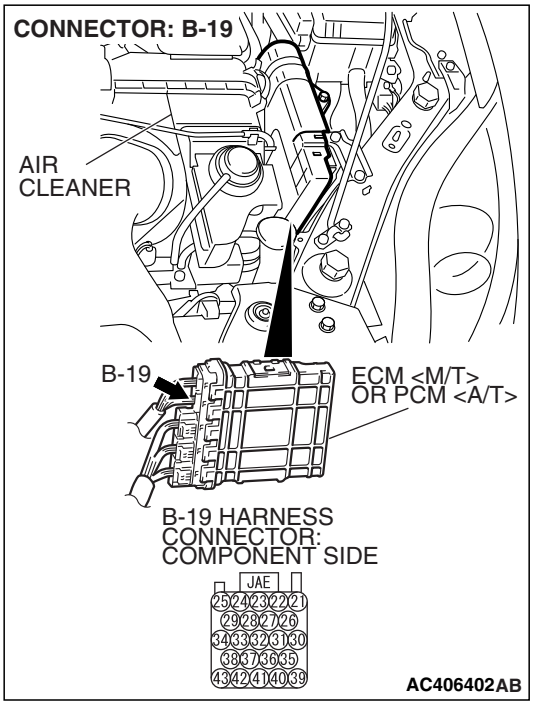
YES : Go to Step 7.
NO : Go to Step 15.

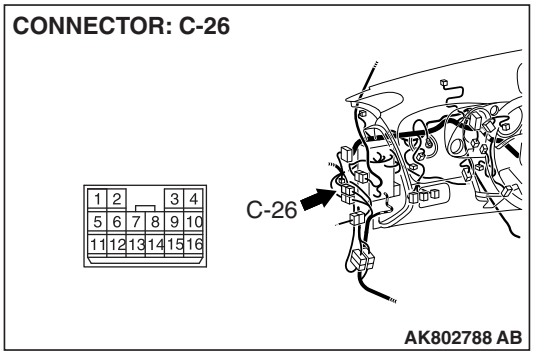
STEP 7. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

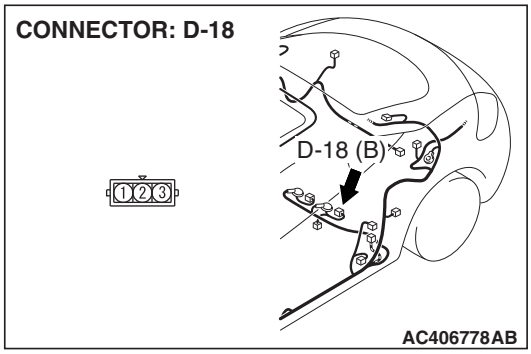
Q: Are the connectors and terminals in good condition?

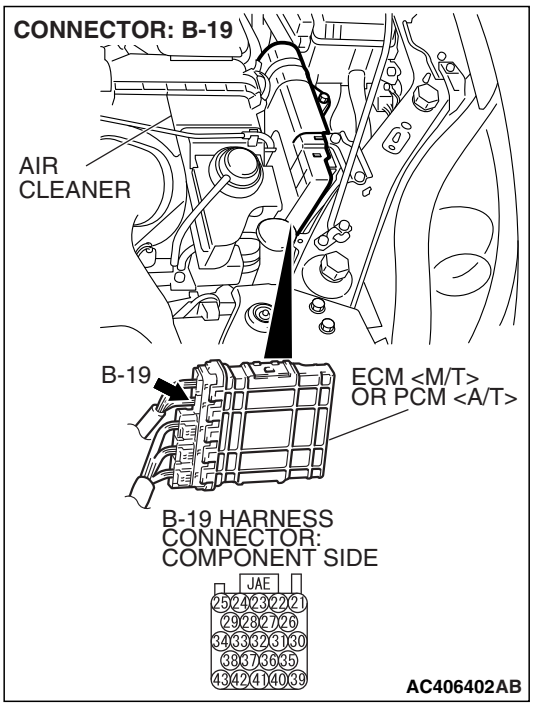
YES : Go to Step 8.

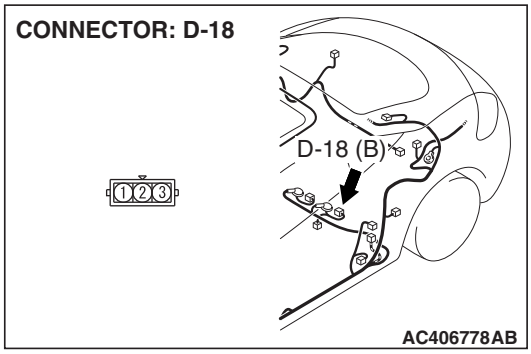
NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.











STEP 8. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 23 and fuel tank differential pressure sensor connector D-18 terminal 1 for damage.

Q: Is the harness wire in good condition?

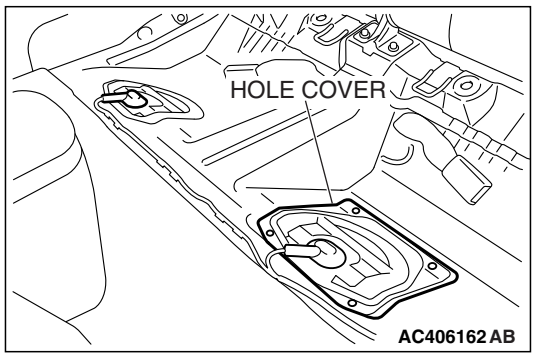
YES : This malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

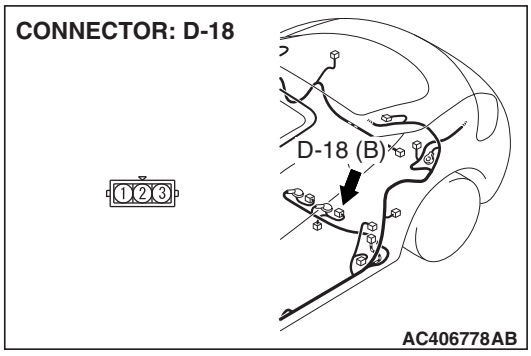
NO : Repair the damaged harness wire. Then go to Step 17.

STEP 9. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-18.

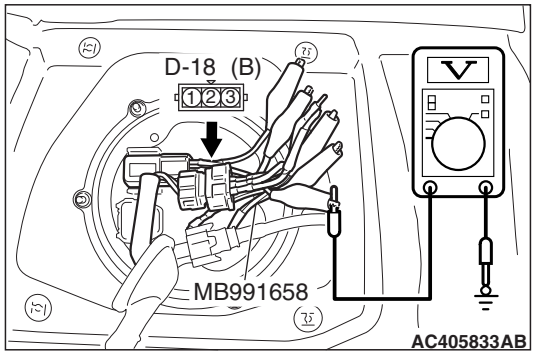
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

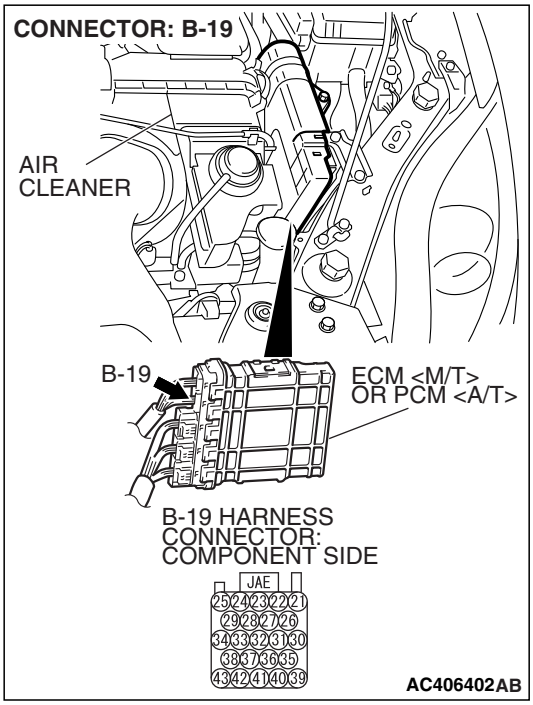
(6) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

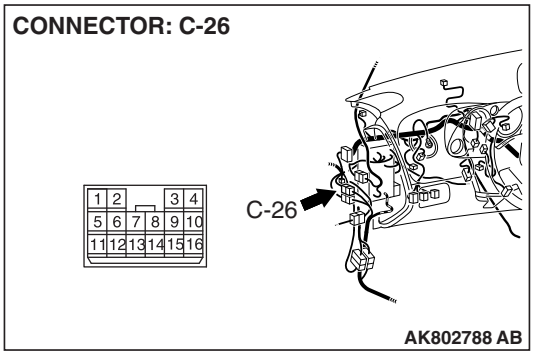
(7) Turn the ignition switch to the "LOCK" (OFF) position.

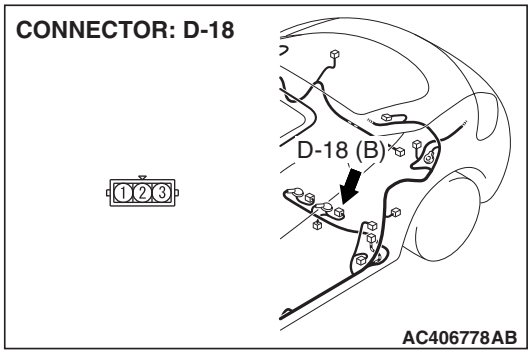
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 12.

NO : Go to Step 10.





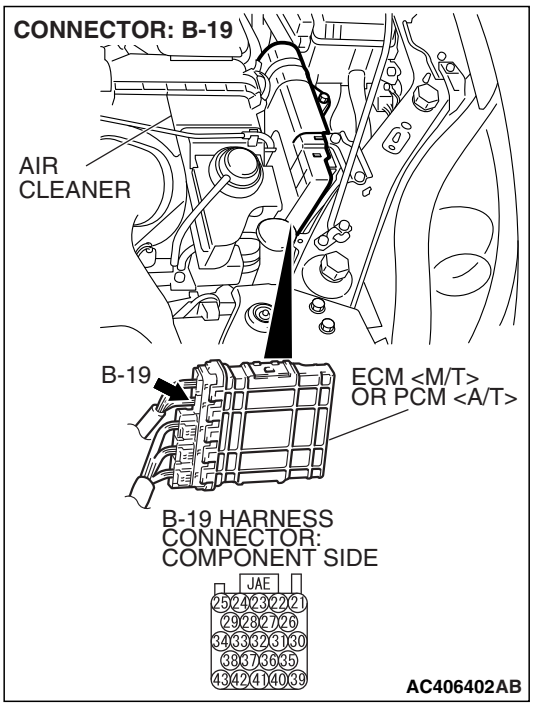


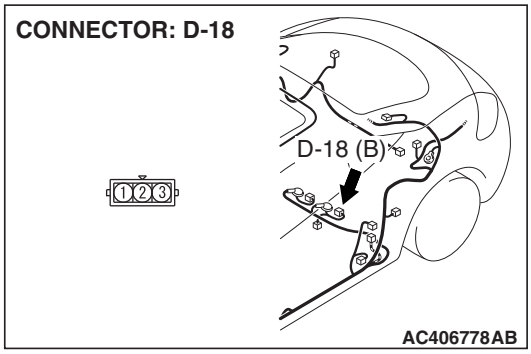
STEP 10. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.





STEP 11. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 21 and fuel tank differential pressure sensor connector D-18 terminal 3 for damage.

Q: Are the harness wires in good condition?

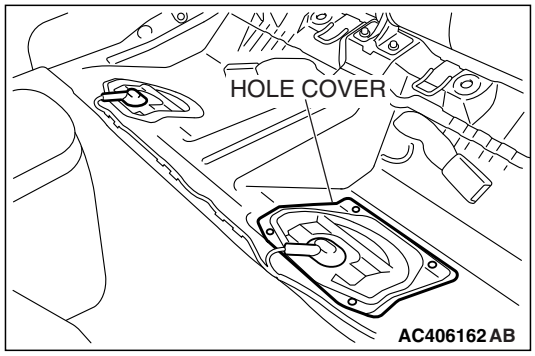
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

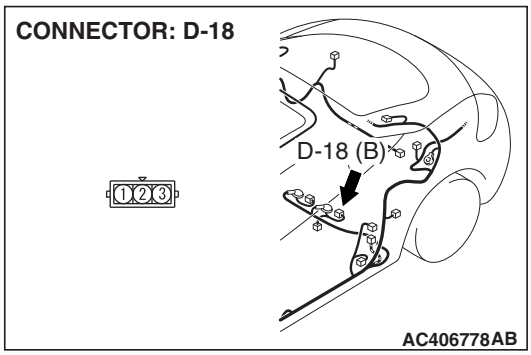
NO : Repair the damaged harness wires. Then go to Step 17.

STEP 12. Measure the fuel tank differential pressure sensor return voltage at fuel tank differential pressure sensor connector D-18.

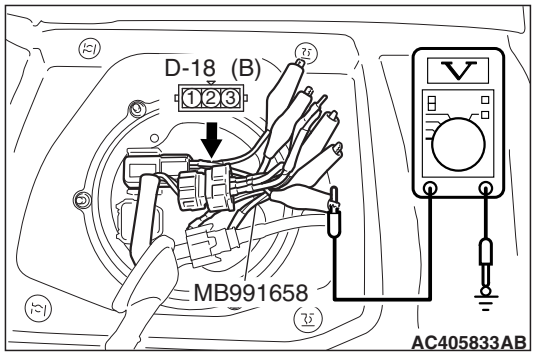
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

(6) Measure the voltage between terminal 2 and ground.
- The voltage should measure 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

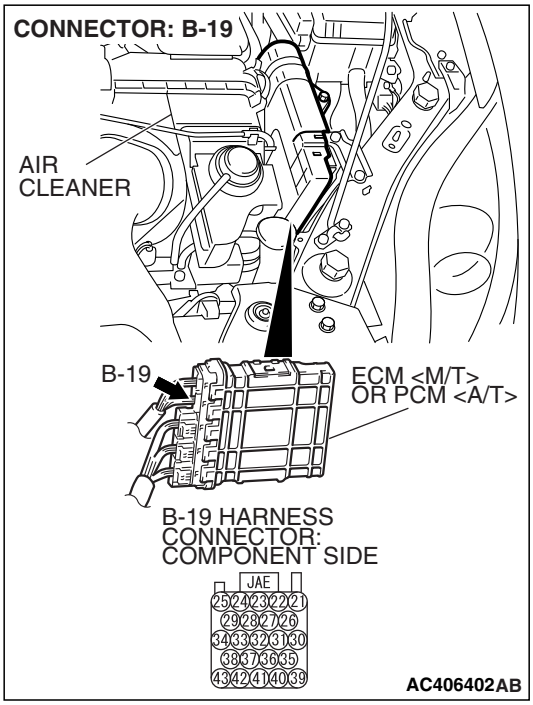
NO : Go to Step 17.

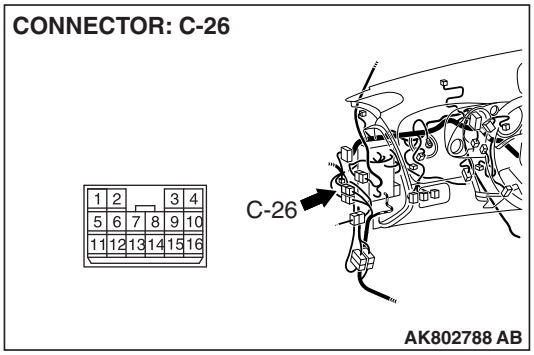
STEP 13. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

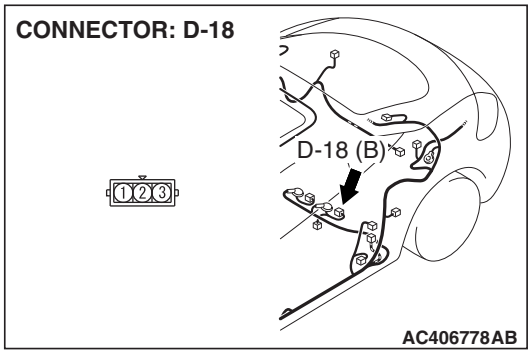
Q: Are the connectors and terminals in good condition?

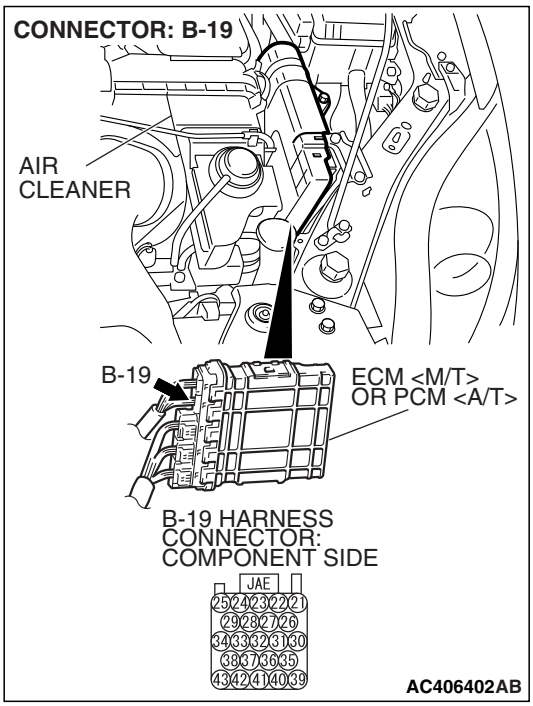
YES : Go to Step 14.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.







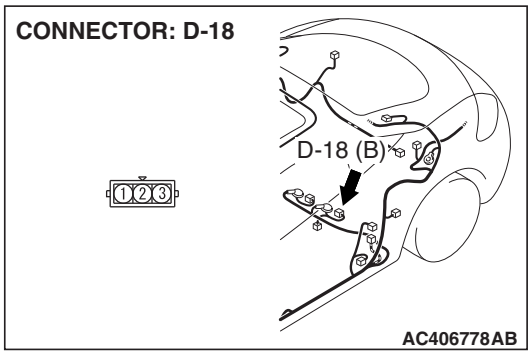


STEP 14. Check the harness wires between ECM <M/T> or PCM <A/T> connector B-19 terminal 22 and fuel tank differential pressure sensor connector D-18 terminal 2 for damage.

Q: Are the harness wires in good condition?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Repair the damaged harness wires. Then go to Step 17.

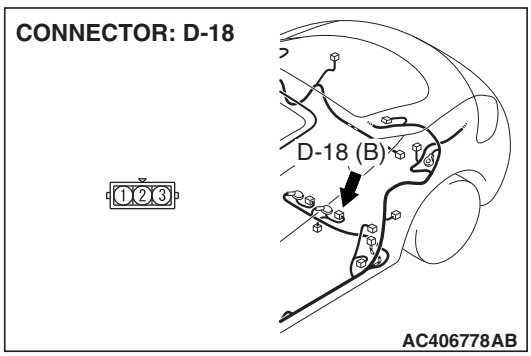


STEP 15. Check fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor. Then go to Step 17.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.

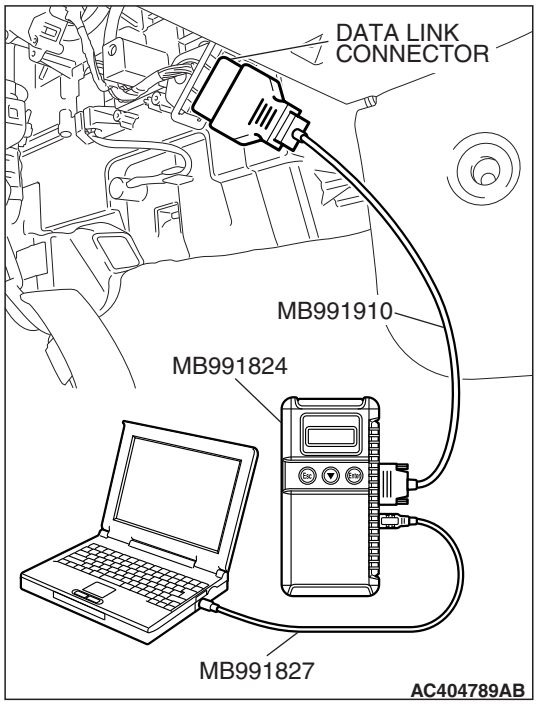


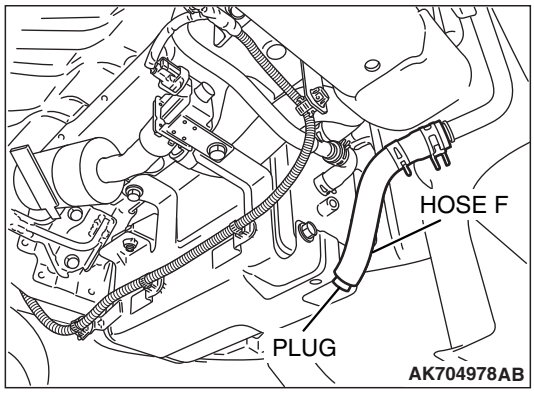
STEP 16. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

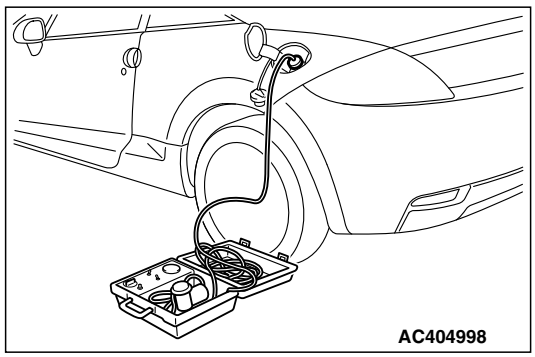
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
    - Item 52, Fuel Tank Differential Pressure Sensor.
        - The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
    - The fuel tank pressure reading should increase.
(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

STEP 17. Perform the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6).

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

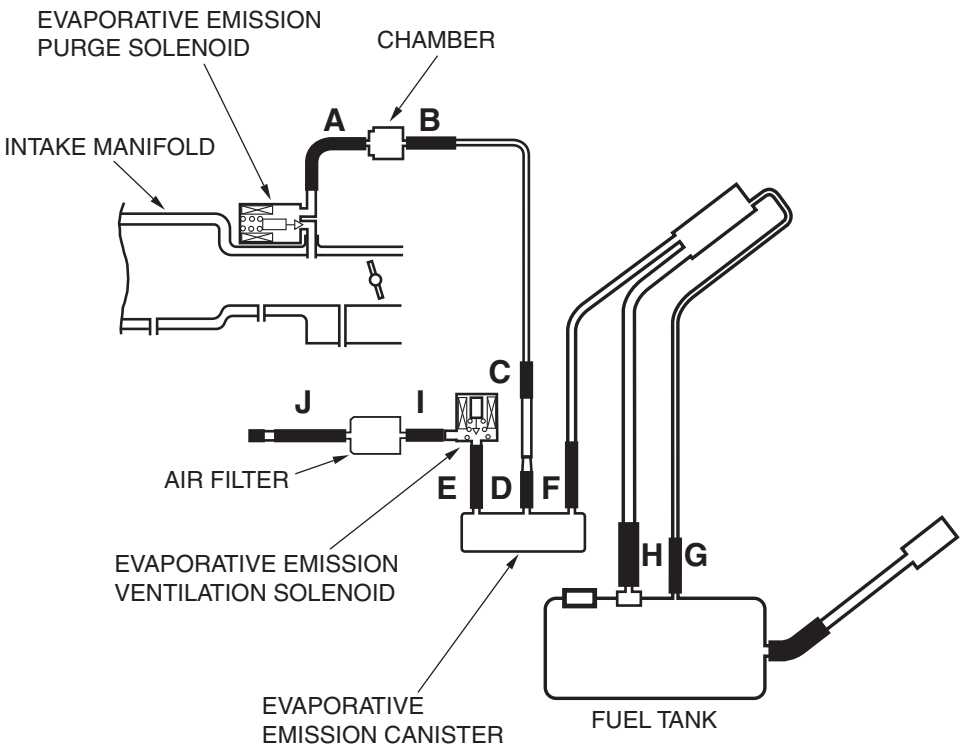
Q: Is DTC P0452 set?

YES : Repeat the troubleshooting from Step 2.

NO : The procedure is complete.

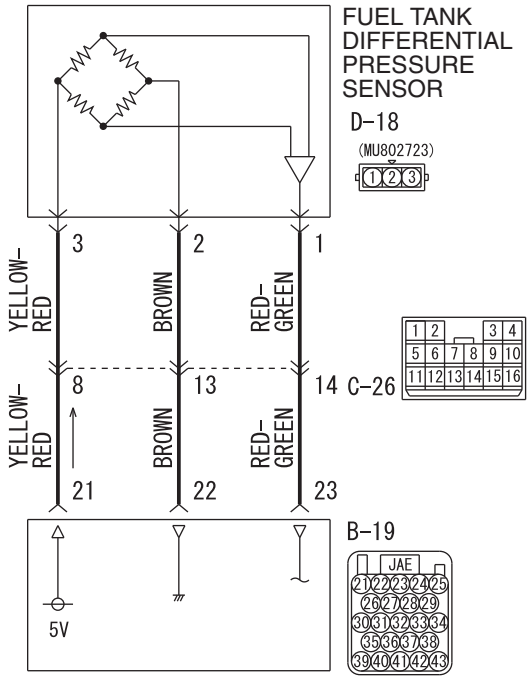
DTC P0453: Evaporative Emission Control System Pressure Sensor High Input

System Diagram

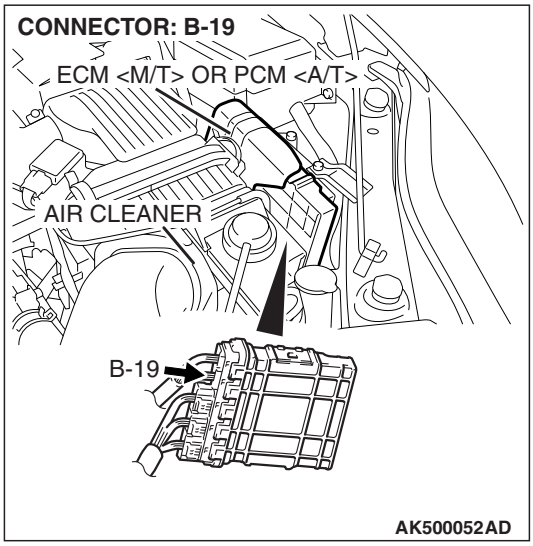


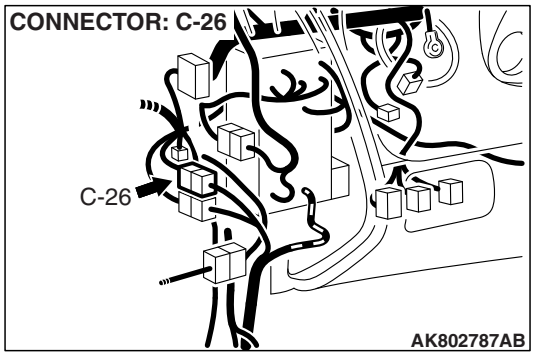
AK802719 AB

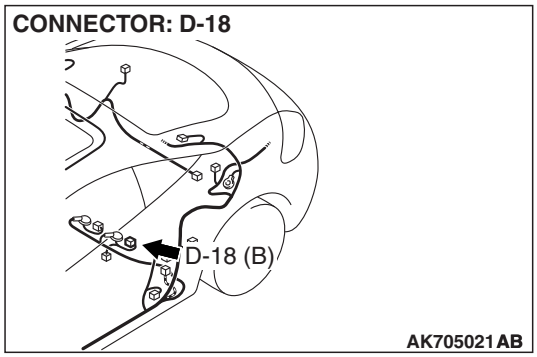
Fuel Tank Differential Pressure Sensor Circuit



AC406365AB
W6P13M000A







TSB Revision

CIRCUIT OPERATION

- The ECM <M/T> or PCM <A/T> (terminal 21) supplies a 5-volt reference voltage to the fuel tank differential pressure sensor (terminal 3). The ECM <M/T> or PCM <A/T> (terminal 22) supplies a ground to the fuel tank differential pressure sensor (terminal 2).
- The ECM <M/T> or PCM <A/T> (terminal 23) receives a voltage signal proportional to the pressure in the fuel tank from the fuel tank differential pressure sensor (terminal 1).

TECHNICAL DESCRIPTION

- To determine whether the fuel tank differential pressure sensor is defective, the ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor output voltage.
- The ECM <M/T> or PCM <A/T> judges if the fuel tank differential pressure sensor output voltage is normal.

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

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Continuous.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

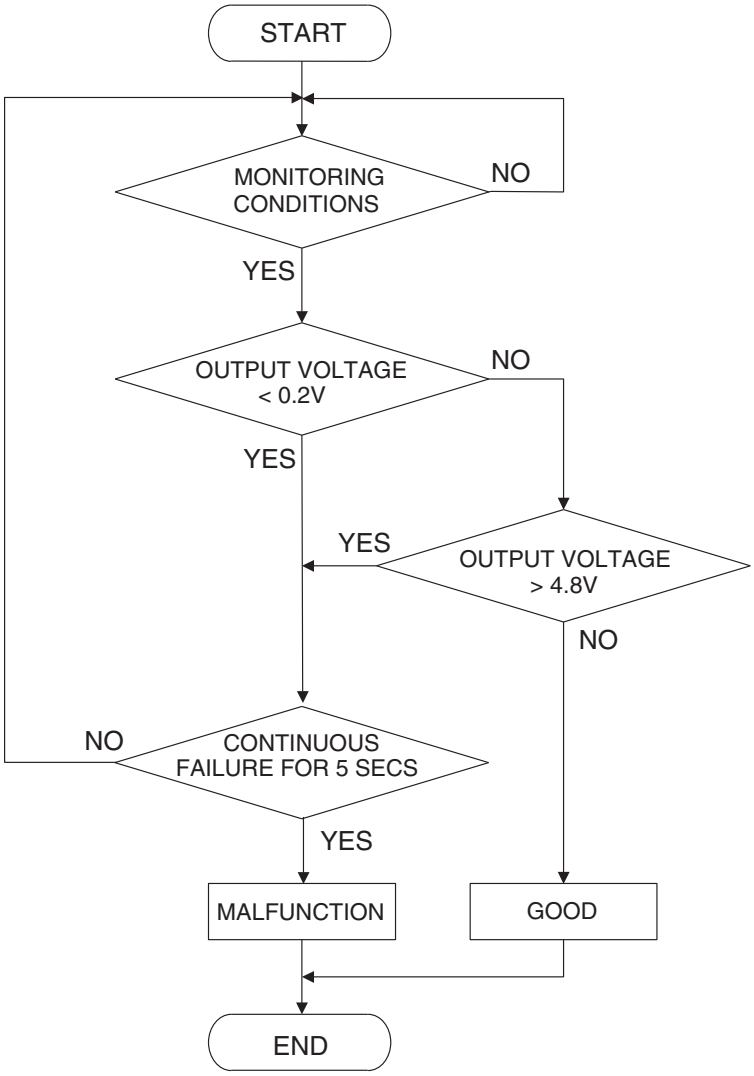
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RANGE CHECK - MIN. / MAX.



DTC SET CONDITIONS

Check Conditions

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

Judgement Criterion

- The fuel tank differential pressure sensor output voltage remains 4.8 volt or greater for 5 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

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

OVERVIEW OF TROUBLESHOOTING

- DTC P0453 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> failure.

TSB Revision

- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (TANK PRS SNSR 73). The mechanical gauge reading is used to verify scan tool reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

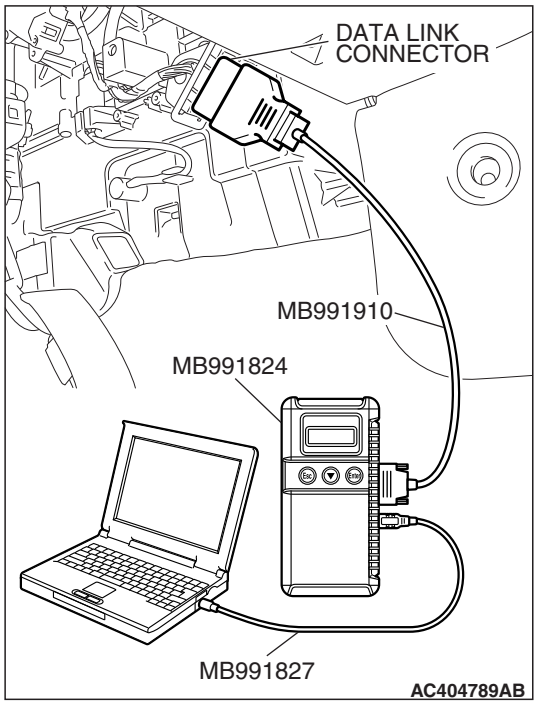
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991658: Test Harness Set
- MB991923: Power Plant ECU Check Harness

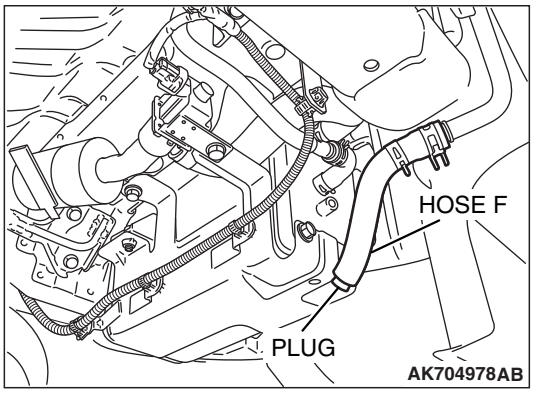
STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

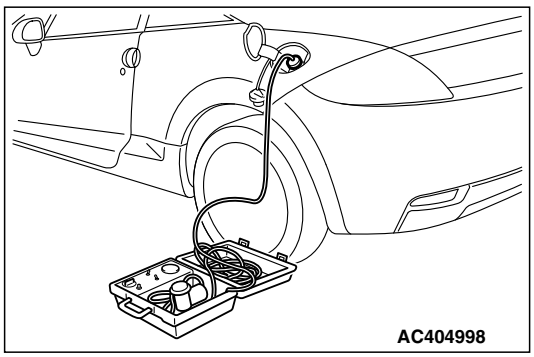
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
- The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Go to Step 2.

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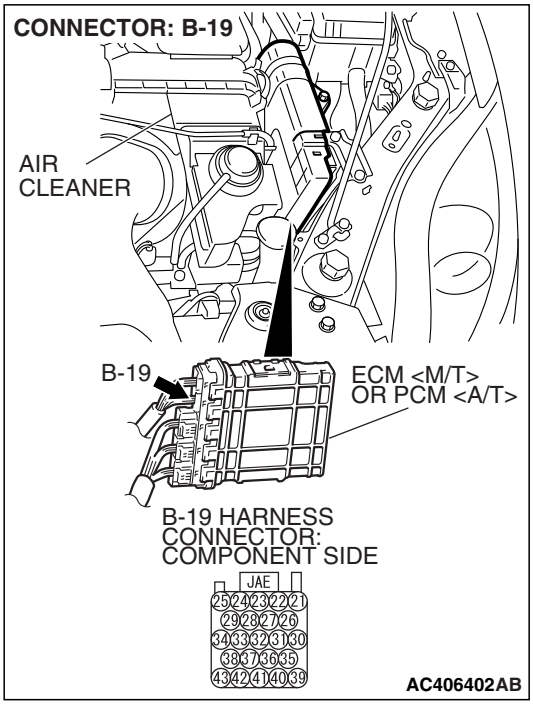
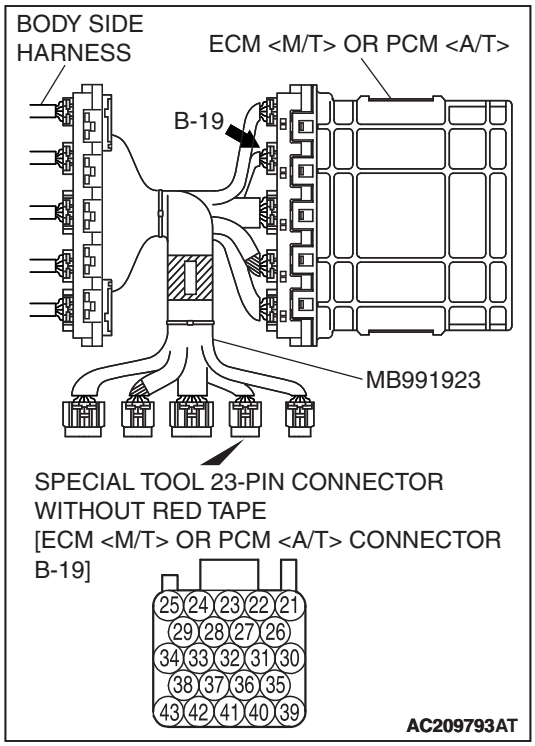
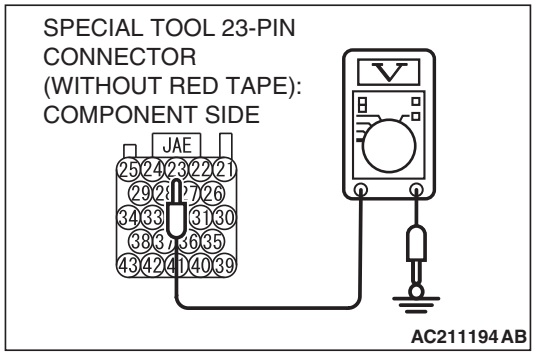
STEP 2. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 23 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

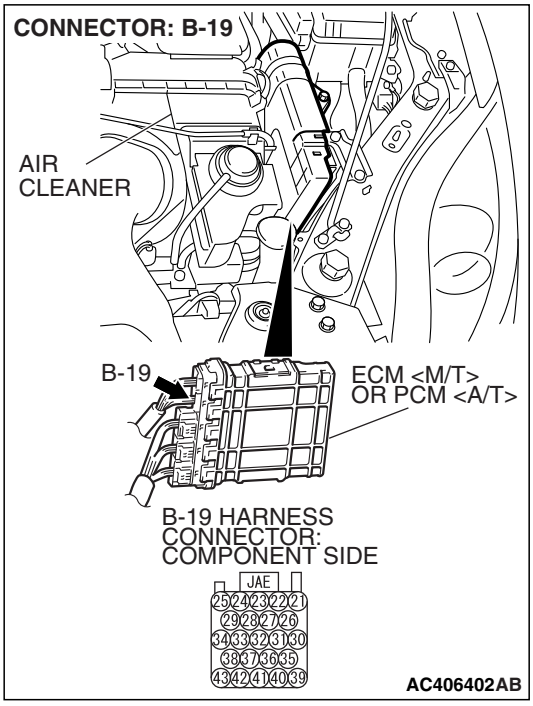
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 16.
NO : Go to Step 3.

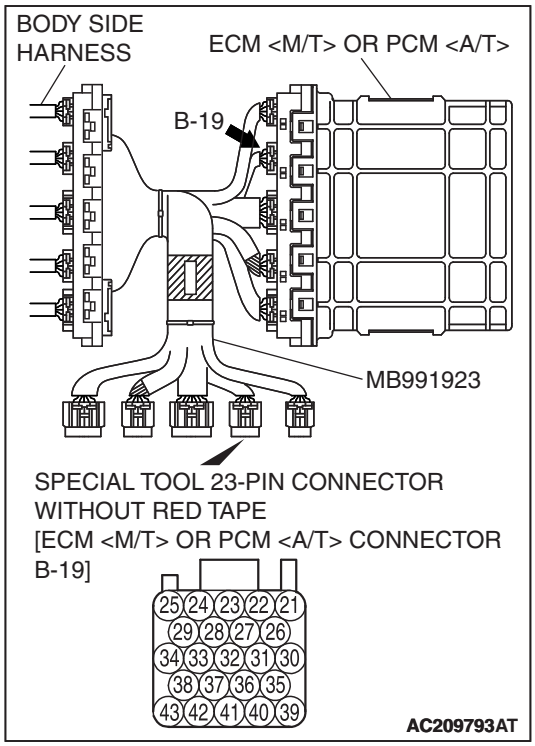
STEP 3. Measure the 5-volt reference signal at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

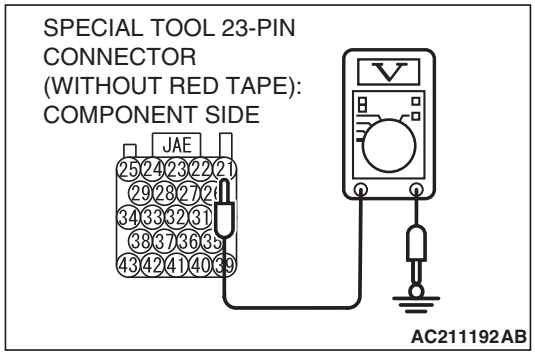
(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.



(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.

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





(4) Measure the voltage between terminal 21 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

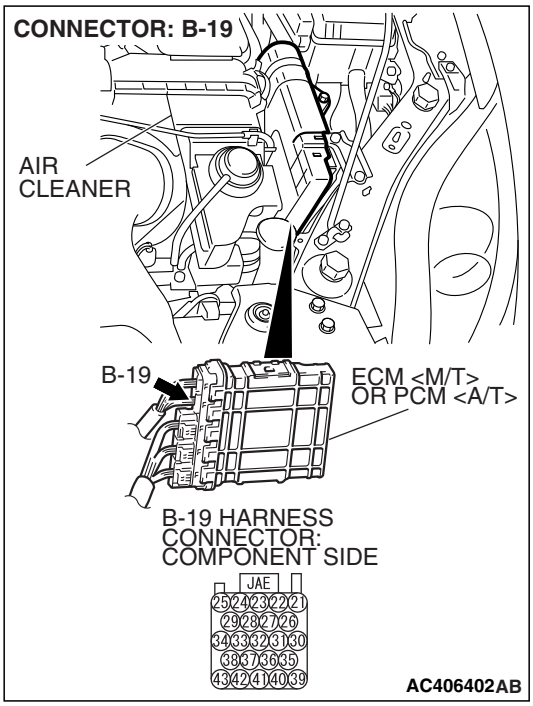
Q: Is the measured voltage between 4.9 and 5.1 volts?

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

STEP 4. Check ECM <M/T> or PCM <A/T> connector B-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

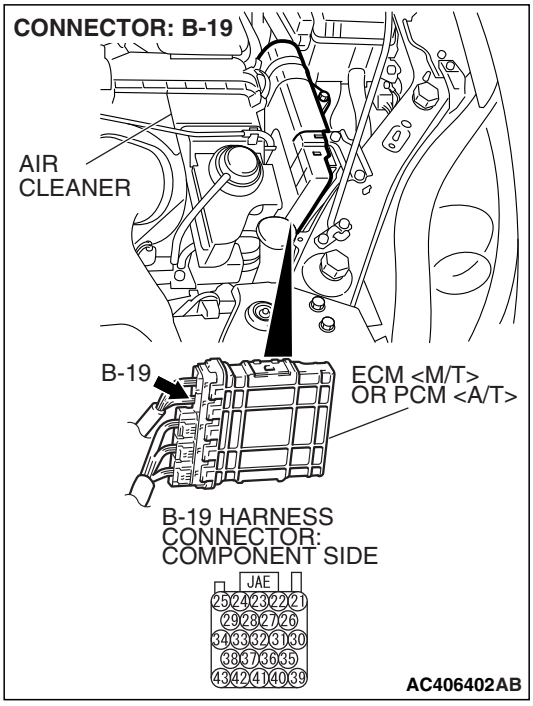
Q: Are the connector and terminals in good condition?

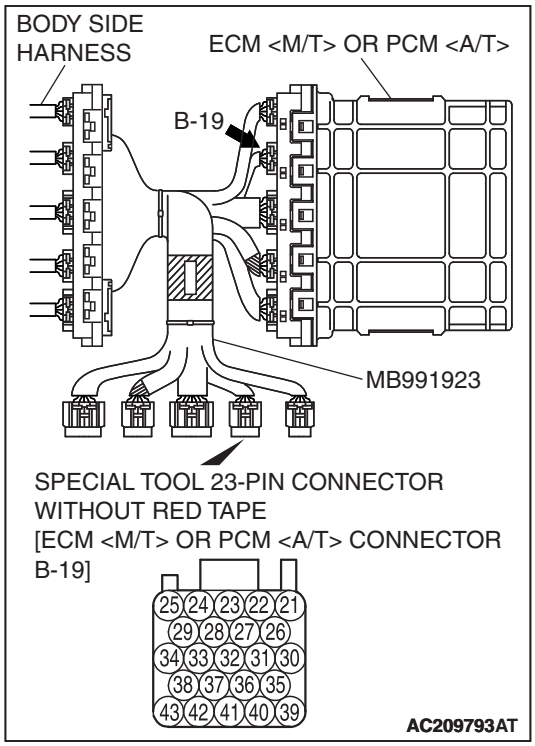
YES : Go to Step 16.
NO : Repair or replace the faulty components. (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.



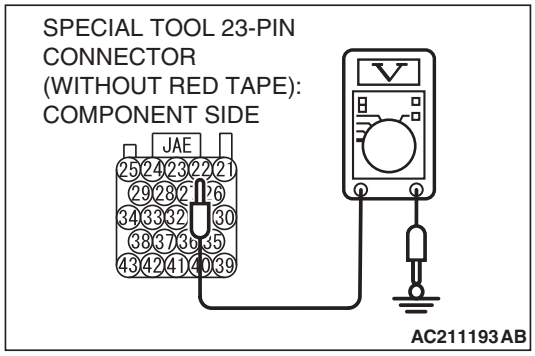
STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-19 by using check harness special tool MB991923.

(1) Disconnect all the connectors from the ECM <M/T> or PCM <A/T>.





(2) Connect special tool MB991923 (check harness) between the ECM <M/T> or PCM <A/T> and the body-side harness connector.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



(5) Measure the voltage between terminal 22 and ground.
- The voltage should measure 0.5 volt or less.

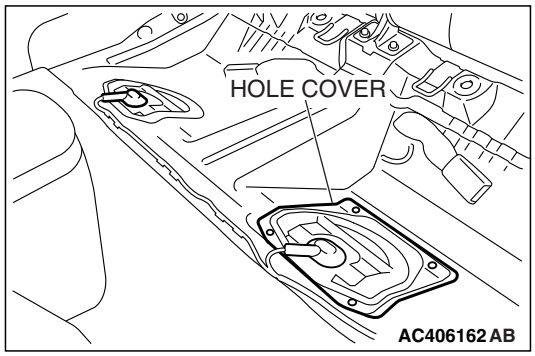
(6) Install the fuel cap.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

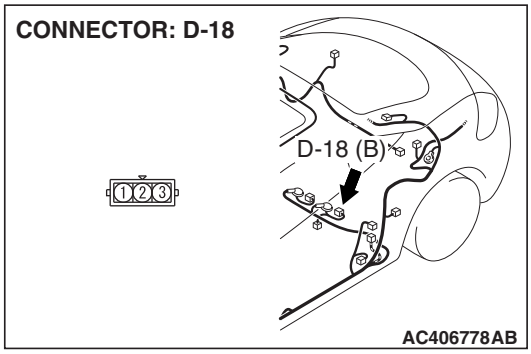
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 6.
NO : Go to Step 9.

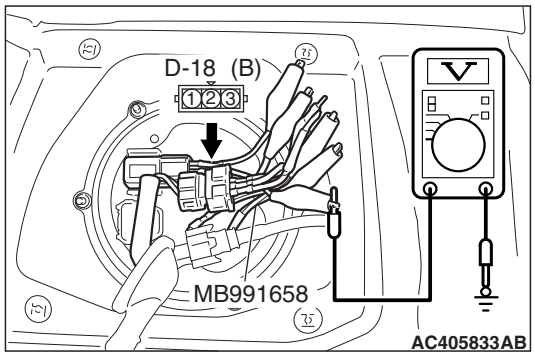
STEP 6. Measure the signal voltage at intermediate connector D-18.

(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).
(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.

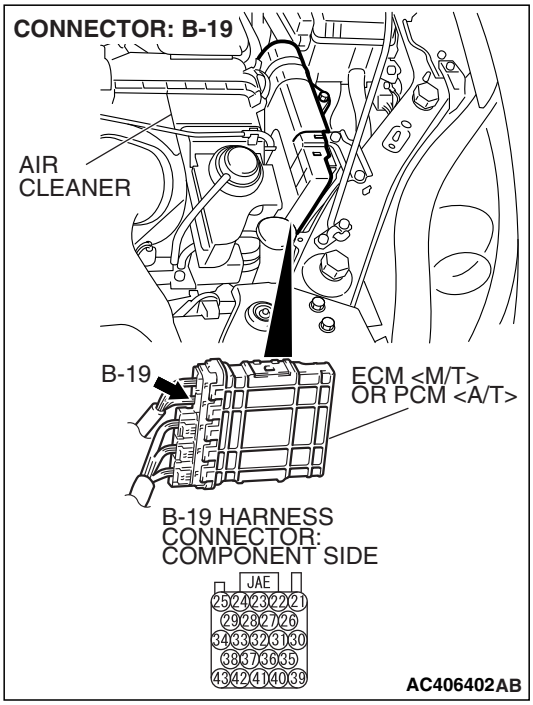


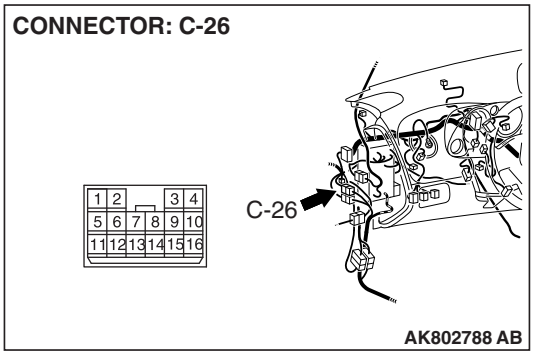
(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.
(5) Turn the ignition switch to the "ON" position.
(6) Remove the fuel cap.
(7) Measure the voltage between connector D-18 terminal 1 and ground.
- The voltage should measure between 2.0 and 3.0 volts.

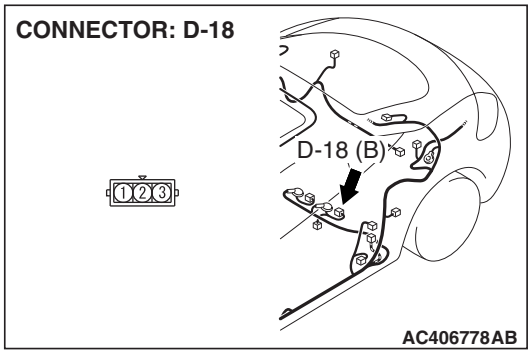
(8) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 7.
NO : Go to Step 15.





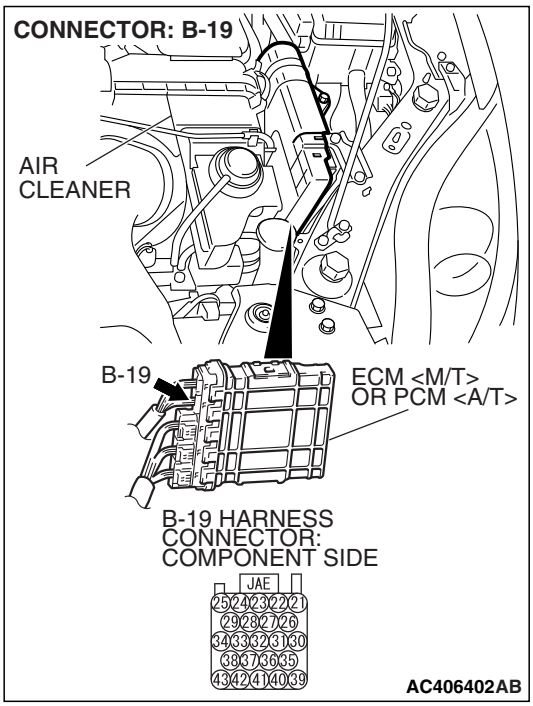


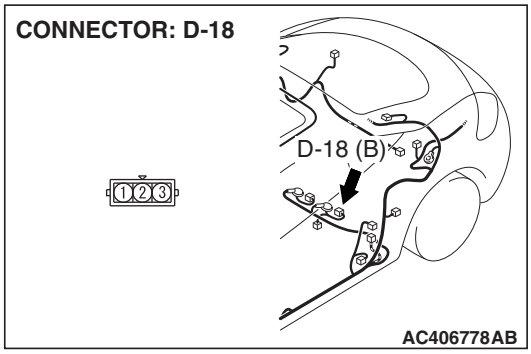
STEP 7. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.





STEP 8. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 23 and fuel tank differential pressure sensor connector D-18 terminal 1 for damage.

Q: Is the harness wire in good condition?

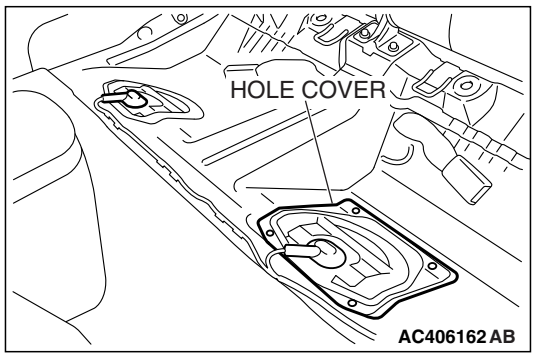
YES : This malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

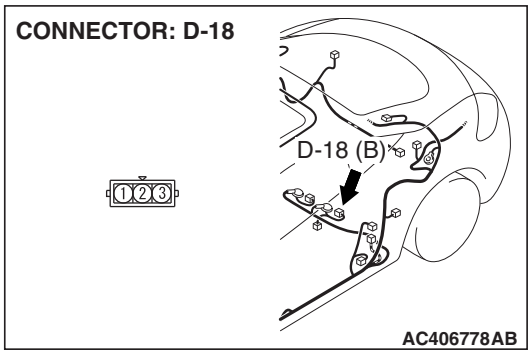
NO : Repair the damaged harness wire. Then go to Step 17.

STEP 9. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-18.

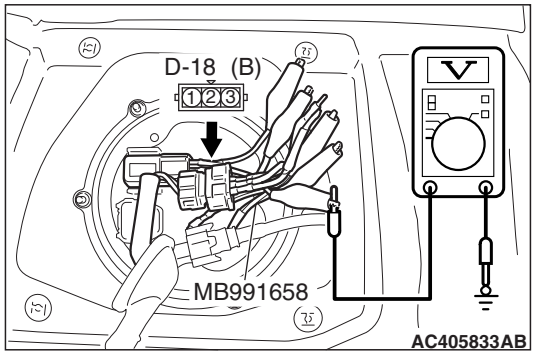
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

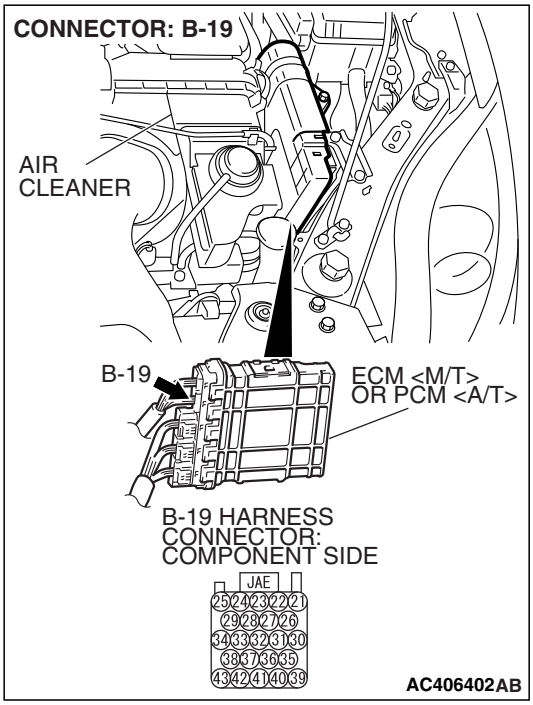
(6) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

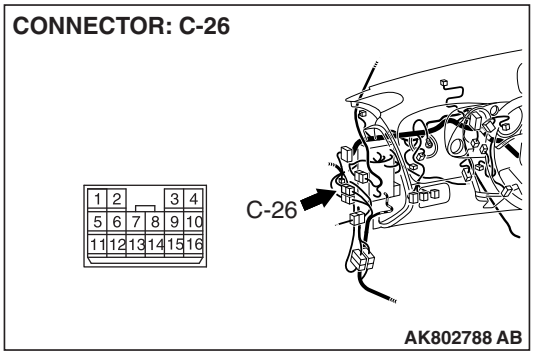
(7) Turn the ignition switch to the "LOCK" (OFF) position.

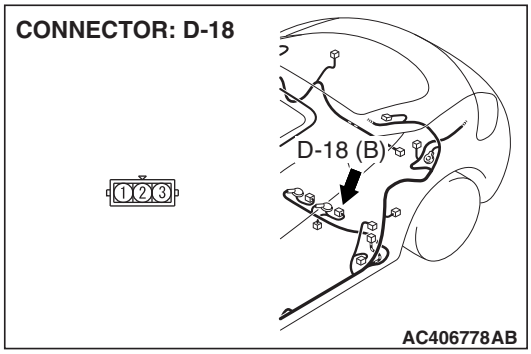
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 12.

NO : Go to Step 10.





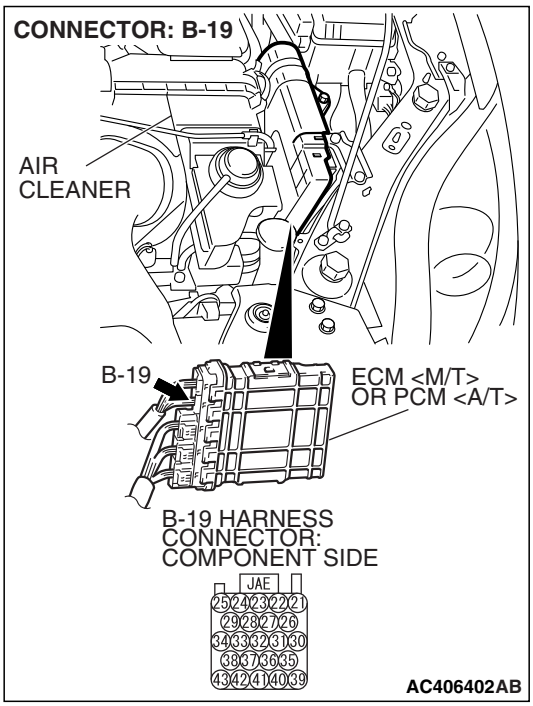


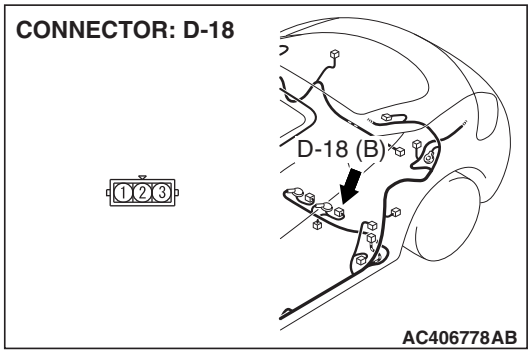
STEP 10. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.





STEP 11. Check the harness wire between ECM <M/T> or PCM <A/T> connector B-19 terminal 21 and fuel tank differential pressure sensor connector D-18 terminal 3 for damage.

Q: Are the harness wires in good condition?

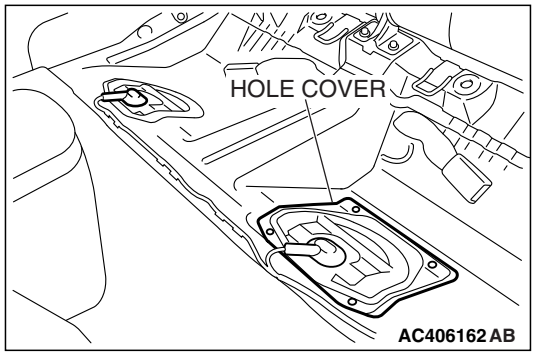
YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

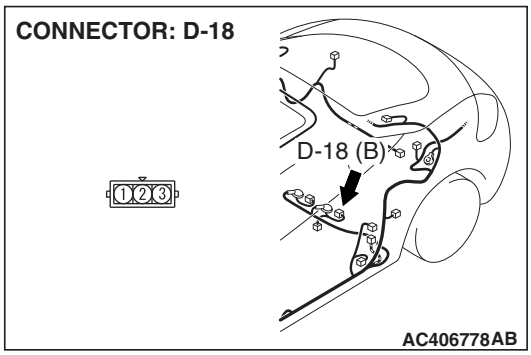
NO : Repair the damaged harness wires. Then go to Step 17.

STEP 12. Measure the fuel tank differential pressure sensor return voltage at fuel tank differential pressure sensor connector D-18.

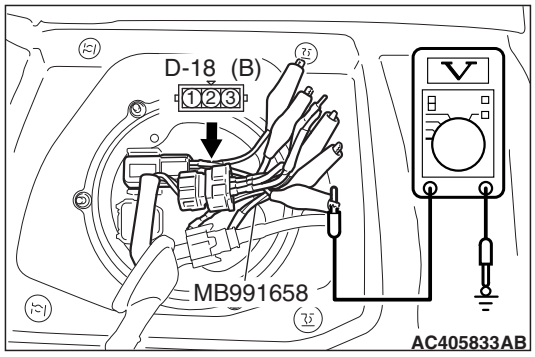
(1) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-49).

(2) Remove the hole cover.





(3) Disconnect fuel tank differential pressure sensor connector D-18.



(4) Use special tool MB991658 to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-18.

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

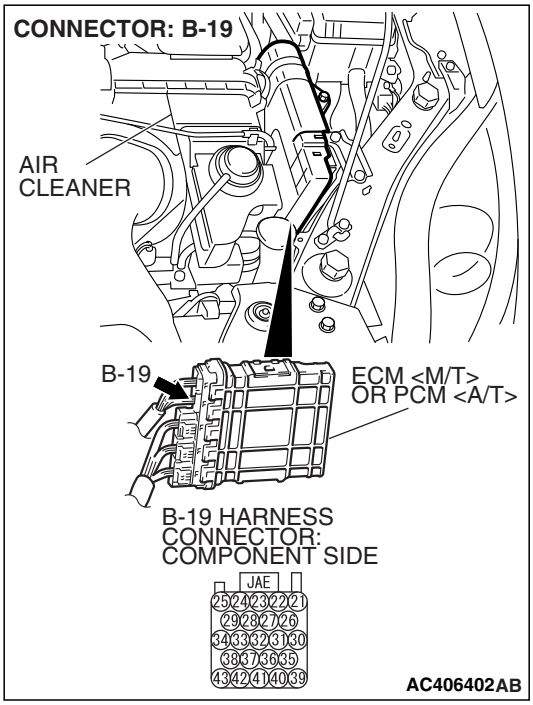
(6) Measure the voltage between terminal 2 and ground.
- The voltage should measure 0.5 volt or less.

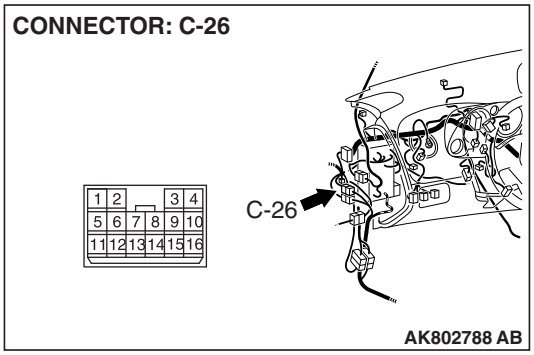
(7) Turn the ignition switch to the "LOCK" (OFF) position.

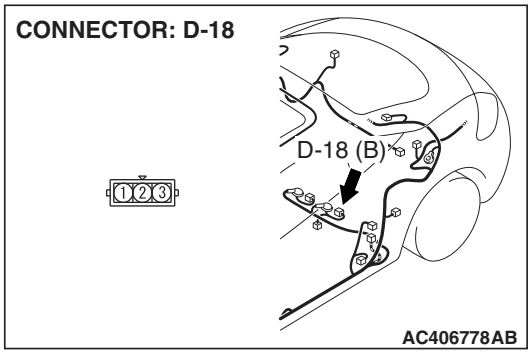
Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

NO : Go to Step 17.





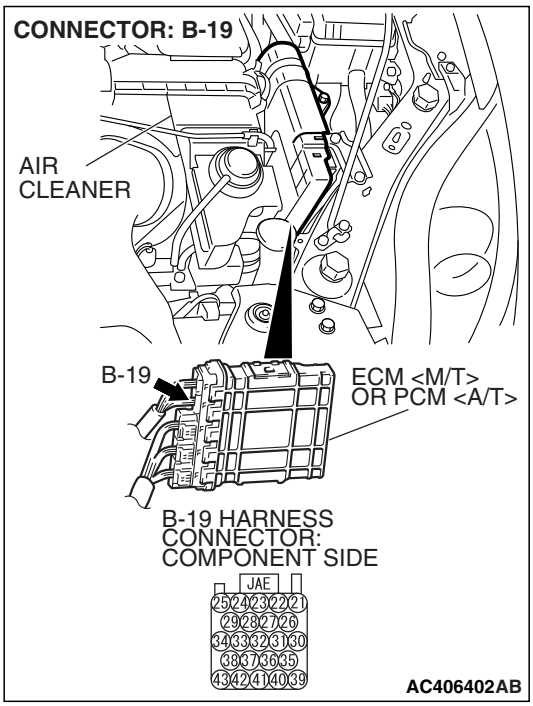


STEP 13. Check ECM <M/T> or PCM <A/T> connector B-19, intermediate connector C-26 and fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.

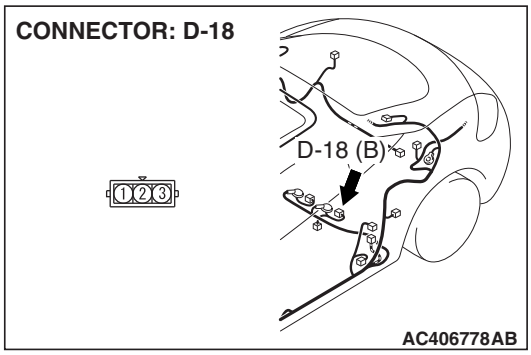


STEP 14. Check the harness wires between ECM <M/T> or PCM <A/T> connector B-19 terminal 22 and fuel tank differential pressure sensor connector D-18 terminal 2 for damage.

Q: Are the harness wires in good condition?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Repair the damaged harness wires. Then go to Step 17.

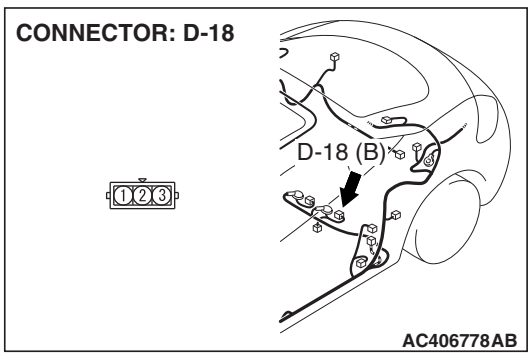


STEP 15. Check fuel tank differential pressure sensor connector D-18 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor. Then go to Step 17.

NO : Repair or replace the faulty components (Refer to GROUP 00E, Harness Connector Inspection P.00E-2). Then go to Step 17.



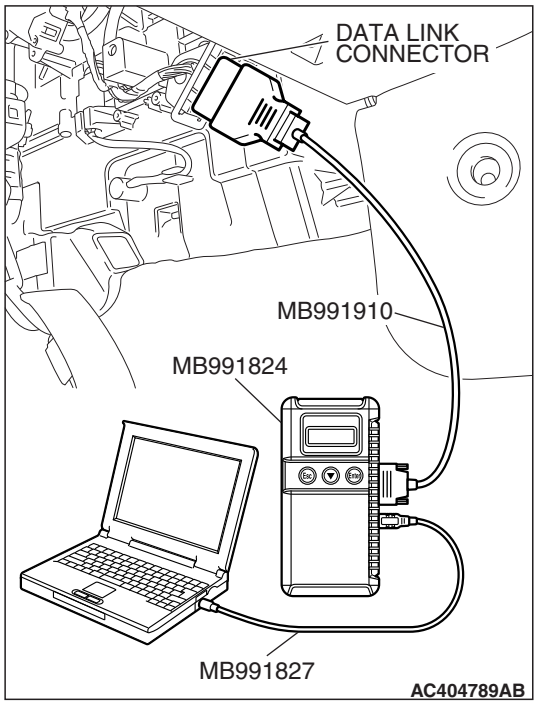
TSB Revision

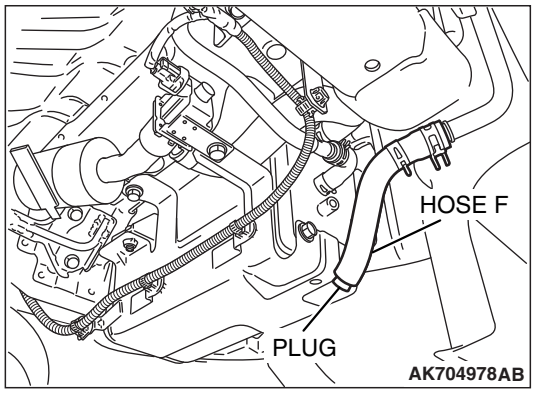
STEP 16. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

⚠ CAUTION

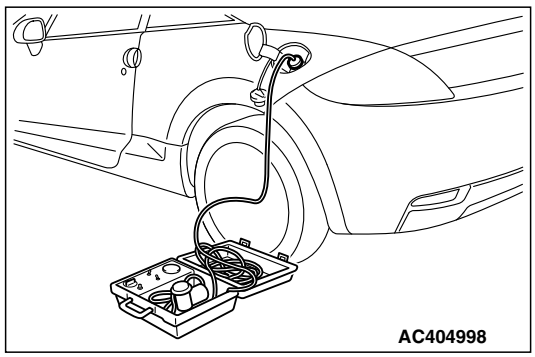
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





(2) Disconnect hose F from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
    - Item 52, Fuel Tank Differential Pressure Sensor.
        - The fuel tank pressure reading on the scan tool should be 2050 to 2950 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
    - The fuel tank pressure reading should increase.
(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(9) Connect hose F to the evaporative emission canister.

Q: Is the fuel tank pressure between 2050 and 2950 mV?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14). Go to Step 17.

NO : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

STEP 17. Perform the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6).

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

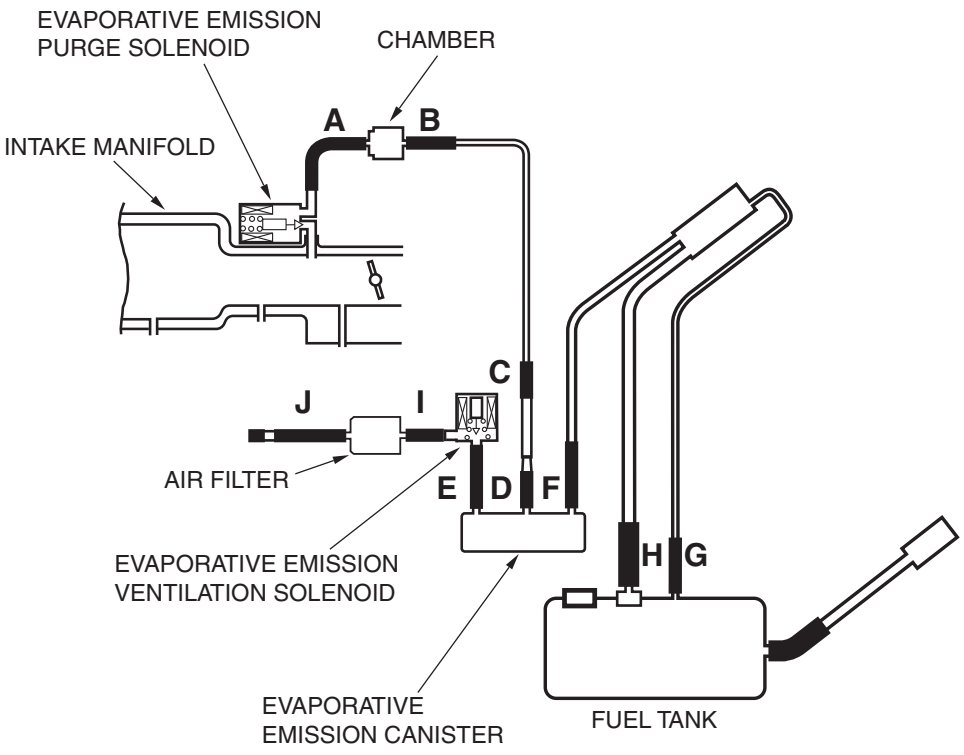
Q: Is DTC P0453 set?

YES : Repeat the troubleshooting from Step 2.

NO : The procedure is complete.

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

System Diagram



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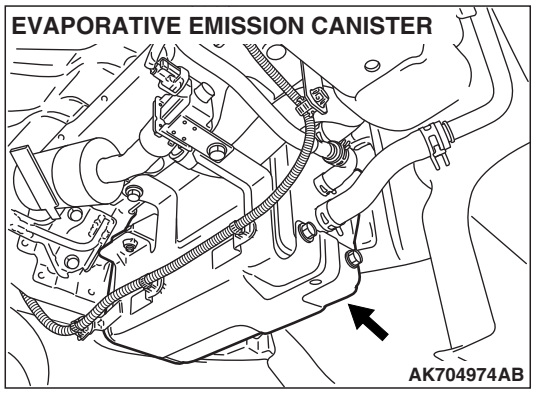

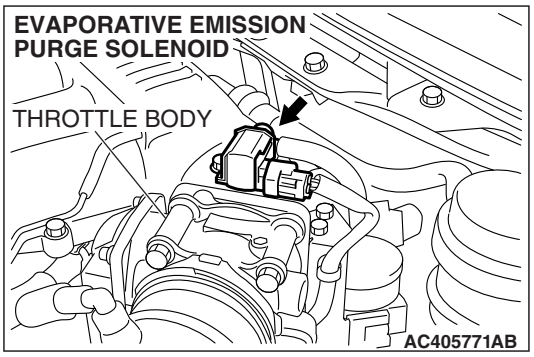

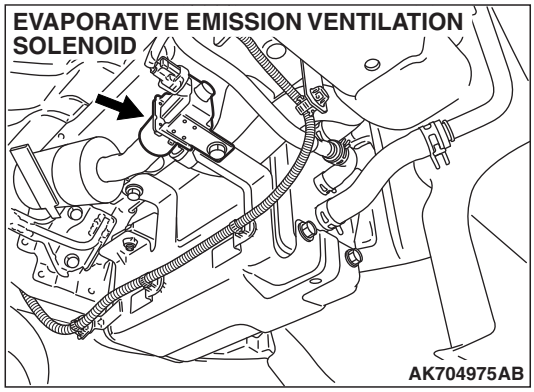

TECHNICAL DESCRIPTION

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

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

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

Sensor (The sensors below are determined to be normal)

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

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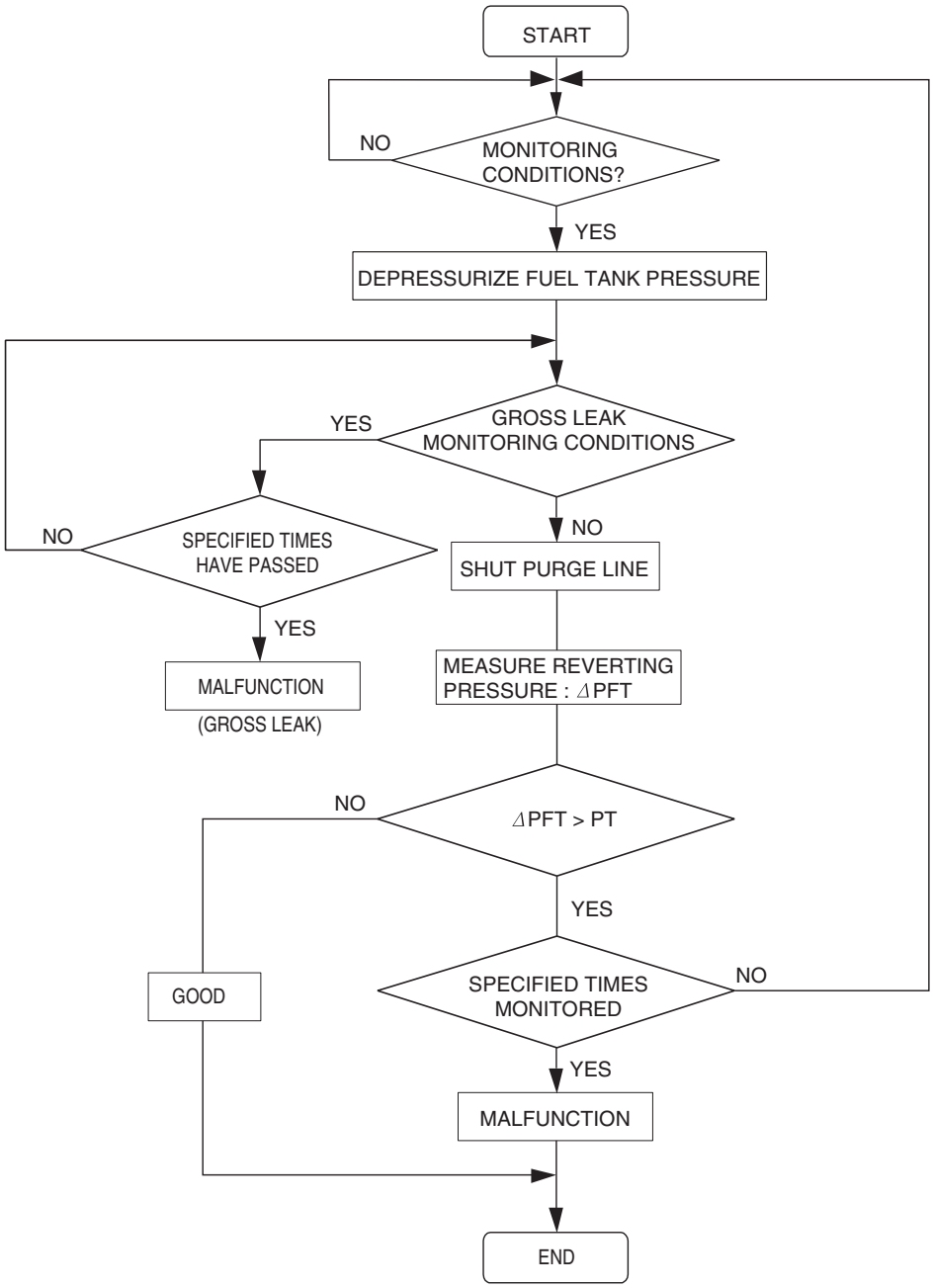
LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



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DTC SET CONDITIONS

Check Conditions A: At Start up

- Intake air temperature is 36°C (97°F) or less upon engine start up.
- The engine coolant temperature is 36°C (97°F) or less upon engine start up.

Check Conditions B: For Test to Run

- The engine coolant temperature is 60°C (140°F) or greater and the fuel tank is 15 – 40 percent full.
- The engine coolant temperature is 20°C (68°F) or greater and the fuel tank is 40 – 85 percent full.
- The engine speed is greater than or equal to 1,594 r/min.
- Barometric pressure is greater than 76 kPa (11 psi).

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- Volumetric efficiency is between 20 and 70 percent.
- The fuel temperature is 36°C (97°F) or less.
- The fuel tank differential pressure sensor output voltage is 1 – 4 volts.

Check Conditions C: For Test to Stop

- The intake air temperature is greater than 5°C (41°F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank rises to 451 Pa (0.065 psi) or less and the amount of remaining fuel is 15 – 40 percent of capacity upon engine start-up.
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank rises to 324 Pa (0.047 psi) or less and the amount of remaining fuel is 40 – 85 percent of capacity upon engine start-up.
- 10 seconds have elapsed from the start of the previous monitoring.
- Monitoring time: 150 seconds.

Judgement Criterion

- The fuel tank internal pressure is 2 kPa (0.29 psi) or more after the evaporative emission purge solenoid valve has been driven when the fuel tank and vapor line were closed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6.

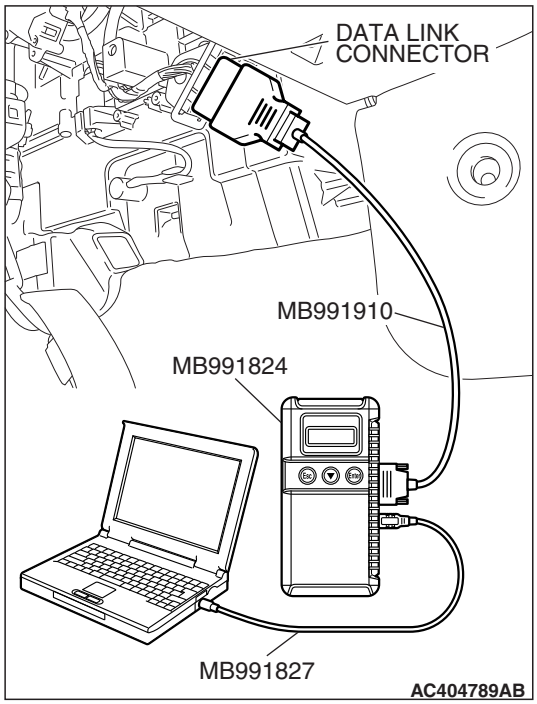
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Loose fuel cap.
- Fuel cap relief pressure is incorrect.
- Fuel overflow limiter valve failed.
- Purge line or vapor line is clogged.
- Fuel tank, purge line or vapor line seal failed.
- Evaporative emission purge solenoid valve failed.
- Evaporative emission ventilation solenoid valve failed.
- Fuel tank differential pressure sensor failed.
- Evaporative emission canister seal is faulty.
- Evaporative emission canister is clogged.

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

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

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-43. 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.

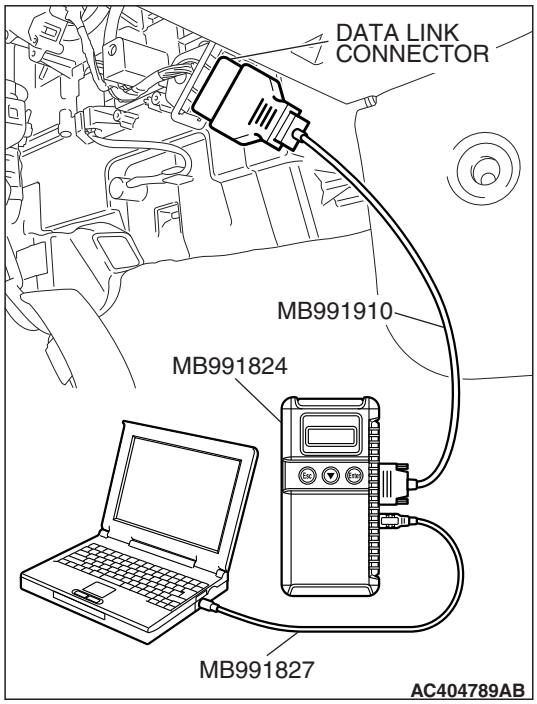
NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1.

STEP 2. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid Valve.

⚠ CAUTION

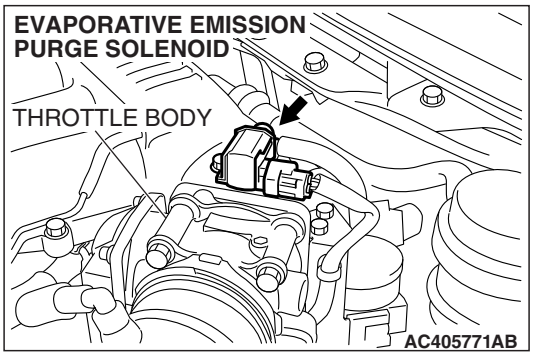
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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



(2) Remove the evaporative emission purge solenoid from the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

(3) Connect the harness connector to the evaporative emission purge solenoid.



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

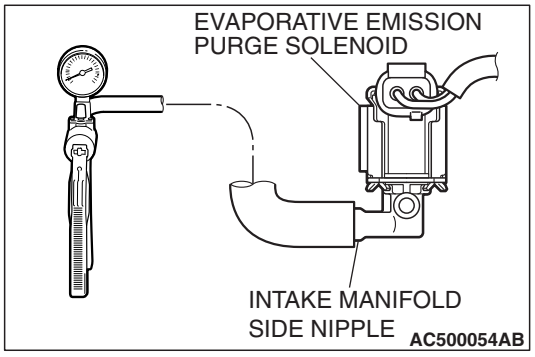
(5) Turn the ignition switch to the "ON" position.

(6) Set scan tool MB991958 to actuator test mode.
- Item 10: Evaporative Emission Purge Solenoid Valve.
  - When the evaporative emission purge solenoid valve is operated, apply a pressure on the hand vacuum pump and confirm that air is blown from the other side nipple.

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

(8) Remove the hose of the hand vacuum pump from the evaporative emission purge solenoid valve.

(9) Remove the harness connector from the evaporative emission purge solenoid.



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(10)Install the evaporative emission purge solenoid to the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

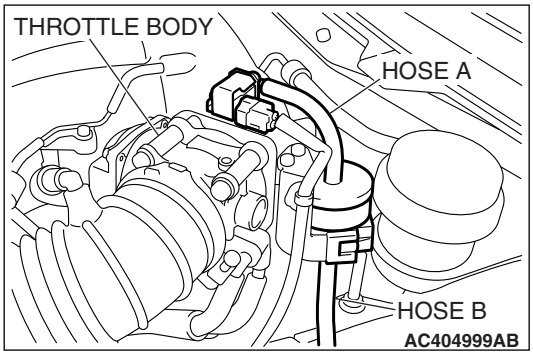
Q: Is the solenoid valve in good condition?

YES : Go to Step 3.

NO : Replace the evaporative emission purge solenoid valve (Refer to GROUP 15, Intake Manifold Plenum). Then go to Step 17.

STEP 3. Check for leaks and clogging in evaporative emission hoses A through B.

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



Q: Are the hoses in good condition?

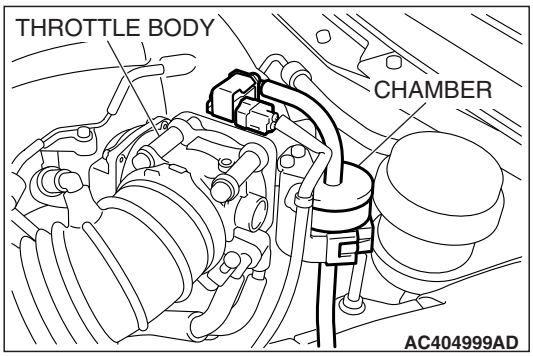
YES : Go to Step 4.

NO : Replace the damaged hose. Then go to Step 17.

STEP 4. Check for leaks and clogging in the chamber.

(1) When you blow the chamber, it should pass less air.

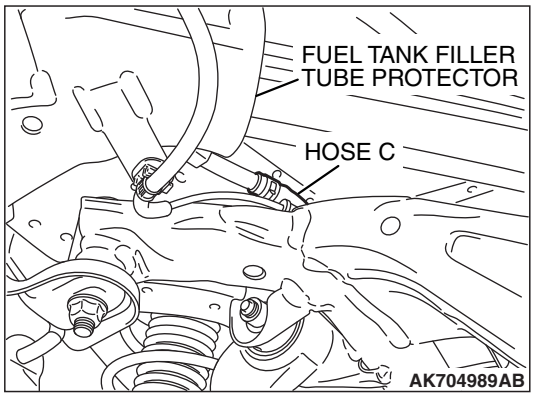
(2) When you blow the chamber, on air should leak from the chamber body.

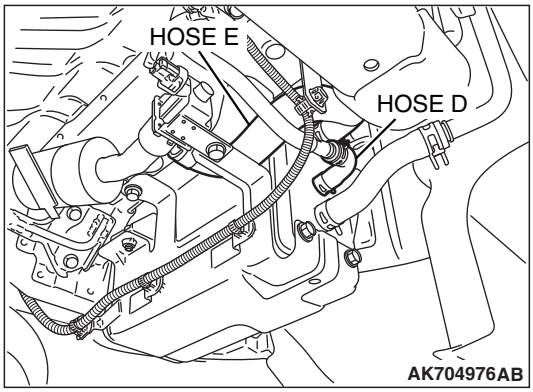


Q: Is the chamber in good condition?

YES : Go to Step 5.

NO : Replace the chamber. Then go to Step 17.





STEP 5. Check for leaks and clogging in evaporative emission hoses C through E.

Perform a vacuum test using a hand vacuum pump on hoses C through E.

Q: Are the hoses in good condition?

YES : Go to Step 6.

NO : Replace the damaged hose. Then go to Step 17.

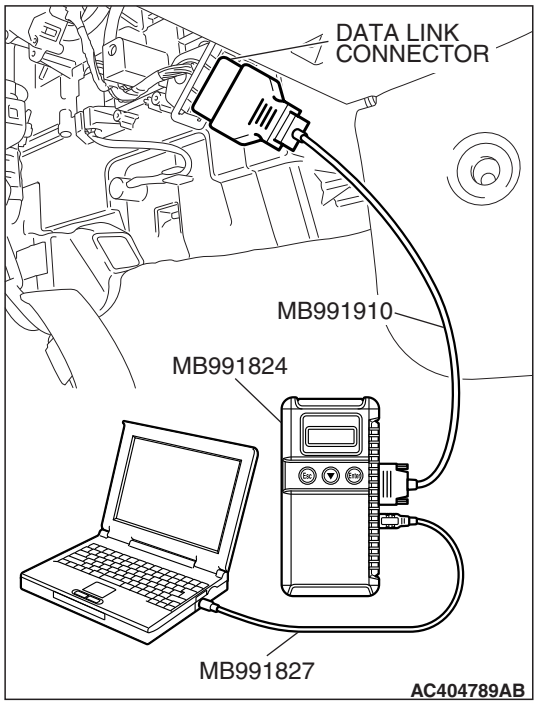
STEP 6. Using scan tool MB991958, check actuator test item 15: Evaporative emission ventilation solenoid.

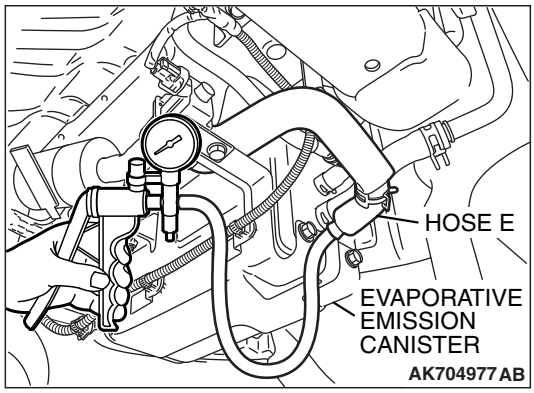
⚠ CAUTION

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) Remove the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).





(3) Disconnect the hose E and evaporative emission canister connection, and connect the hand vacuum pump to the hose E.

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

(5) Set scan tool MB991958 to actuator test mode.
- 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, and disconnect scan tool MB991958.

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

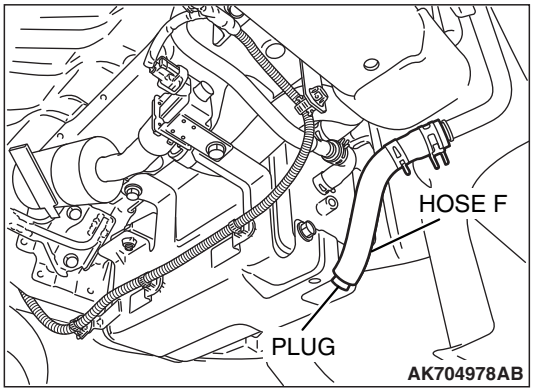
(8) Reinstall the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).

Q: Did the evaporative emission ventilation solenoid hold vacuum?

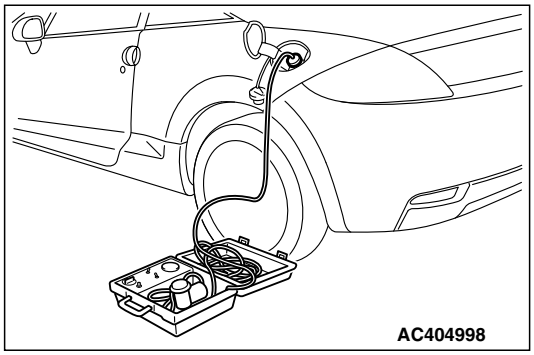
YES : Go to Step 7.

NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-112). Then go to Step 17.

STEP 7. Pressure test the evaporative emission system lines from hoses F to I.



(1) Disconnect hose F from the evaporative emission canister, and plug hose F securely.
(2) 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.
(3) Remove the fuel cap.



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

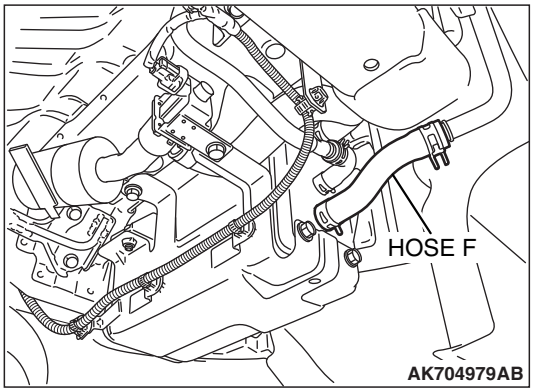
NOTE: The "Pressure test" in this procedure refers to the I/M240 Simulation Test. The eight steps of this test are described in the manufacturer's instructions for the evaporative emission system pressure pump, Miller number 6872A.

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

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

YES : Go to Step 12.
NO : Go to Step 8.

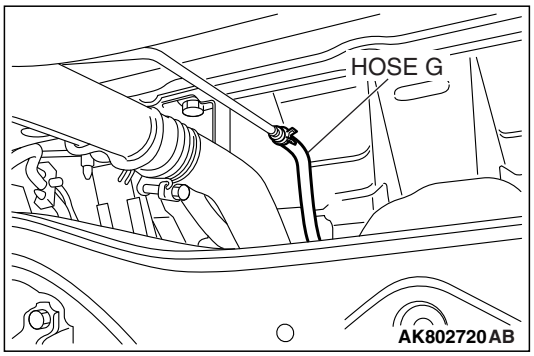
STEP 8. Check for leaks in evaporative emission hose F.



(1) Remove the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).
(2) Use a hand vacuum pump to check the hose F.

Q: Do the hose hold vacuum?

YES : Go to Step 9.
NO : Replace any damaged hose, and reinstall rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4). Then go to Step 17.



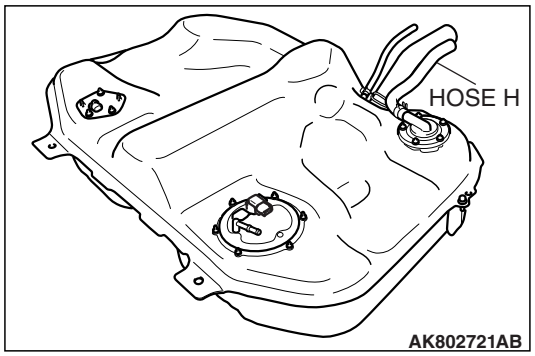
STEP 9. Check for leaks in evaporative emission hoses G.

Use a hand vacuum pump to test each hose G.

Q: Do the hoses hold vacuum?

YES : Go to Step 10.

NO : Replace any damaged hose. Then go to Step 17.



STEP 10. Check for leaks in evaporative emission hose H.

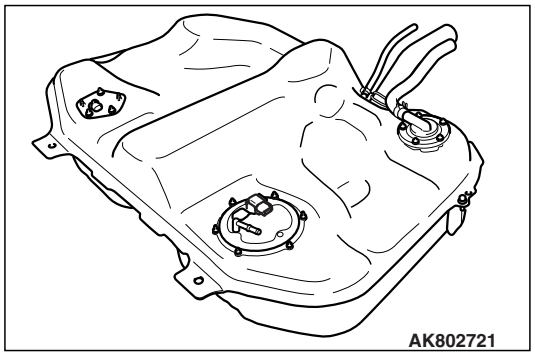
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11).

(2) Use the hand vacuum pump to check the hose H.

Q: Does the hose hold vacuum?

YES : Go to Step 11.

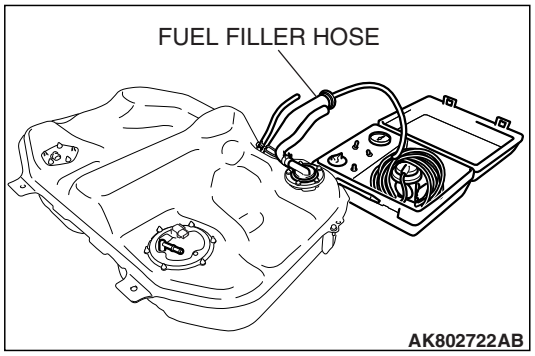
NO : Replace the hose and reinstall the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 17.



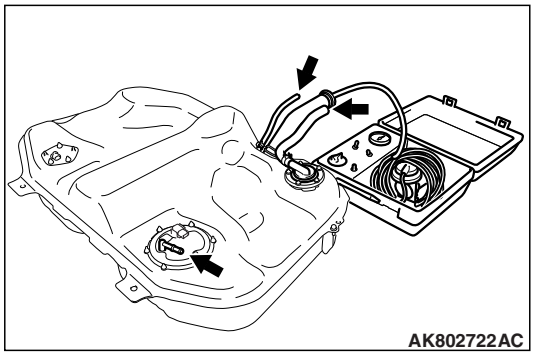
STEP 11. Check for leaks in the fuel tank.

(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 (sub) or leveling valve.> : Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 17 .

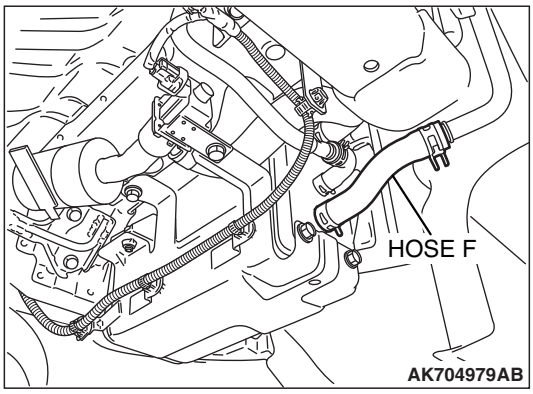
YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Go to Step 17.

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 16.

STEP 12. Check for clogging in evaporative emission system hose F.

(1) Remove the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).

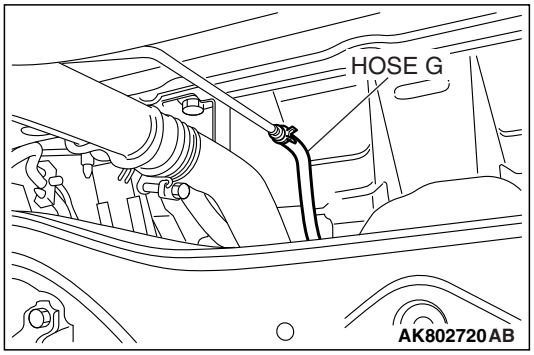
(2) Use a hand vacuum pump to check the hose F.



Q: Is the hose in good condition?

YES : Go to Step 13.

NO : Replace the damaged hose, and reinstall the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4). Then go to Step 17.



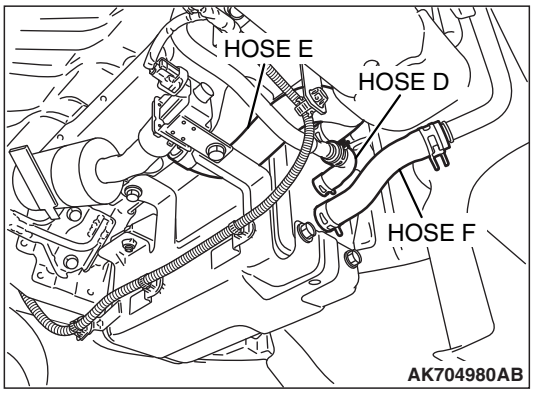
STEP 13. Check for clogging in evaporative emission hoses G.

Use a hand vacuum pump to test each hose G.

Q: Are the hoses in good condition?

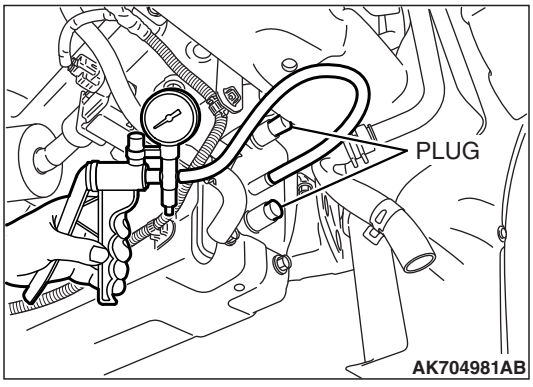
YES : Go to Step 14.

NO : Replace any damaged hose. Then go to Step 17.



STEP 14. Check the evaporative emission canister for leaks and clogging.

(1) Disconnect hoses D, E and F from the evaporative emission canister side, and connect a hand vacuum pump to the evaporative emission canister instead of hose D, and plug the other nipples.

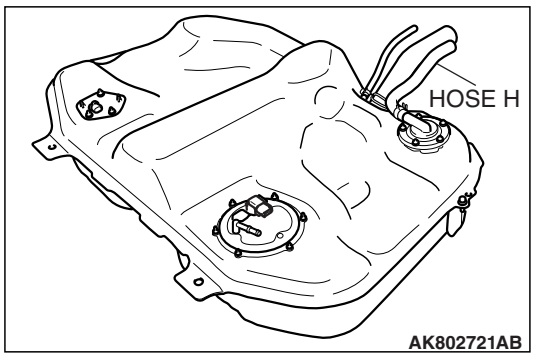


(2) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(3) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(4) When the plugs are removed, check for air leakage.
(5) Disconnect the hand vacuum pump, and connect hoses D, E and F to the canister.

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 15.

NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112). Then go to Step 17 .



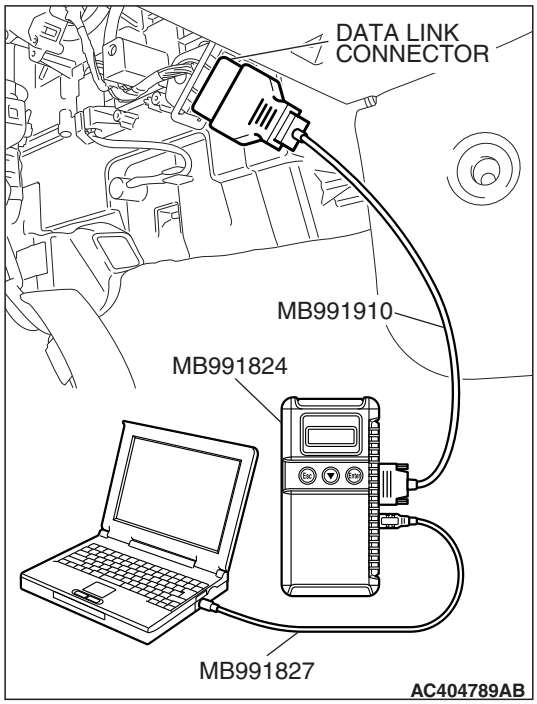
STEP 15. Check for clogging in evaporative emission hose H.

(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11).
(2) Use the hand vacuum pump to check the hose H.

Q: Is the hose in good condition?

YES : Reinstall the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 16.

NO : Replace any damaged hose and reinstall the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 17.



STEP 16. 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> position.**

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

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

YES : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

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 17 .

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 16.

STEP 17. Perform the OBD-II drive cycle.

(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 5 P.13B-6).
(2) Read the diagnostic trouble code (DTC).

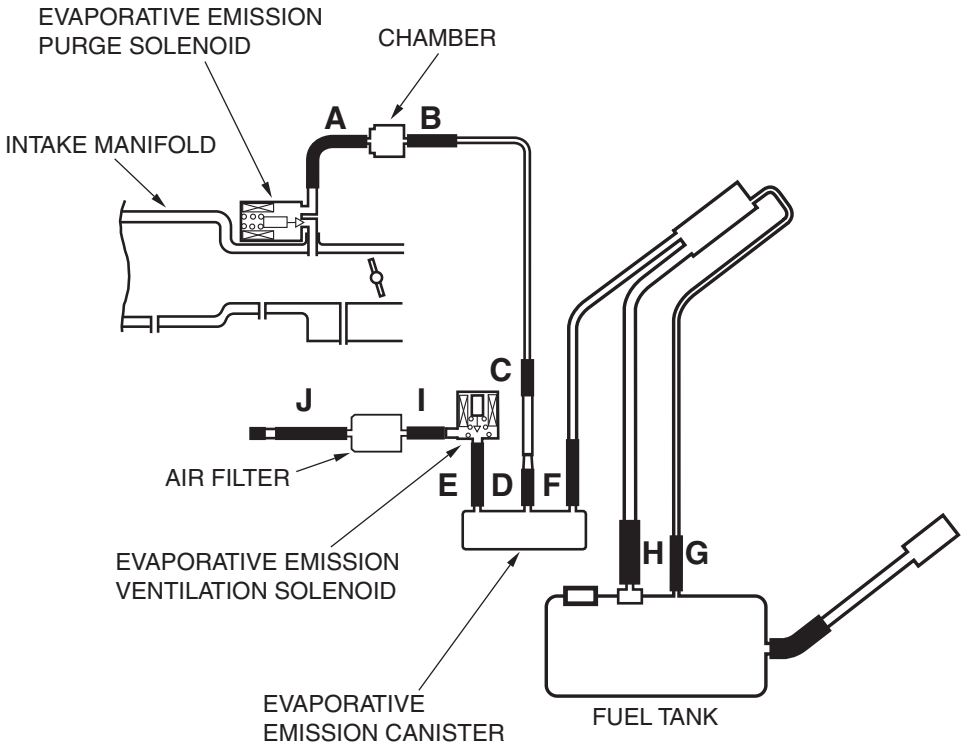
Q: Is DTC P0455 set?

YES : Repeat the troubleshooting from Step 1.
NO : The procedure is complete.

TSB Revision

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

System Diagram



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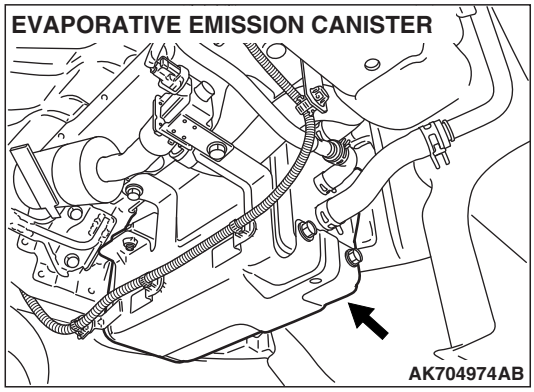
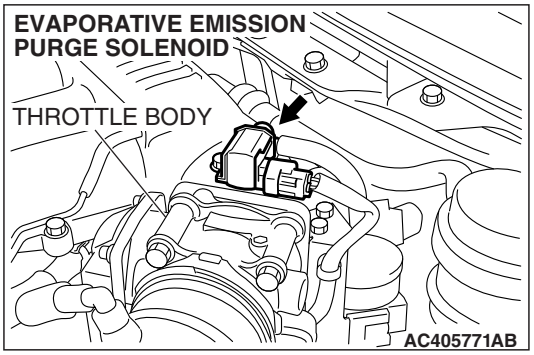
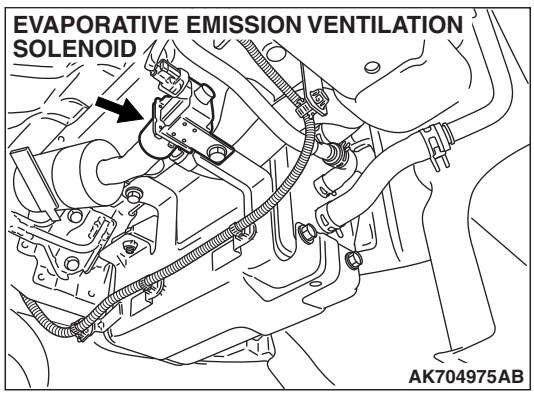






TSB Revision

TECHNICAL DESCRIPTION

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

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

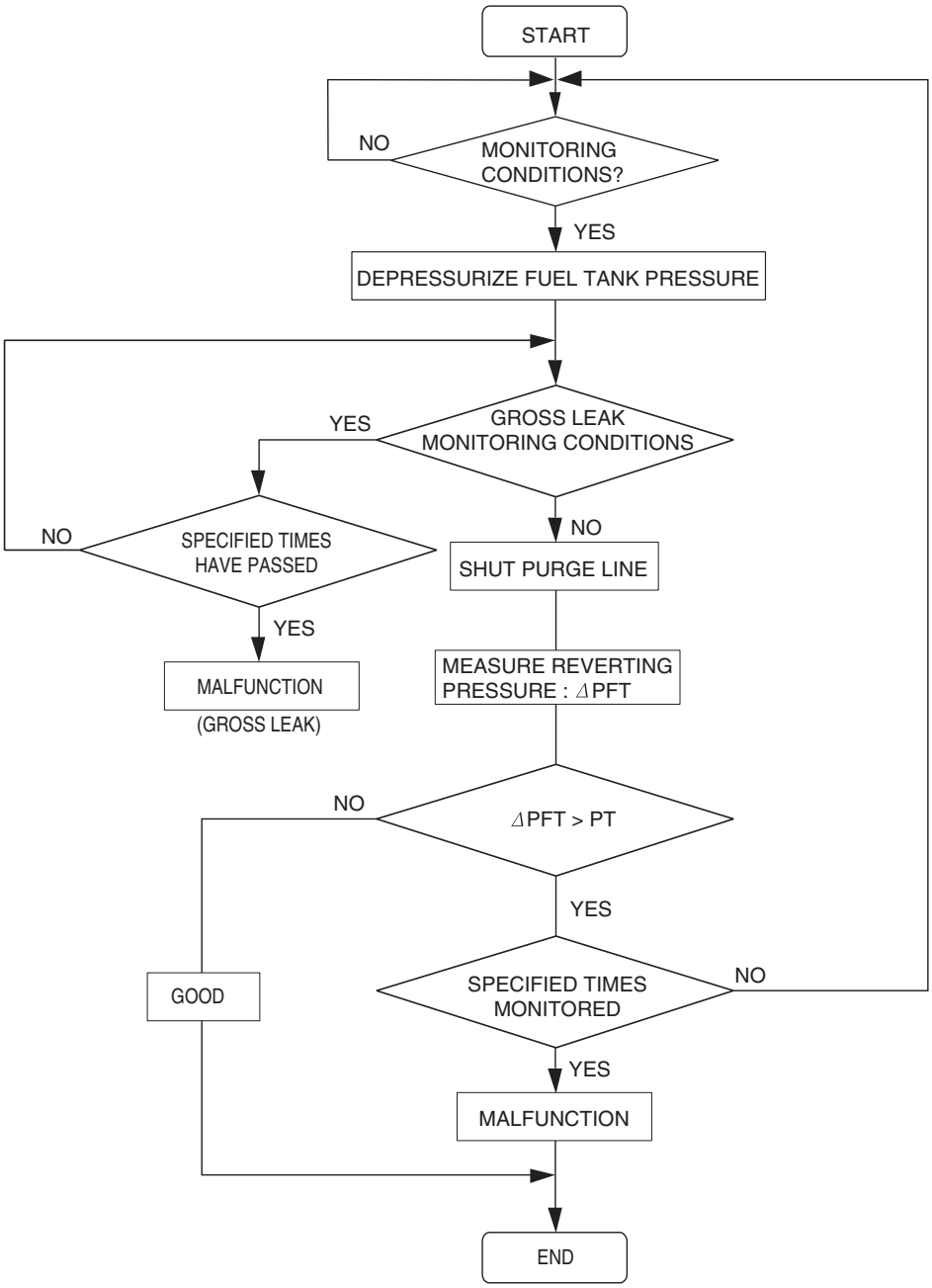
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



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DTC SET CONDITIONS

Check Conditions A: At Start up

- Intake air temperature is 36°C (97°F) or less when the engine is started.
- The engine coolant temperature is 36°C (97°F) or less when the engine is started.
- The fuel level sensor output voltage is 2.4 – 3.7 volts when the engine starts and the amount of remaining fuel is 40 – 85 percent of capacity.

Check Conditions B: For Test to Run

- Barometric pressure is greater than 76 kPa (11 psi).
- The fuel temperature is 33°C (91°F) or less.
- Fuel tank differential pressure sensor output voltage is 1 to 4 volts.

TSB Revision

Check Conditions C: For Test to Stop

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

Judgement Criterion

- Internal pressure of the fuel tank has changed more than 1,177 – 1,373 Pa (0.177 – 0.199 psi) in 128 seconds after the tank and vapor line were closed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 6 P.13B-6.

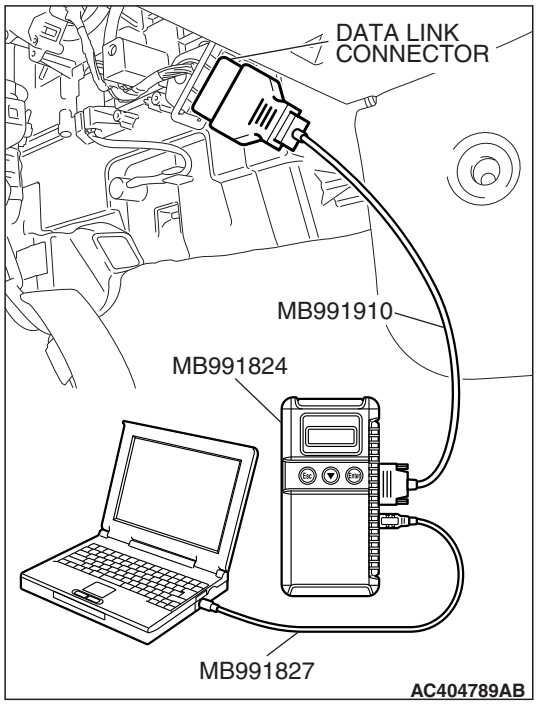
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Loose fuel cap.
- Fuel cap relief pressure is incorrect.
- Malfunction of the evaporative emission canister seal.
- Malfunction of the fuel tank, purge line or vapor line seal.
- Malfunction of the evaporative emission ventilation solenoid.

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

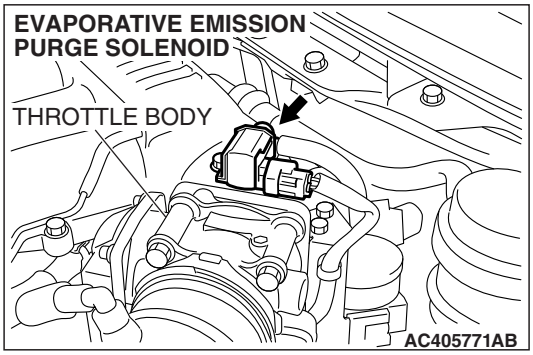
Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-43. If no other DTC's have been set, go to Step 2.

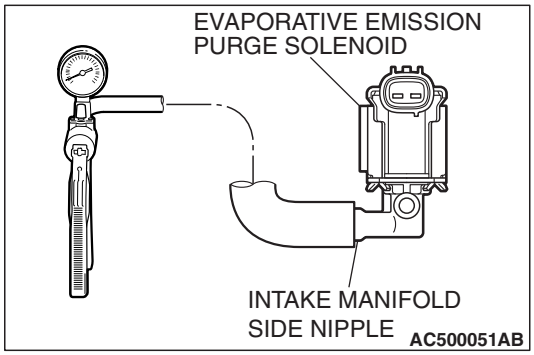
NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Explain to the customer that an improperly tightened fuel cap can cause the MIL to illuminate. Return the vehicle to the customer.

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.



(1) Remove the evaporative emission purge solenoid from the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

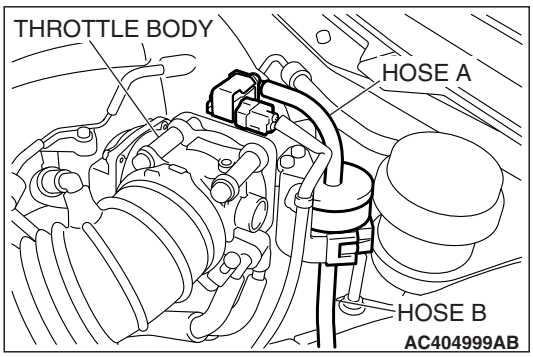


(2) Connect the hose of the hand vacuum pump to the intake manifold side nipple of the evaporative emission purge solenoid.
(3) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.
(4) Install the evaporative emission purge solenoid to the intake manifold (Refer to GROUP 15, Intake Manifold P.15-14).

Q: Does the evaporative emission purge solenoid hold vacuum?

YES : Go to Step 3.
NO : Replace the evaporative emission purge solenoid. Then go to Step 14.

STEP 3. Check for leaks in evaporative emission hoses A and B.

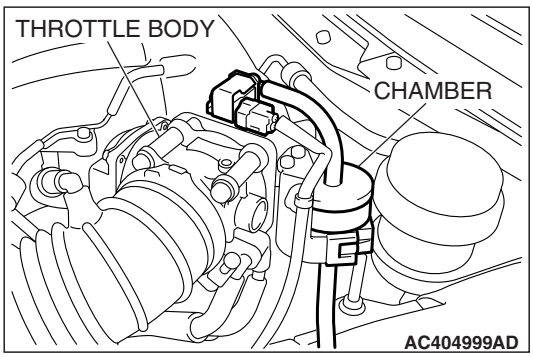


Use a hand vacuum pump to test each hose from hose A to hose B.

Q: Do the hoses hold vacuum?

YES : Go to Step 4.
NO : Replace any damaged hose. Then go to Step 14.

STEP 4. Check for leaks in the chamber.



(1) Connect a hand vacuum pump to the nipple.
(2) Plug the other nipple.
(3) Apply vacuum with the hand vacuum pump, and confirm that the applied vacuum does not fluctuate.

Q: Is the chamber in good condition?

YES : Go to Step 5.
NO : Replace the chamber. Then go to Step 14.

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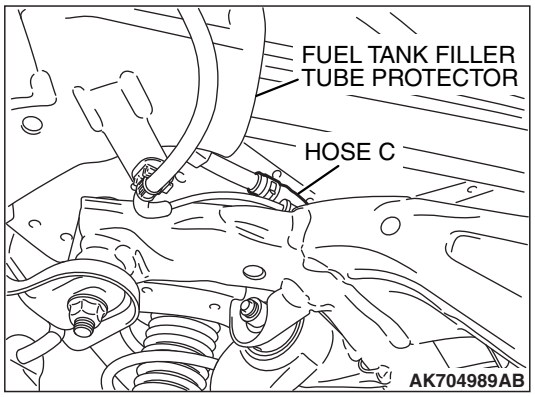
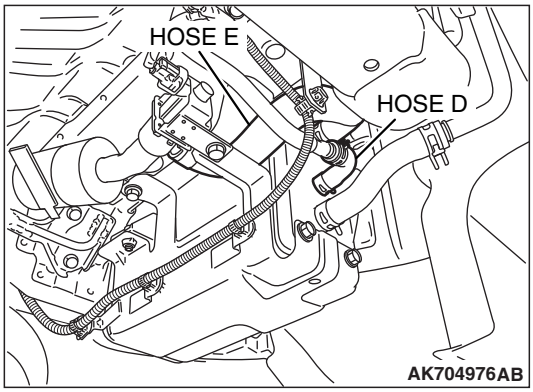




STEP 5. Check for leaks in evaporative emission hoses C through E.

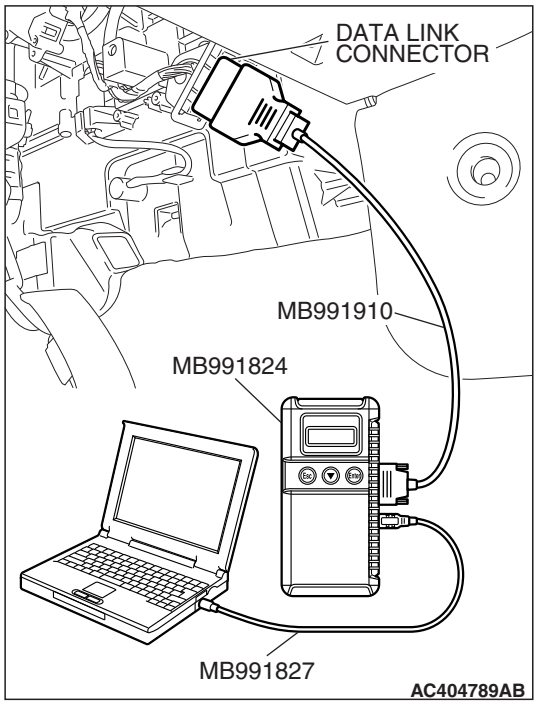
Use a hand vacuum pump to test each hose from hose C to hose E.

Q: Do the hoses hold vacuum?

YES : Go to Step 6.

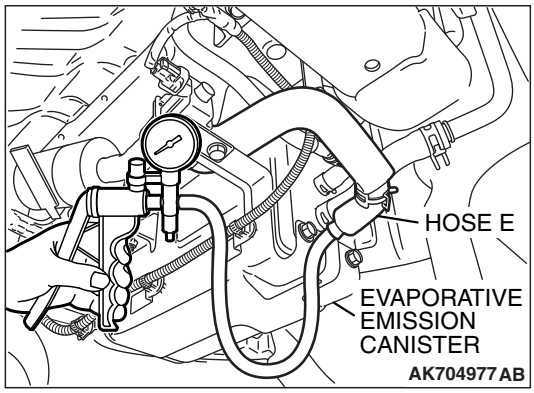
NO : Replace any damaged hose. Then go to Step 14.

STEP 6. 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) Remove the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).



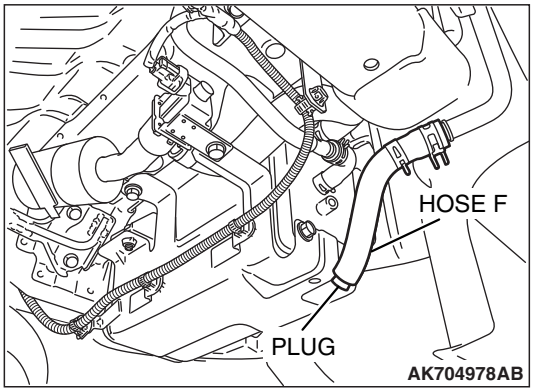
(3) Disconnect the hose E and evaporative emission canister connection, and connect the hand vacuum pump to the hose E.
(4) Turn the ignition switch to the "ON" position.
(5) Set scan tool MB991958 to actuator test mode.
- Item 15: Evaporative Emission Ventilation Solenoid.
  - While the evaporative 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, and disconnect scan tool MB991958.
(7) Disconnect the hand vacuum pump, and connect hose E to the evaporative emission canister.
(8) Reinstall the rear splash shield (Refer to GROUP 51, Rear Bumper Assembly P.51-4).

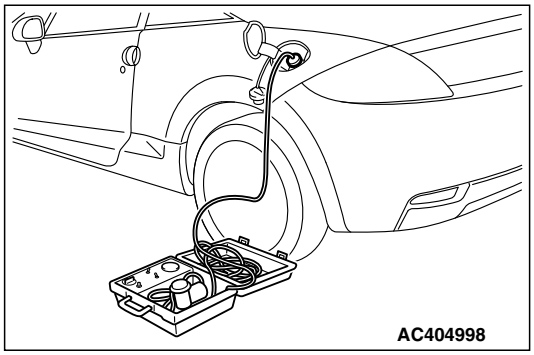
Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 7.
NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-112). Then go to Step 14.

STEP 7. Pressure test the evaporative emission system lines from hoses F to I.



(1) Disconnect hose F from the evaporative emission canister, and plug hose F securely.
(2) 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.
(3) Remove the fuel cap.



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

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

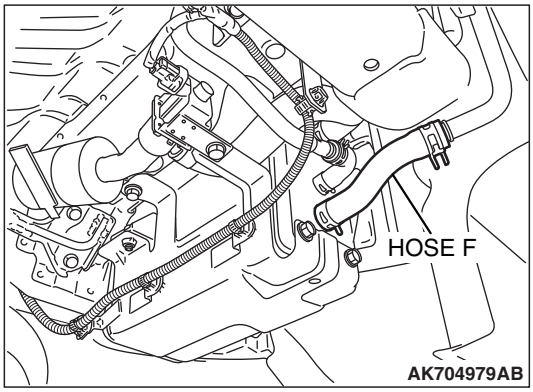
(6) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(7) Connect hose F to the evaporative emission canister.

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

YES : Go to Step 12.
NO : Go to Step 8.

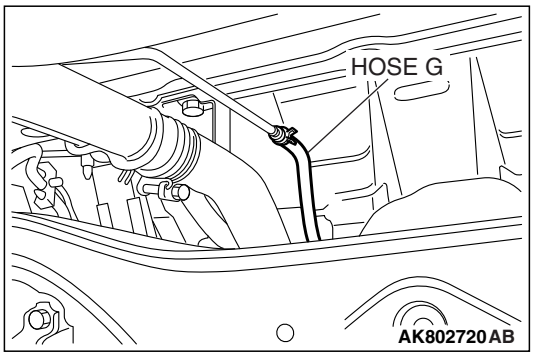
STEP 8. Check for leaks in evaporative emission hose F.

(1) Remove the fuel tank filler tube protector (Refer to GROUP 13C, Fuel Tank P.13C-11).
(2) Use a hand vacuum pump to check the hose F.



Q: Do the hose hold vacuum?

YES : Go to Step 9.
NO : Replace any damaged hose. Then go to Step 14.



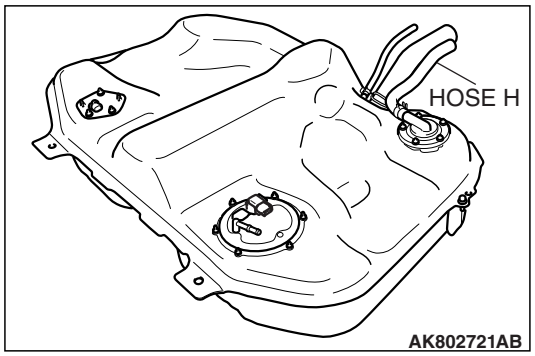
STEP 9. Check for leaks in evaporative emission hoses G.

Use a hand vacuum pump to test each hose G.

Q: Do the hoses hold vacuum?

YES : Go to Step 10.

NO : Replace any damaged hose. Then go to Step 14.



STEP 10. Check for leaks in evaporative emission hose H.

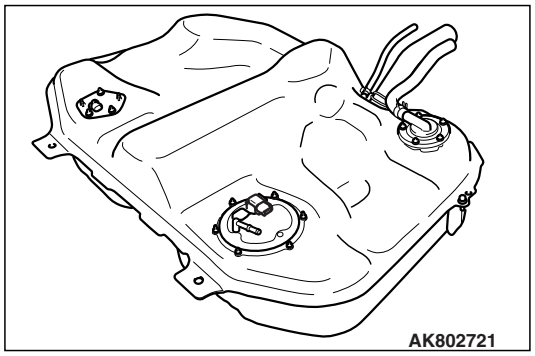
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11).

(2) Use the hand vacuum pump to check the hose H.

Q: Dose the hose hold vacuum?

YES : Go to Step 11.

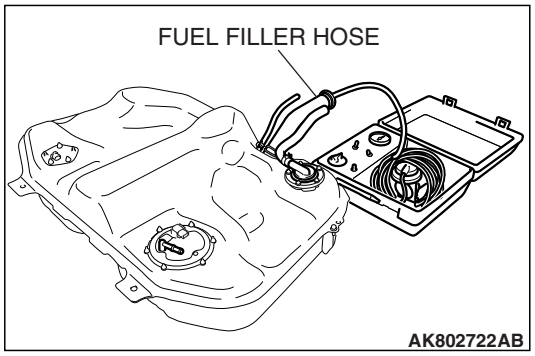
NO : Replace the hose and reinstall the fuel tank assembly (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 14.



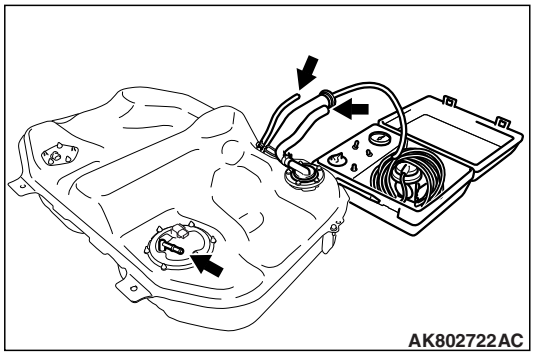
STEP 11. Check for leaks in the fuel tank.

(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.

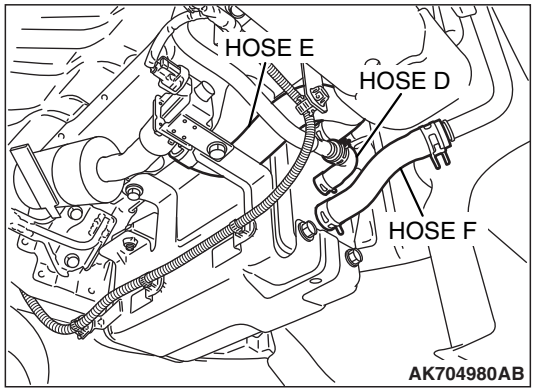
Q: Are any leaks found?

YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor (sub) or leveling valve.> : Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Then go to Step 14 .

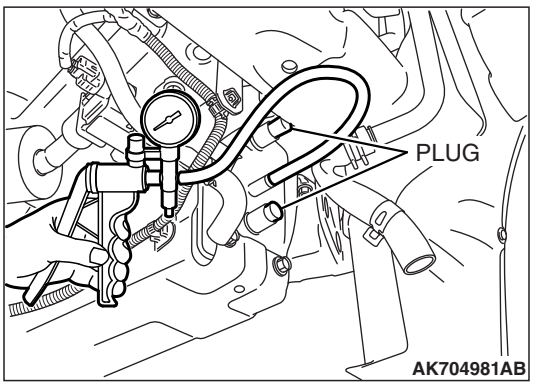
YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank P.13C-11). Go to Step 14.

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

STEP 12. Check the evaporative emission canister for vacuum leaks.



(1) Remove the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112).

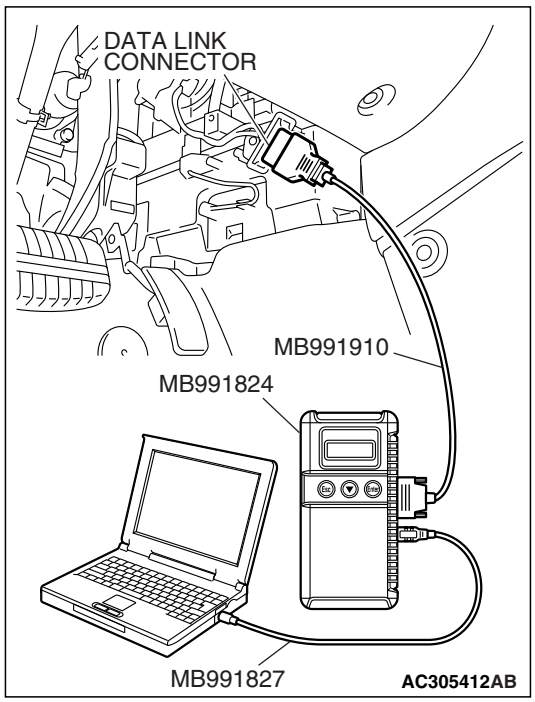


(2) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(3) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(4) Disconnect the hand vacuum pump and remove the plugs, and then install the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112).

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 13.

NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-112). Then go to Step 14 .



STEP 13. 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> position.**

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

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

YES : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.Then go to Step 14.

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 14 .

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 13.

STEP 14. Perform the OBD-II drive cycle.

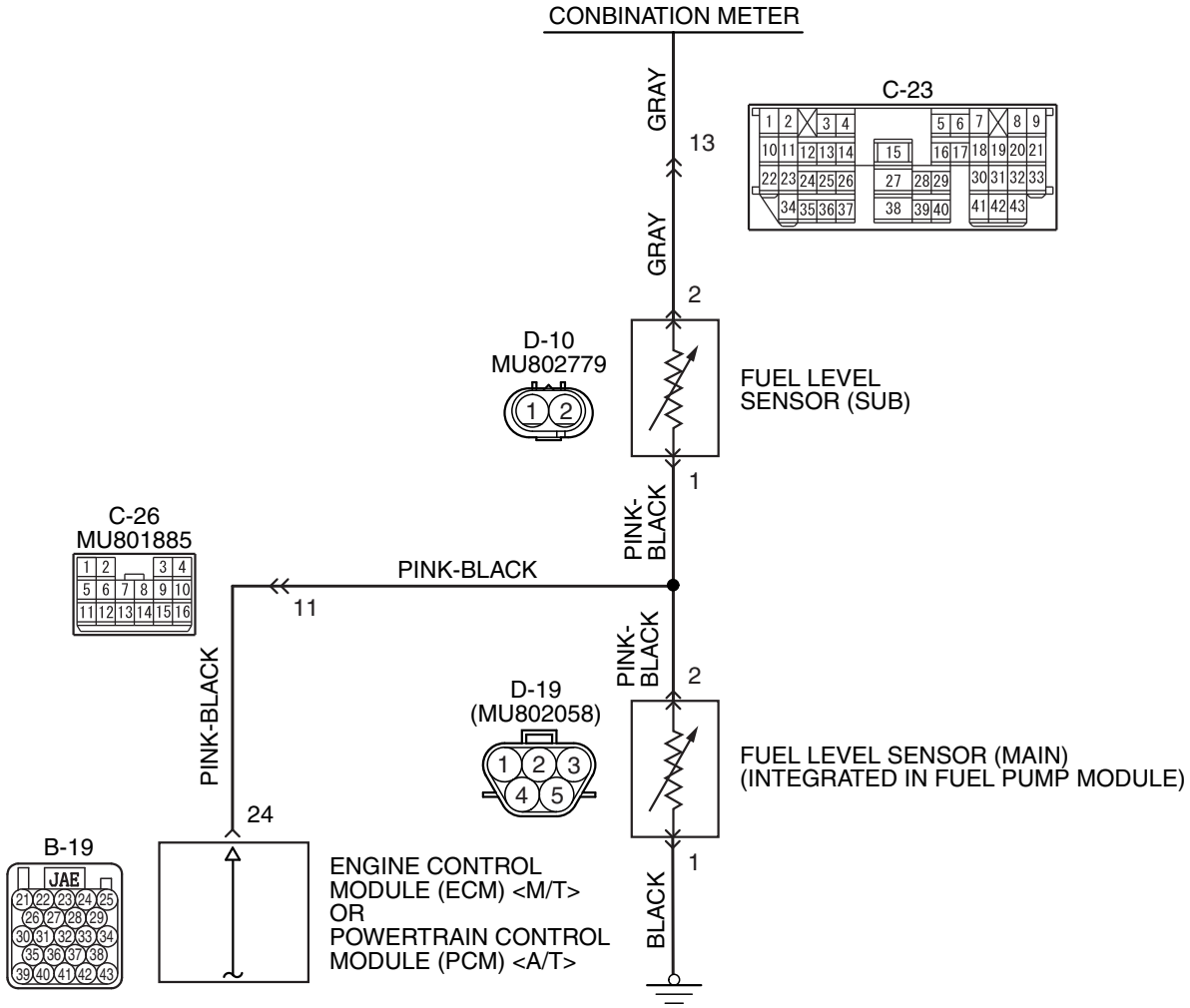
(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 6 P.13B-6).
(2) Read the diagnostic trouble code (DTC).

Q: Is DTC P0456 set?

YES : Repeat the troubleshooting from Step 1.
NO : The procedure is complete.

DTC P0461: Fuel Level Sensor (main) Circuit Range/Performance

Fuel Level Sensor Circuit



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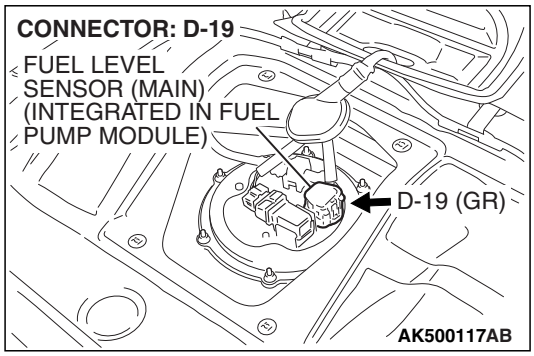

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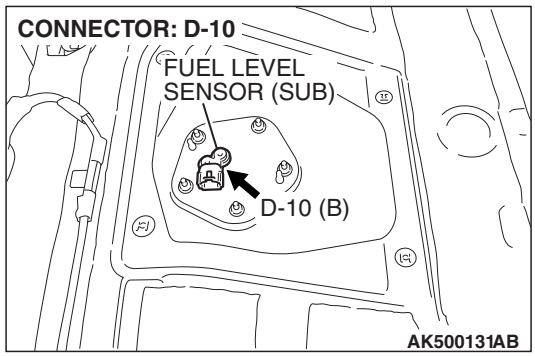

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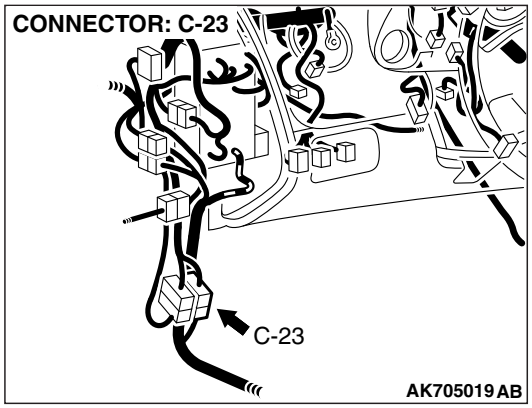
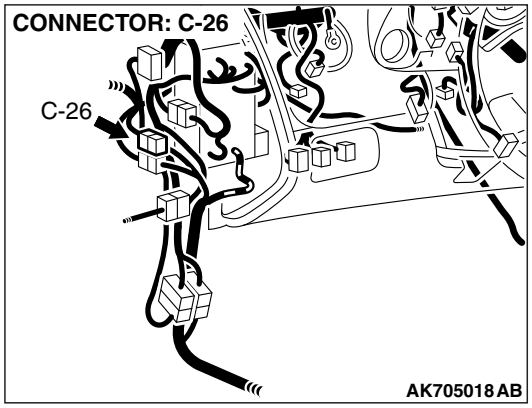
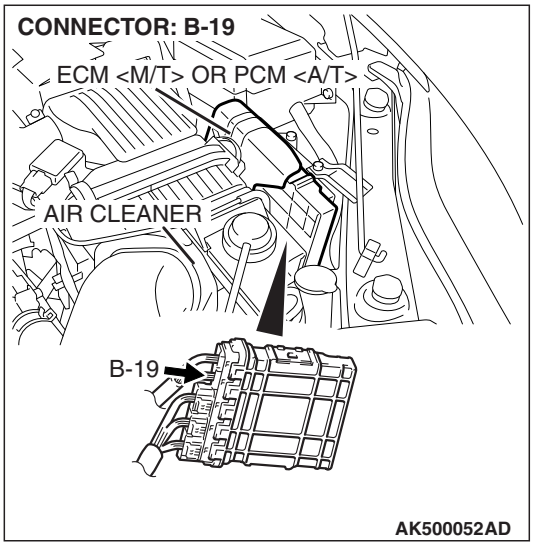
TSB Revision







CIRCUIT OPERATION

- The fuel level sensor (main) output voltage is input in ECM <M/T> or PCM <A/T> (terminal No. 24).

TECHNICAL DESCRIPTION

- Branch the output voltage from the fuel level sensor circuit, and input it into ECM <M/T> or PCM <A/T>.
- The ECM <M/T> or the PCM <A/T> detects the amount of fuel left in the fuel tank with this signal, and also controls the fuel level warning light.

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)

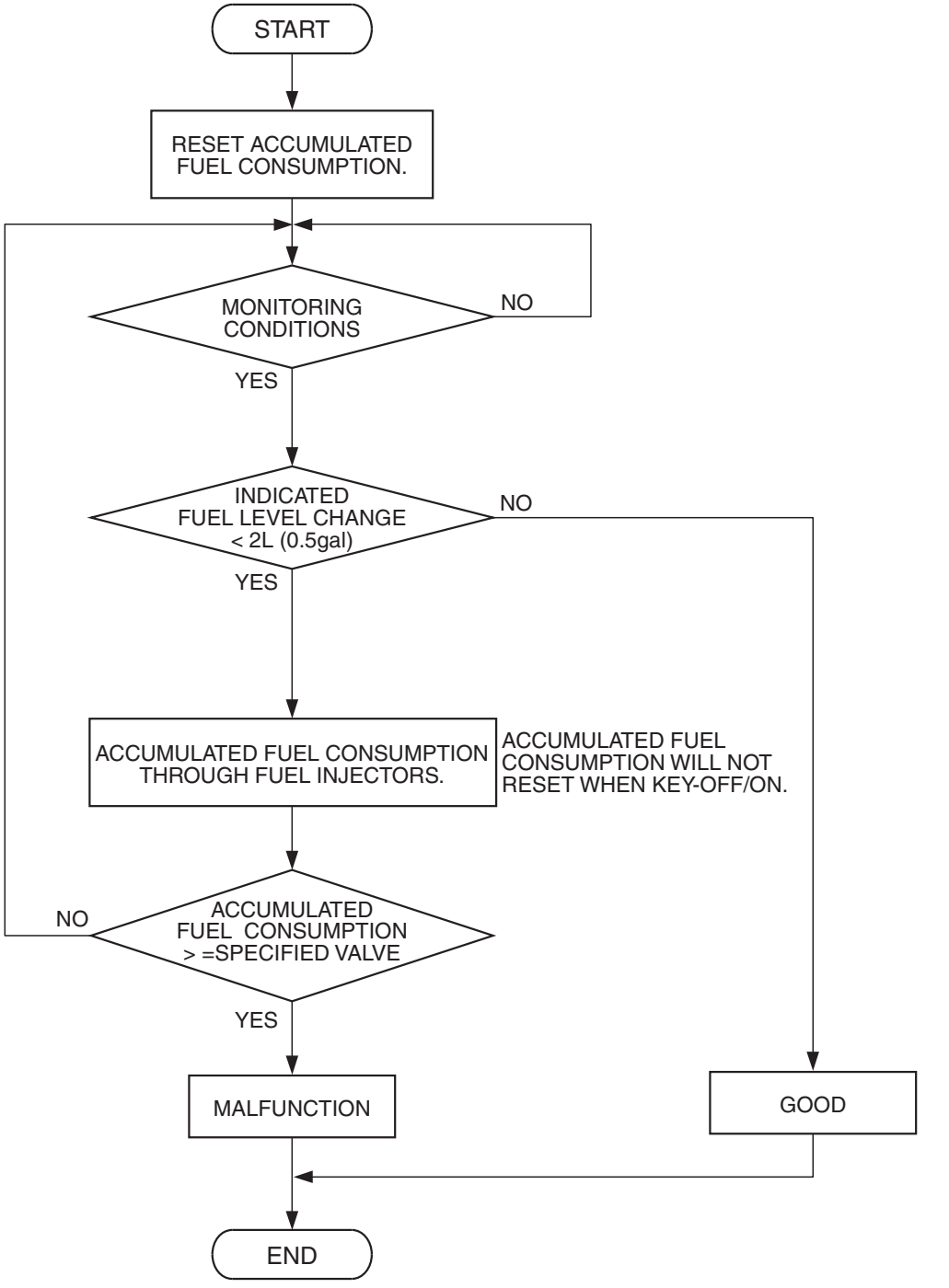
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Condition, Judgement Criterion

- When the fuel consumption calculated from the operation time of the injector amounts to 30 liters (7.8 gal), the diversity of the amount of fuel in tank calculated from the fuel level sensor is 2 liters (0.5 gal) or less.

OBD-II DRIVE CYCLE PATTERN

None.

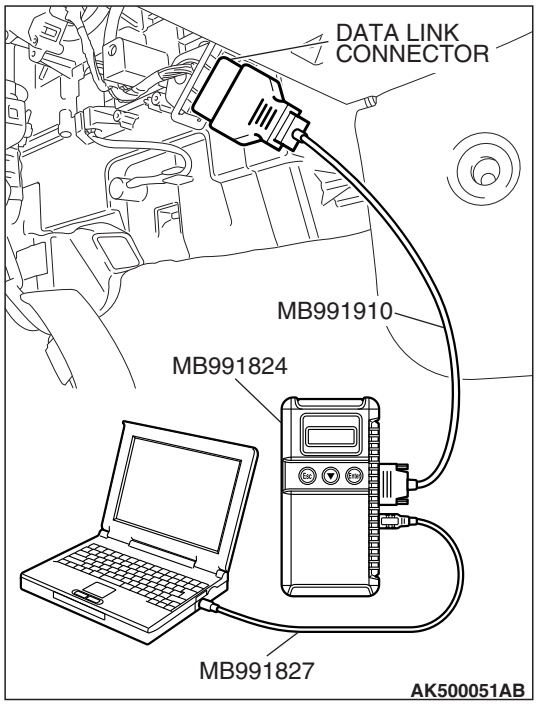
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Fuel pump module or fuel level sensor failed.
- Harness damage or connector damage in fuel level sensor circuit.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

Q: Is DTC P2066 set?

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

STEP 2. Check fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 3.
NO : Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly – Symptom Chart P.54A-105.

STEP 3. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operate correctly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

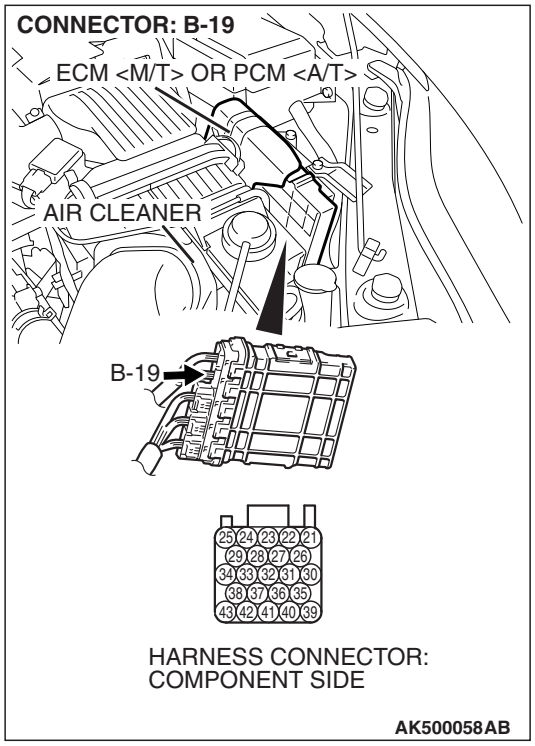
NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.

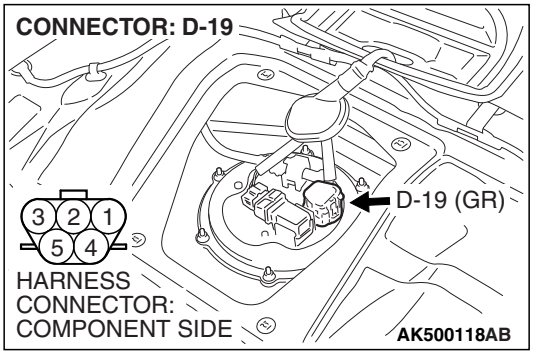
STEP 4. Check harness connector D-19 at fuel level sensor (main) and harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

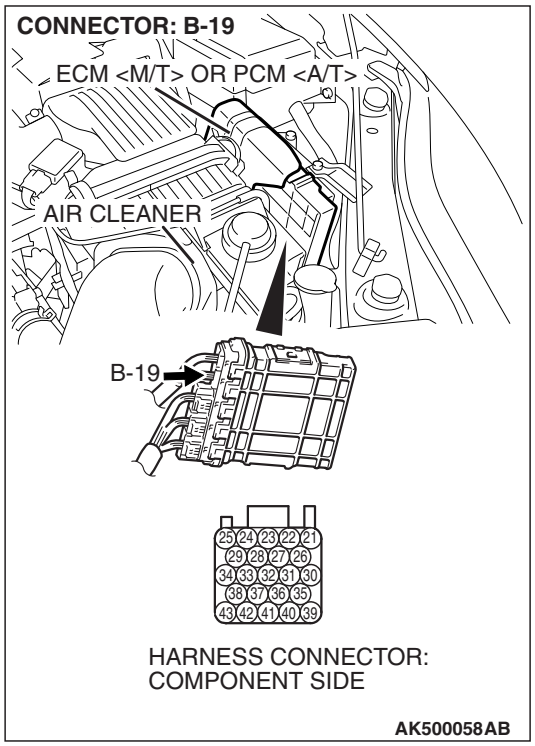
YES : Go to Step 5.

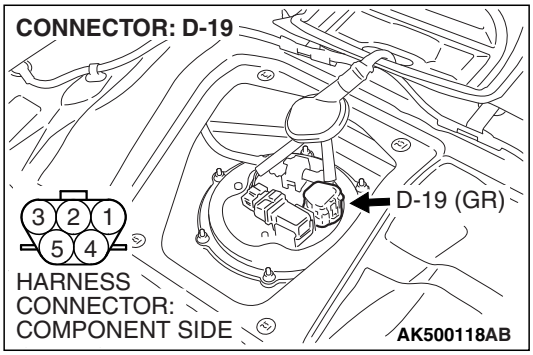
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.





STEP 5. Check for harness damage between fuel level sensor (main) connector D-19 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 24).





NOTE: Check harness after checking intermediate connector C-26. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

Q: Is the harness wire in good condition?

YES : Go to Step 6.
NO : Repair it. Then go to Step 8.

STEP 6. Check the fuel pump module.

Check to see if the fuel pump module is normal. Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor – On-Vehicle Service – Fuel Level Sensor Check P.54A-134.

Q: Is the fuel pump module normal?

YES : Go to Step 7.
NO : Replace the fuel pump module. Then go to Step 8.

STEP 7. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operate correctly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.

STEP 8. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

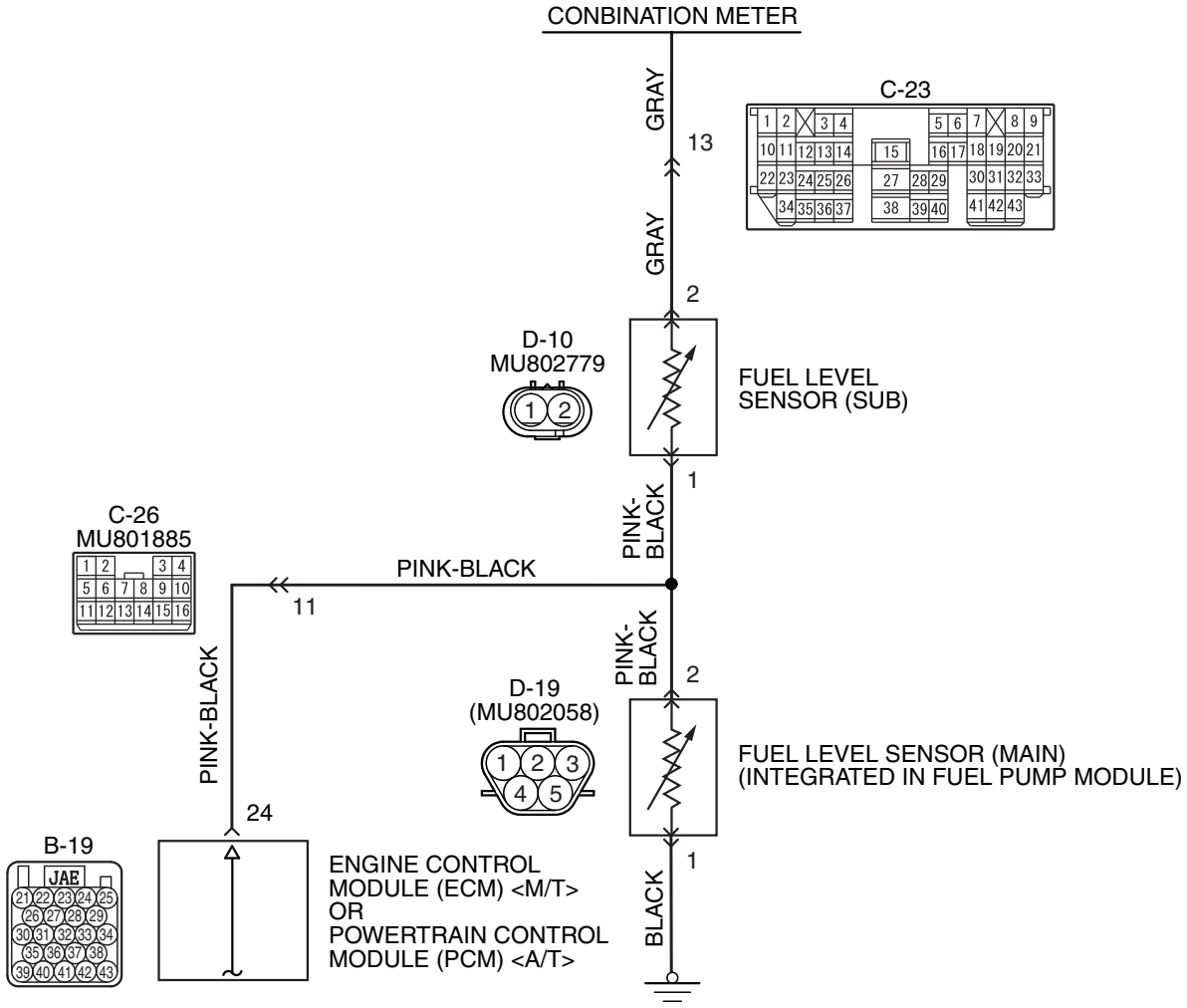
Q: Does the fuel gauge operate correctly?

YES : The inspection is complete.

NO : Retry the troubleshooting.

DTC P0462: Fuel Level Sensor Circuit Low Input

Fuel Level Sensor Circuit



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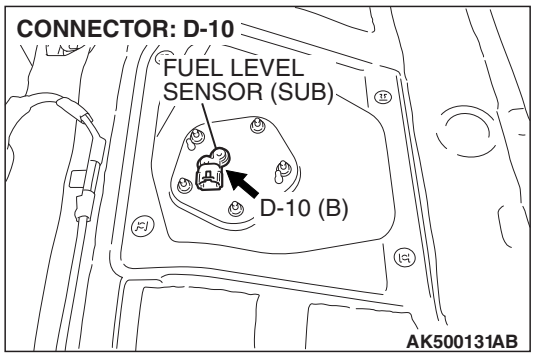

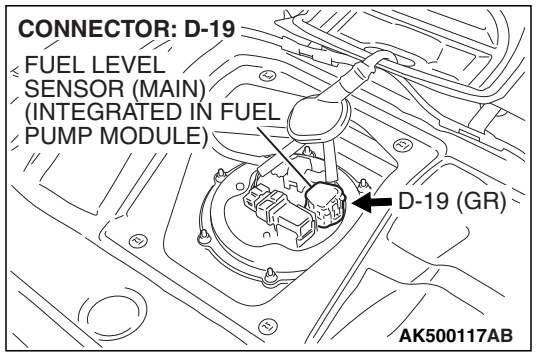

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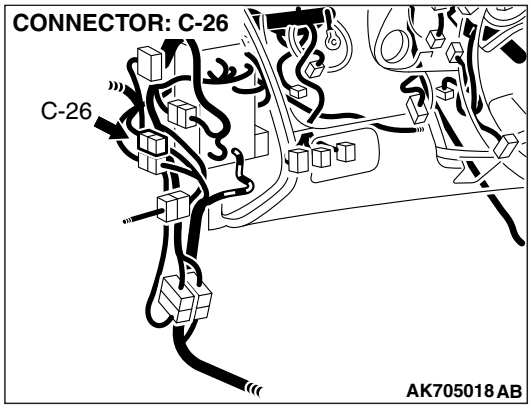
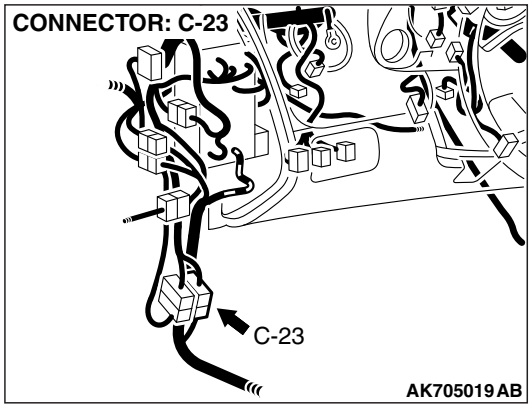
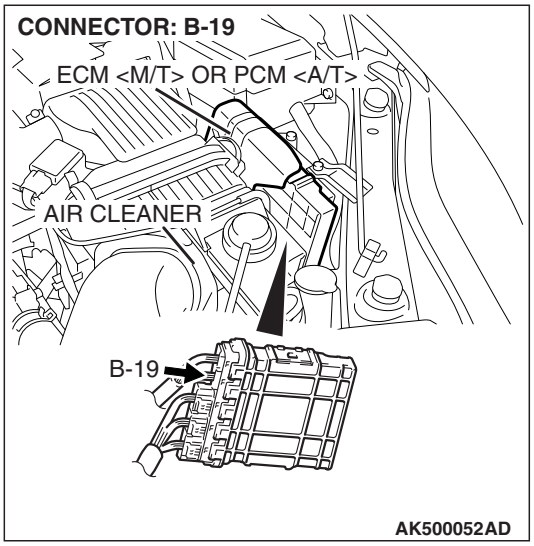






CIRCUIT OPERATION

- The fuel level sensor output voltage is input in combination meter (terminal No. 16).

TECHNICAL DESCRIPTION

- The fuel level sensor converts the rest of the fuel to a voltage.
- The combination meter sends the data regarding the rest of the fuel to the ECM <M/T> or PCM <A/T>.
- The ECM <M/T> or the PCM <A/T> checks whether this data is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

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

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

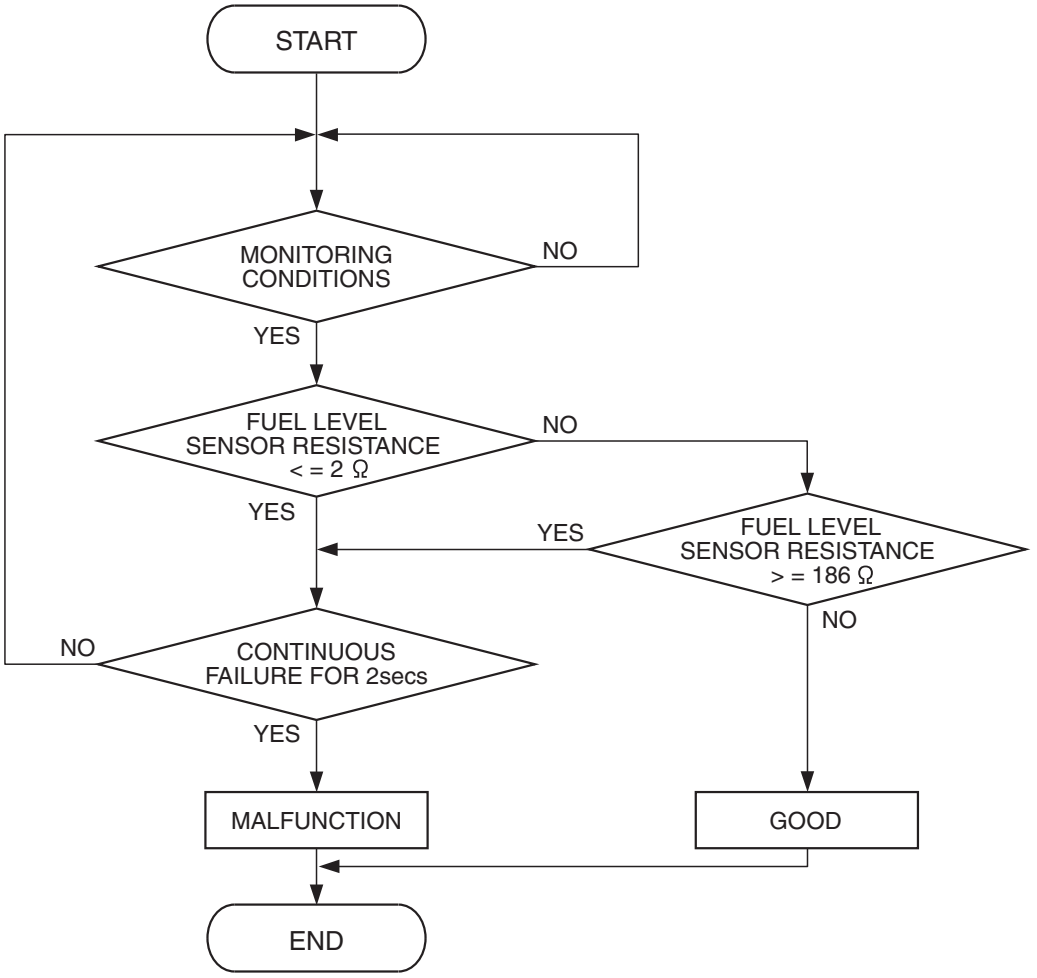
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Battery positive voltage is between 11 and 16.5 volts.
- 2 seconds or more have passed since the engine staring sequence was completed.

Judgement Criterion

- Fuel level sensor resistance has continued to be lower than 2 ohms for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

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

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DIAGNOSIS

Required Special Tools:

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

STEP 1. Check fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 2.

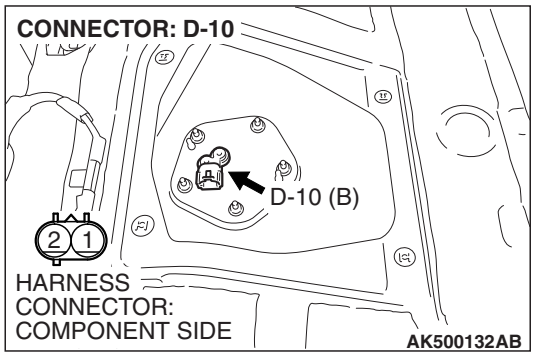
NO : Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly – Symptom Chart P.54A-105.

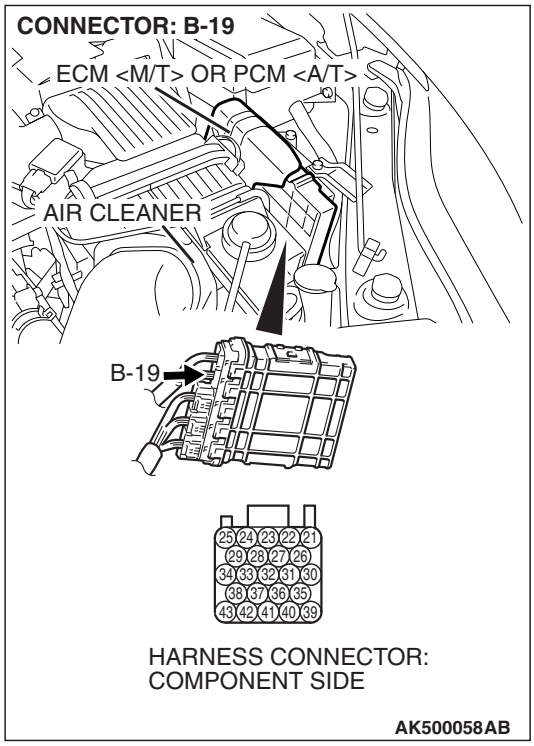
STEP 2. Check harness connector B-19 at ECM <M/T> or PCM <A/T> and harness connector D-10 at fuel level sensor (sub) for damage.

Q: Is the harness connector in good condition?

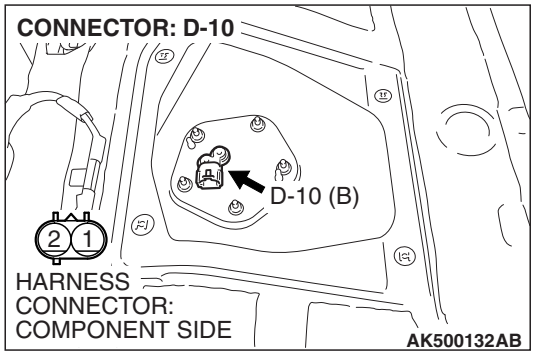
YES : Go to Step 3.

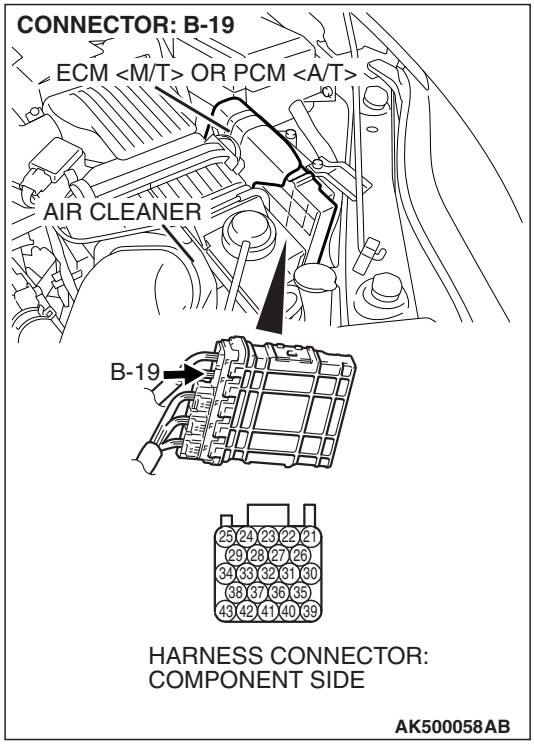
NO : Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2 Then go to Step 7.





STEP 3. Check for short circuit to ground between ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 24) and fuel level sensor (sub) connector D-10 (terminal No. 1).



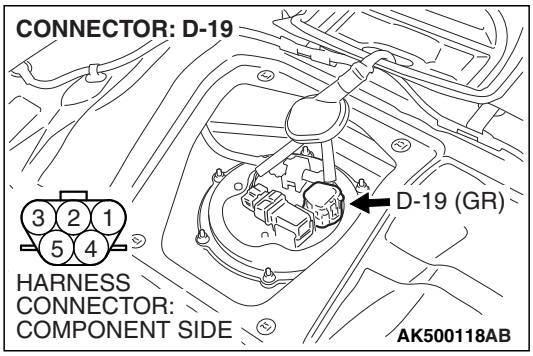


NOTE: Check harness after checking intermediate connector C-26. If intermediate connector is damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair it. Then go to Step 7.

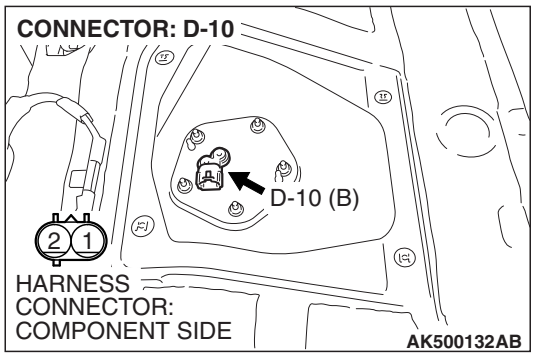


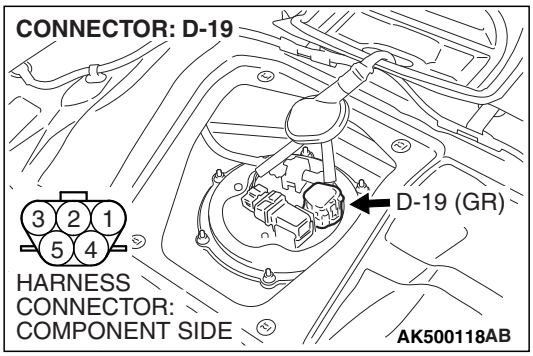
STEP 4. Check harness connector D-19 at fuel level sensor (main) for damage.

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 7.





STEP 5. Check for short circuit to ground between fuel level sensor (main) connector D-19 (terminal No. 2) and fuel level sensor (sub) connector D-10 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 7.

STEP 6. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

Q: Is DTC P0462 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.

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-6.

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

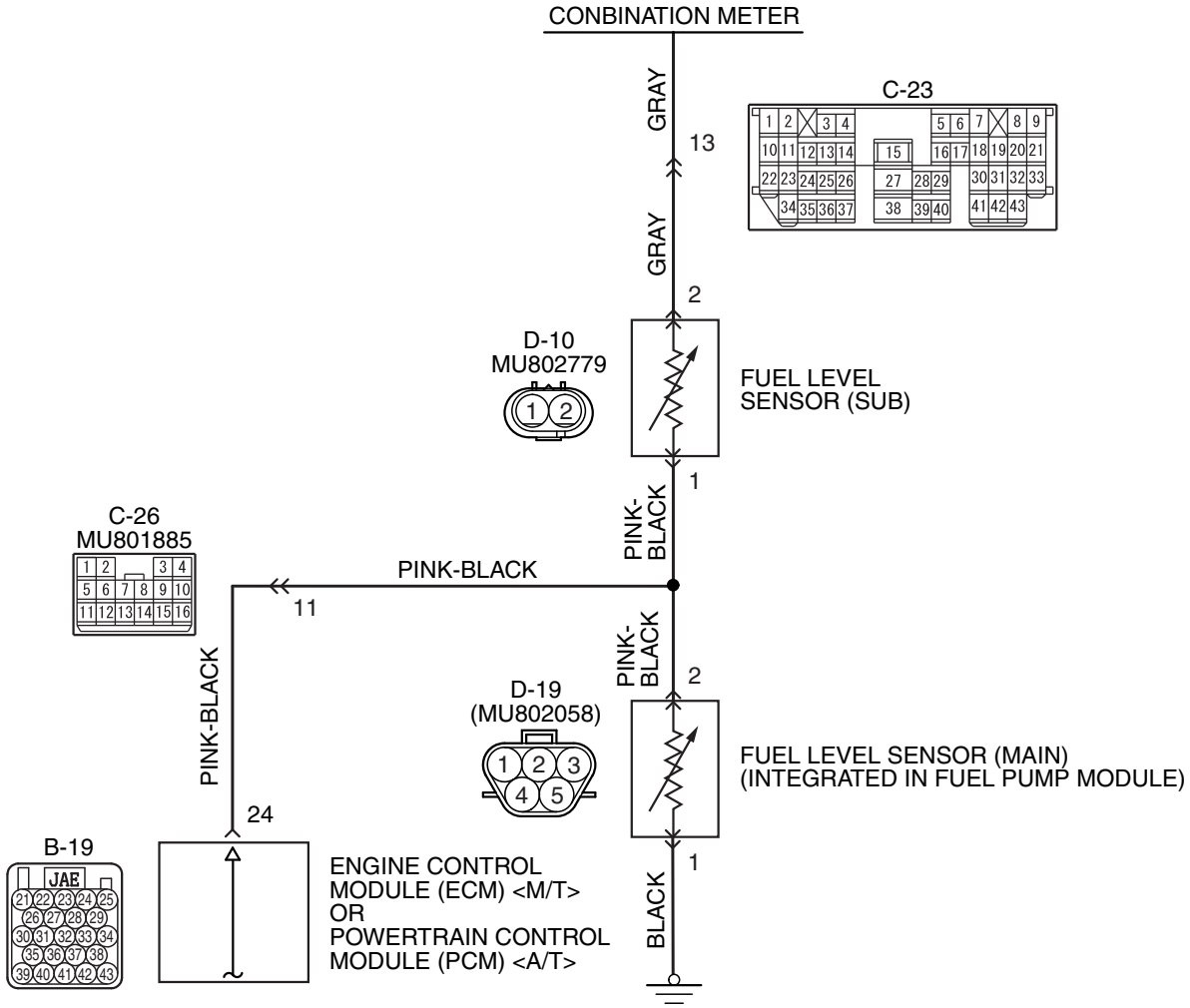
Q: Is DTC P0462 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0463: Fuel Level Sensor Circuit High Input

Fuel Level Sensor Circuit



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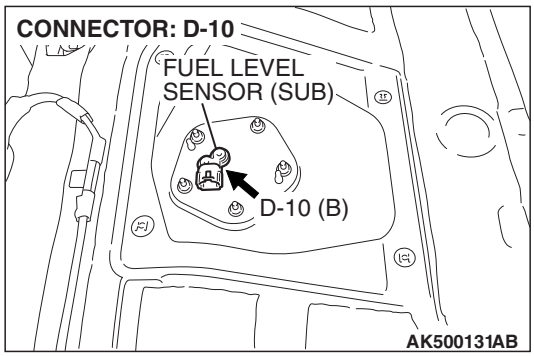

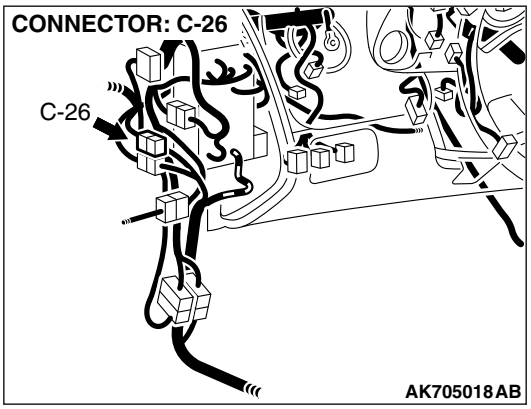

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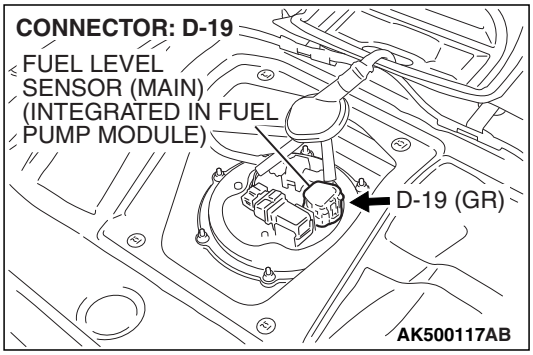
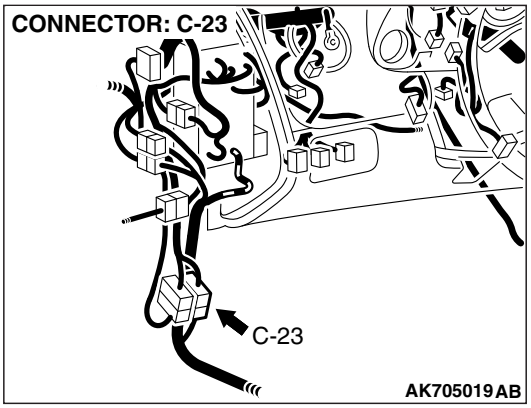
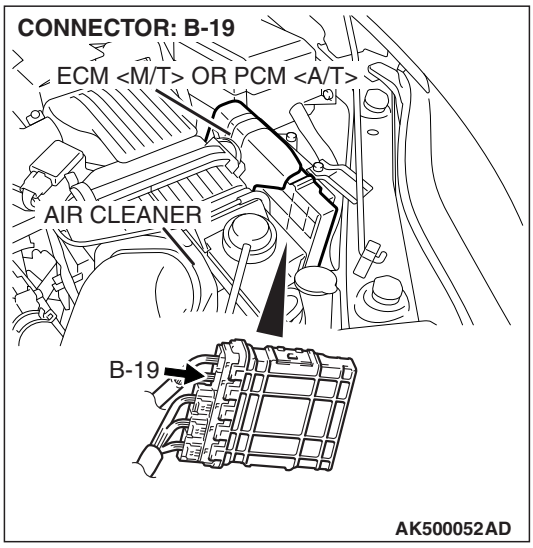






CIRCUIT OPERATION

- The fuel level sensor output voltage is input in combination meter (terminal No. 16).

TECHNICAL DESCRIPTION

- The fuel level sensor converts the rest of the fuel to a voltage.
- The combination meter sends the data regarding the rest of the fuel to the ECM <M/T> or the PCM <A/T>.
- The ECM <M/T> or the PCM <A/T> 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)

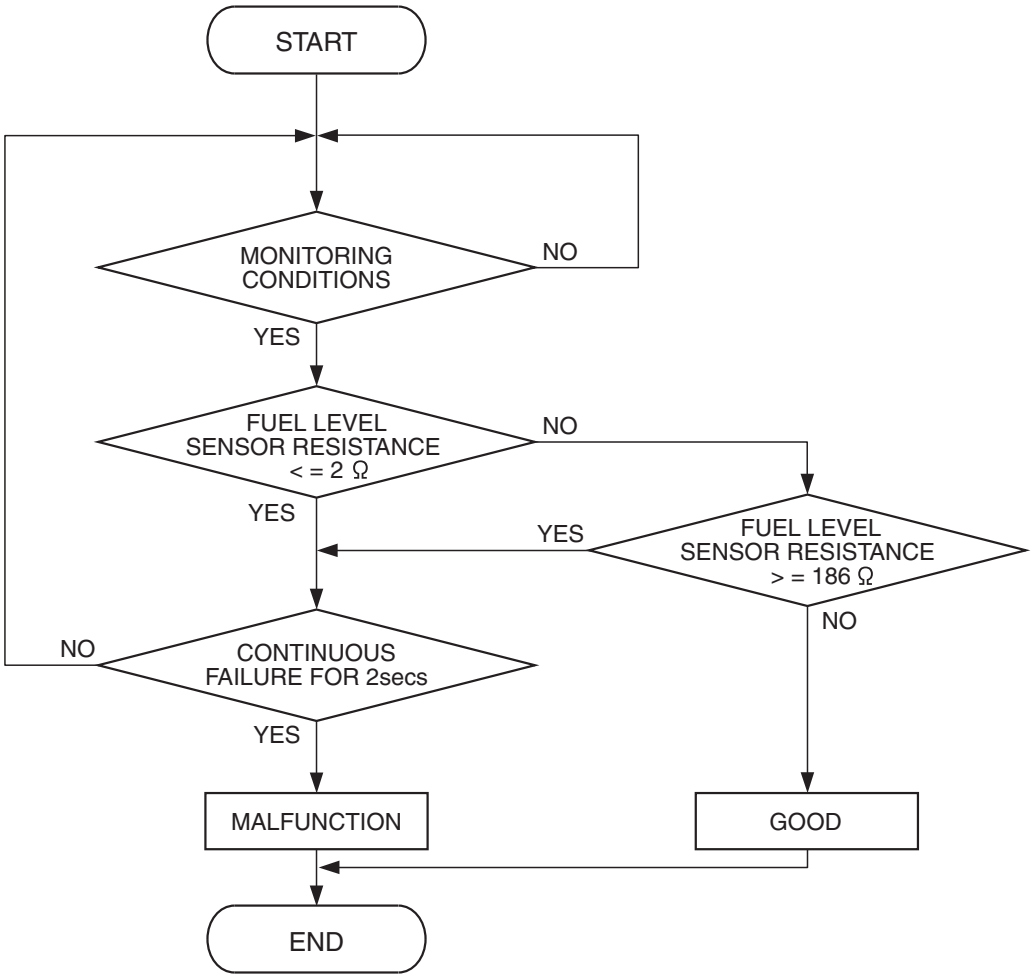
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Battery positive voltage is between 11 and 16.5 volts.
- 2 seconds or more have passed since the engine staring sequence was completed.

Judgement Criterion

- Fuel level sensor resistance has continued to be higher than 186 ohms for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

- Fuel level sensor failed.
- Open or shorted fuel level sensor circuit, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

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DIAGNOSIS

Required Special Tools:

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

STEP 1. Check fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 2.

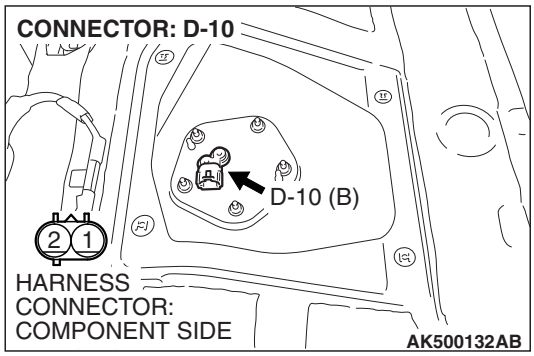
NO : Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly – Symptom Chart P.54A-105.

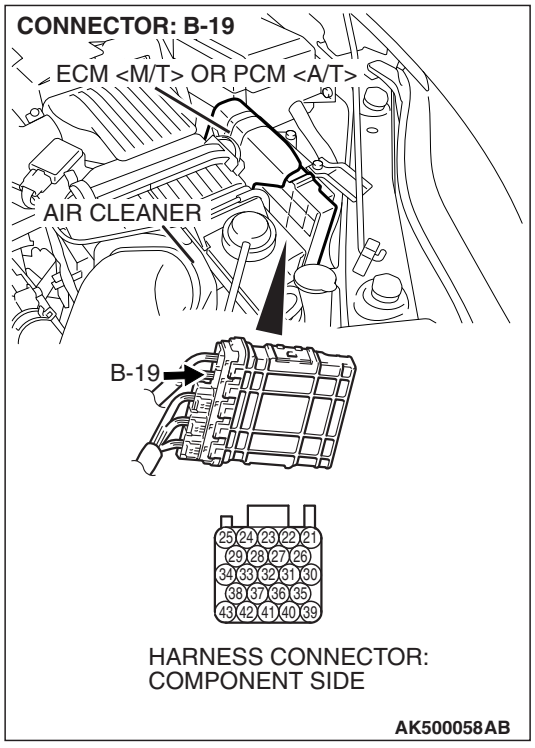
STEP 2. Check harness connector B-19 at ECM <M/T> or PCM <A/T> and harness connector D-10 at fuel level sensor (sub) for damage.

Q: Is the harness connector in good condition?

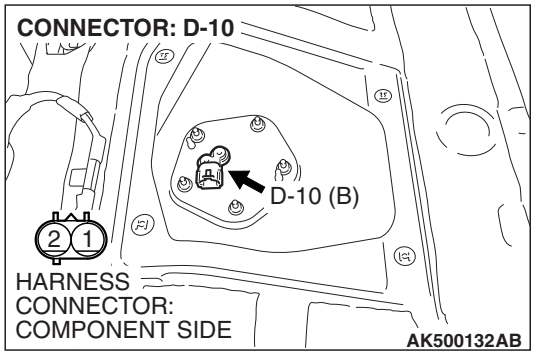
YES : Go to Step 3.

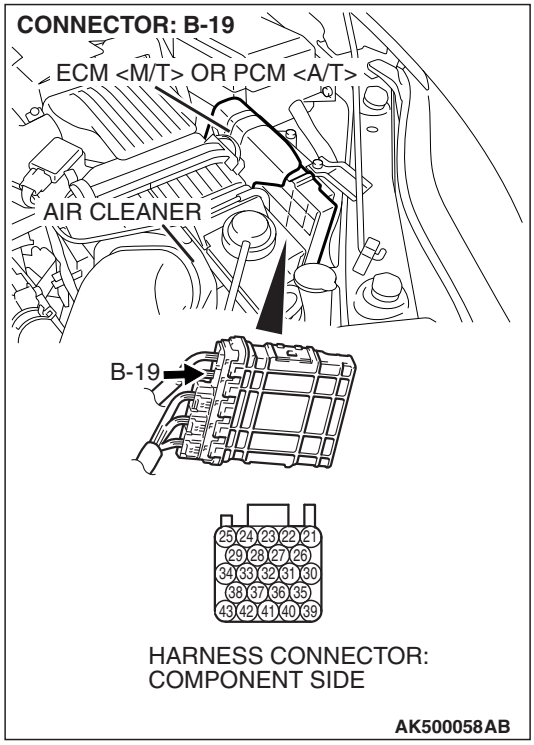
NO : Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2 Then go to Step 7.





STEP 3. Check for short circuit to ground between ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 24) and fuel level sensor (sub) connector D-10 (terminal No. 1).



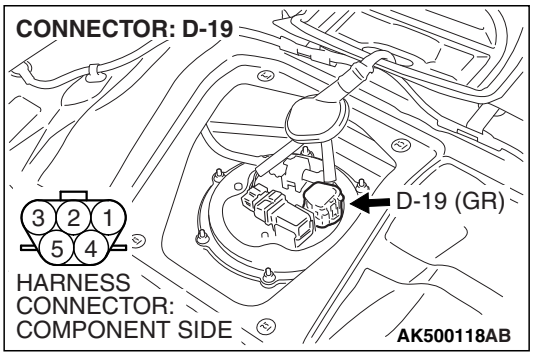


NOTE: Check harness after checking intermediate connector C-26. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair it. Then go to Step 7.

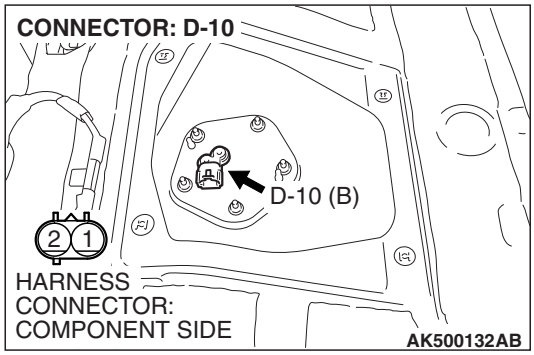


STEP 4. Check harness connector D-19 at fuel level sensor (main) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

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

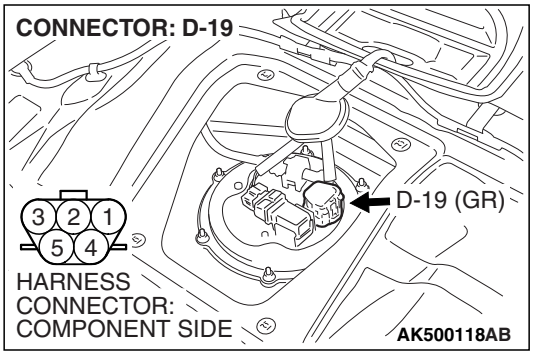


STEP 5. Check for open circuit and short circuit to ground between fuel level sensor (main) connector D-19 (terminal No. 2) and fuel level sensor (sub) connector D-10 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 7.



STEP 6. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

Q: Is DTC P0463 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.

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-6.

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

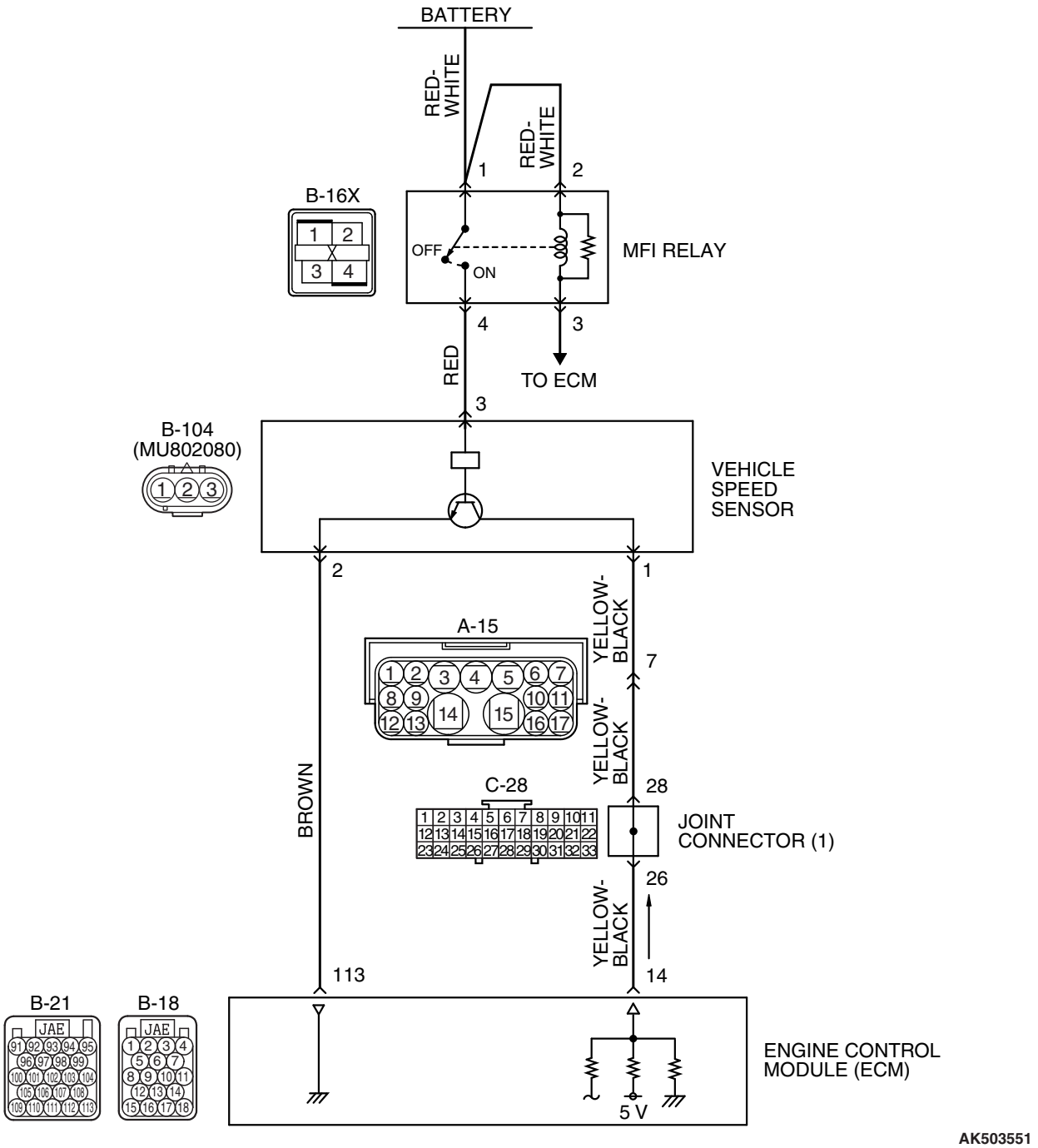
Q: Is DTC P0463 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

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

Vehicle Speed Sensor Circuit



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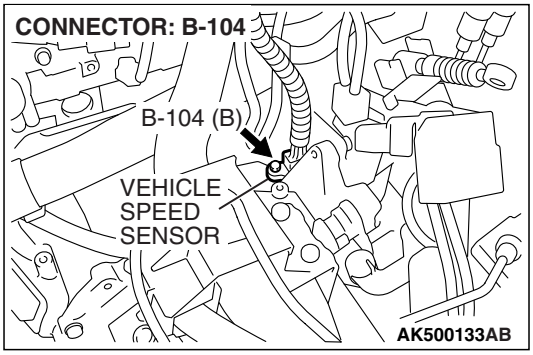

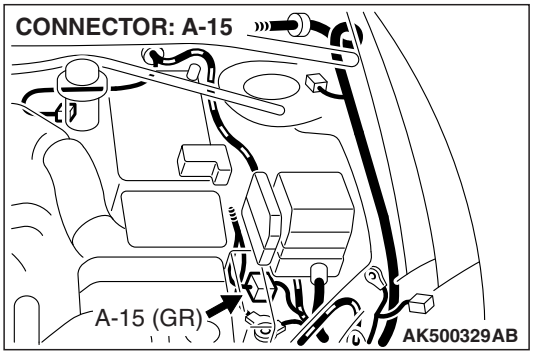

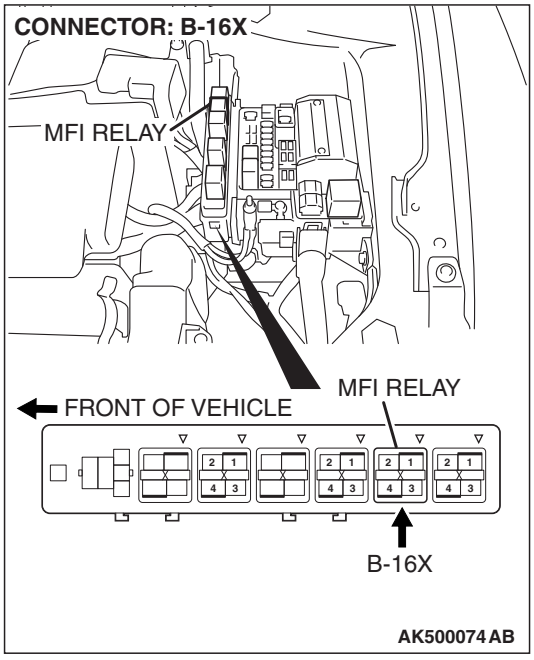

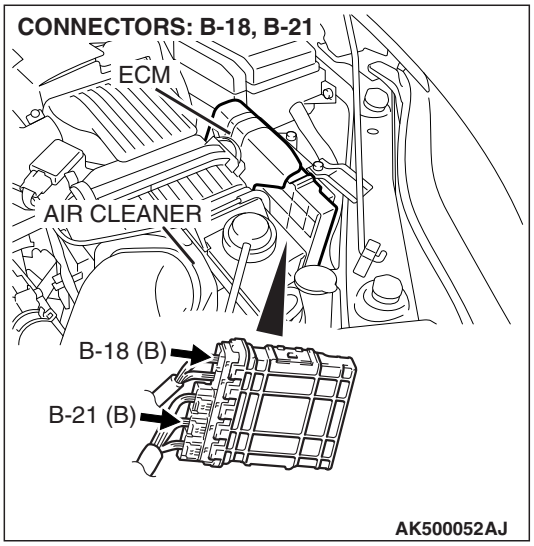

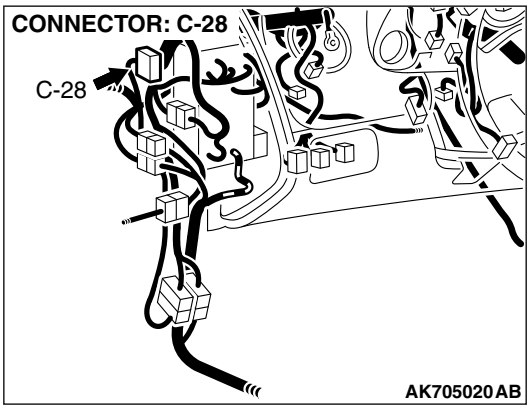

CIRCUIT OPERATION

- A 5-volt voltage is applied to the vehicle speed sensor output terminal (terminal No. 1) from the ECM (terminal No. 14). 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.

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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)

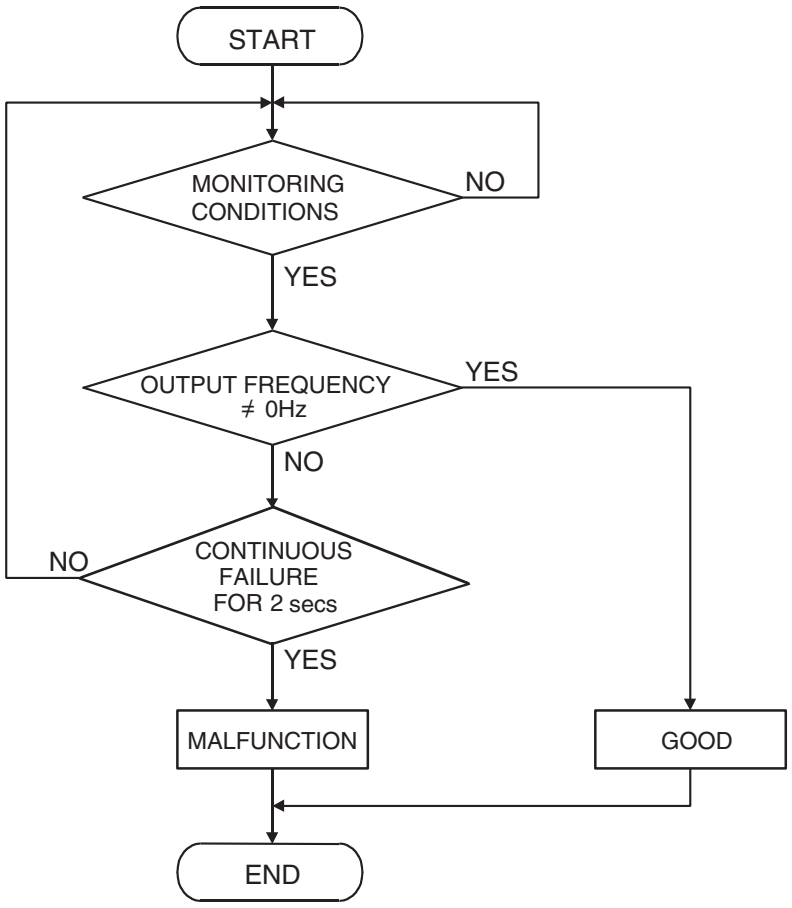
- Not applicable

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor

DTC SET CONDITIONS (Entry Conditions and Malfunction Thresholds)

Logic Flow Chart



A800002

Check Conditions

- 2 seconds or more have passed the engine starting sequence was completed.
- Engine speed is at between 2,000 and 4,000 r/min.
- Volumetric efficiency is at between 40 and 75 percent.

Judgement Criterion

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

OBD-II DRIVE CYCLE PATTERN

None

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

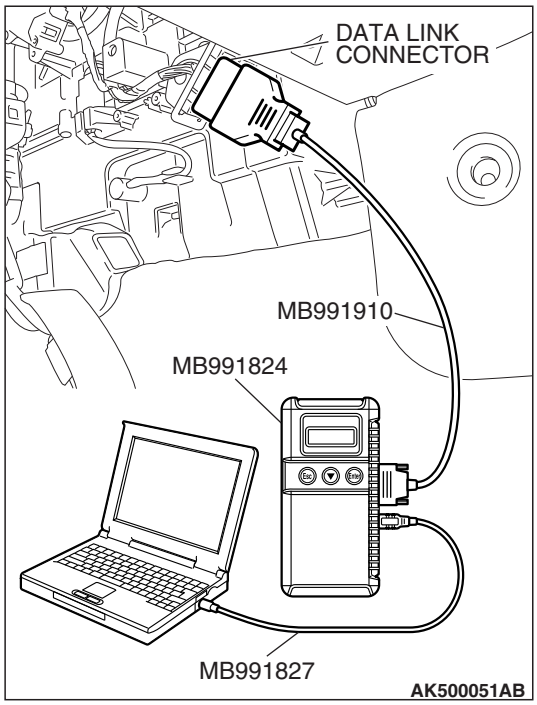
- Vehicle speed sensor failed.
- Open or shorted vehicle speed sensor circuit, or harness damage, or connector damage.
- ECM failed.

DIAGNOSIS

Required Special Tools:

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

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).

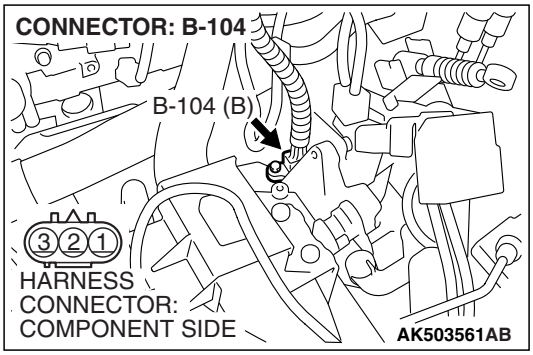
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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.00-14.

NO : Go to Step 2.

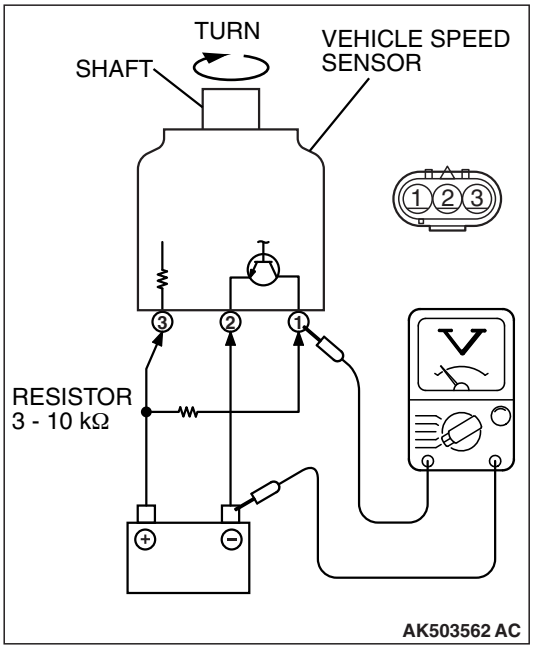
STEP 2. Check connector B-104 at vehicle speed sensor for damage.



Q: Is the connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.



STEP 3. Check the vehicle speed sensor.

1.Remove the vehicle speed sensor and connect a 3 – 10 kΩ resistor as shown in the illustration.

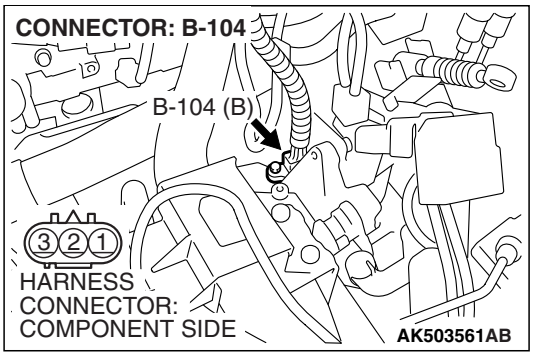
2.Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2 – 3. (1 turn = 4 pulses)

Standard value: 0 or Battery Voltage (1 turn = 4pulses)

Q: Is the vehicle speed sensor normal?

YES : Go to Step 4.

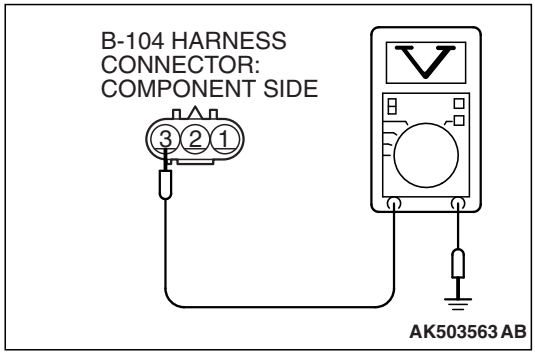
NO : Replace the vehicle speed sensor. Then go to Step 17.



STEP 4. Measure the power supply voltage at vehicle speed sensor connector B-104.

(1) Disconnect the connector B-104 and measure at the harness side.

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



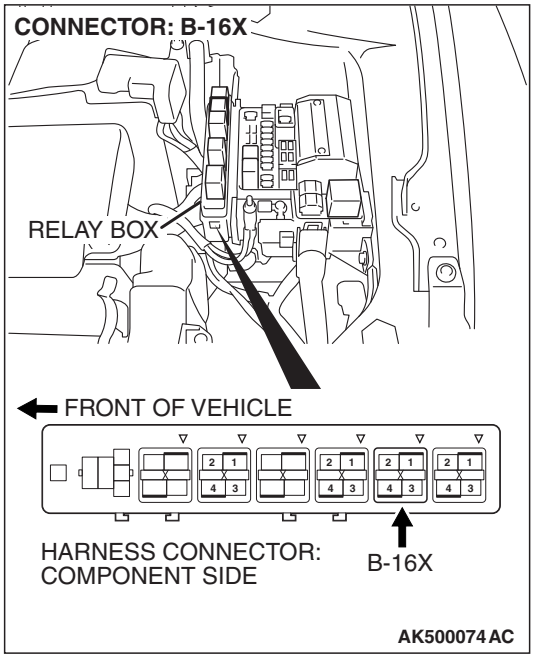
(3) Measure the voltage between terminal No. 3 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.

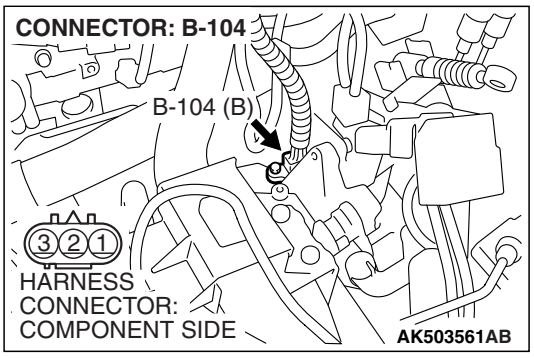


STEP 5. Check harness connector B-16X at MFI relay for damage.

Q: Is the harness connector in good condition?

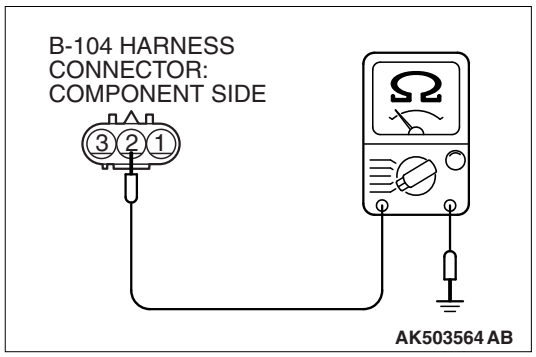
YES : Repair harness wire between MFI relay connector B-16X (terminal No. 4) and vehicle speed sensor connector B-104 (terminal No. 3) because of open circuit or short circuit to ground. Then go to Step 17.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.



STEP 6. Check the continuity at vehicle speed sensor harness side connector B-104.

(1) Disconnect the connector B-104 and measure at the harness side.

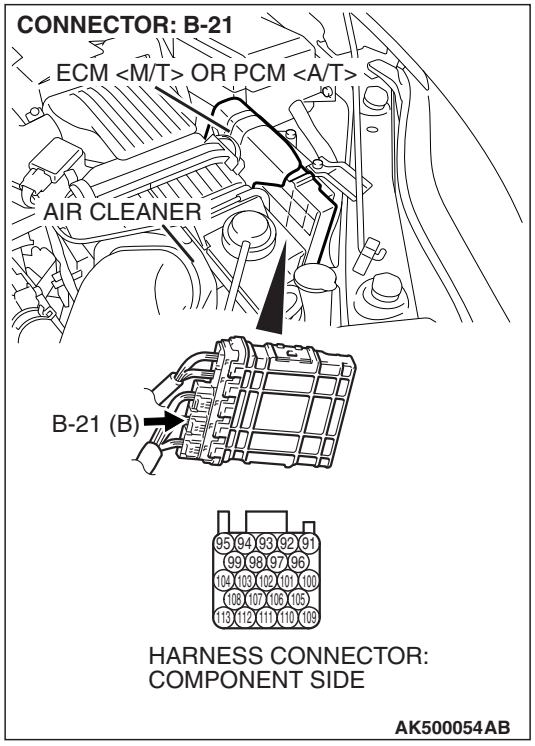


(2) Check for the continuity between terminal No. 2 and ground.
- Continuity (2 Ω or less)

Q: Does the continuity exist?

YES : Go to Step 10.

NO : Go to Step 7.

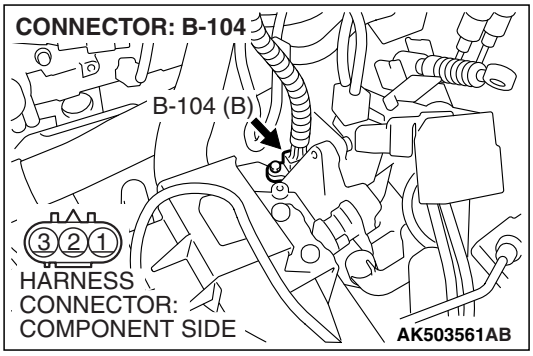


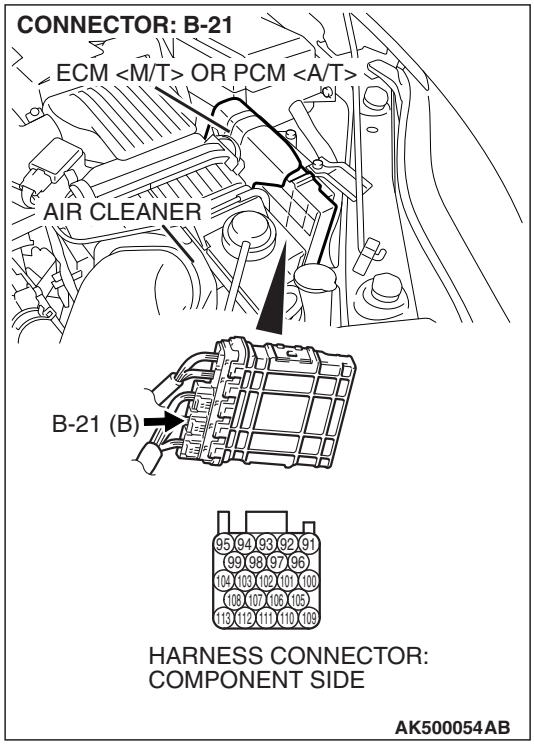
STEP 7. Check connector B-21 at ECM for damage.

Q: Is the connector in good condition?

YES : Go to Step 8.

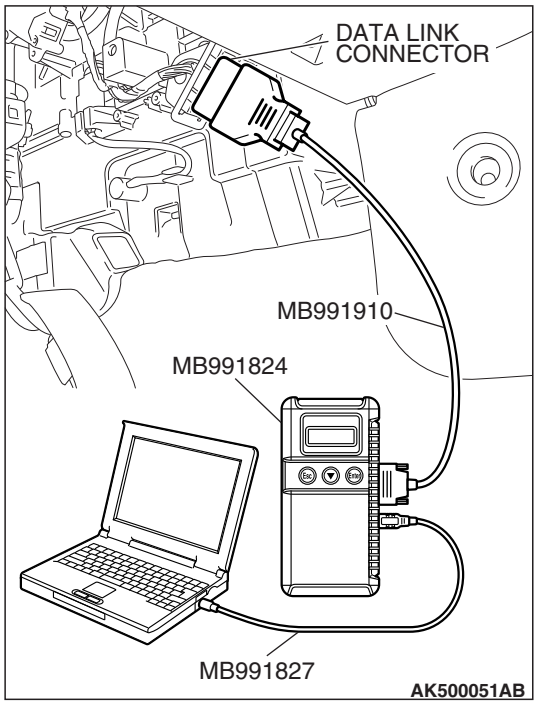
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.





STEP 8. Check for open circuit and harness damage between vehicle speed sensor connector B-104 (terminal No. 2) and ECM connector B-21 (terminal No. 113).
Q: Is the harness wire in good condition?

YES : Go to Step 9.
NO : Repair it. Then go to Step 17.



STEP 9. 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.

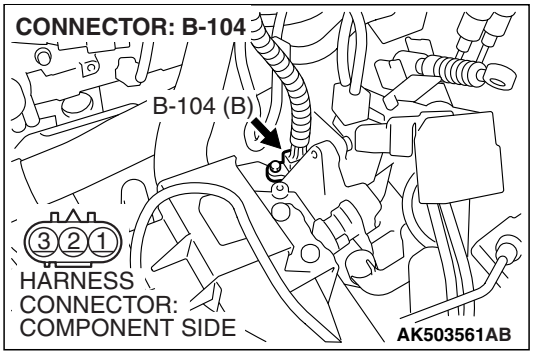
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode for item 4, Vehicle Speed Sensor.
- Check that the speedometer and MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).

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

Q: Is the sensor operating properly?

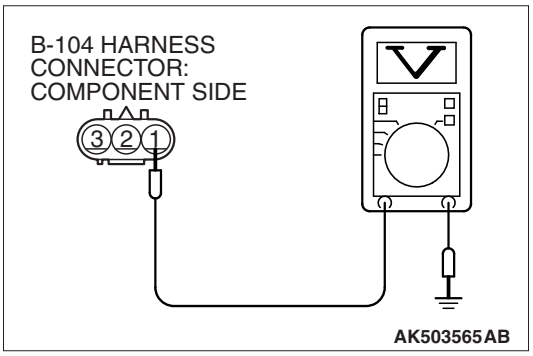
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM. When the ECM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.



STEP 10. Measure the sensor supply voltage at vehicle speed sensor harness side connector B-104.

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

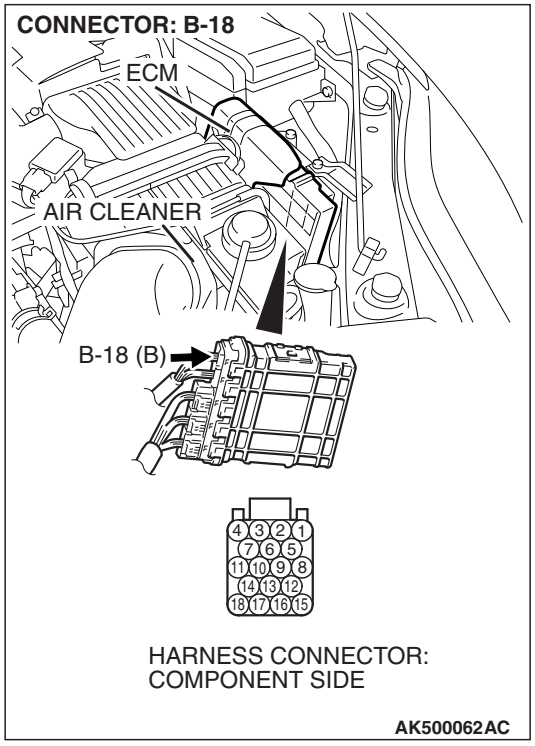


(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be between 4.9 and 5.1 volts.

(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 14.
NO : Go to Step 11.

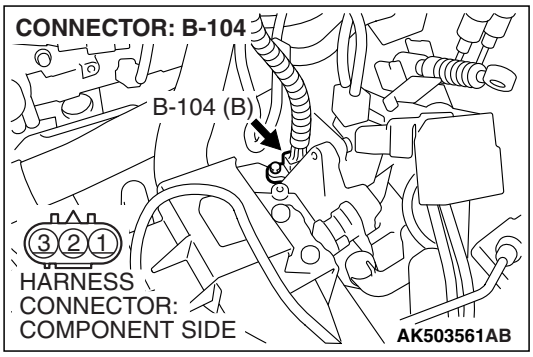


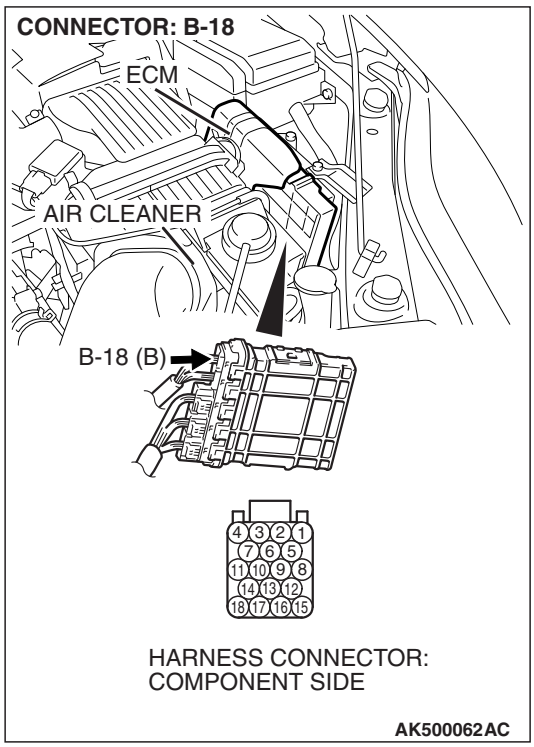
STEP 11. Check connector B-18 at ECM for damage.

Q: Is the connector in good condition?

YES : Go to Step 12.

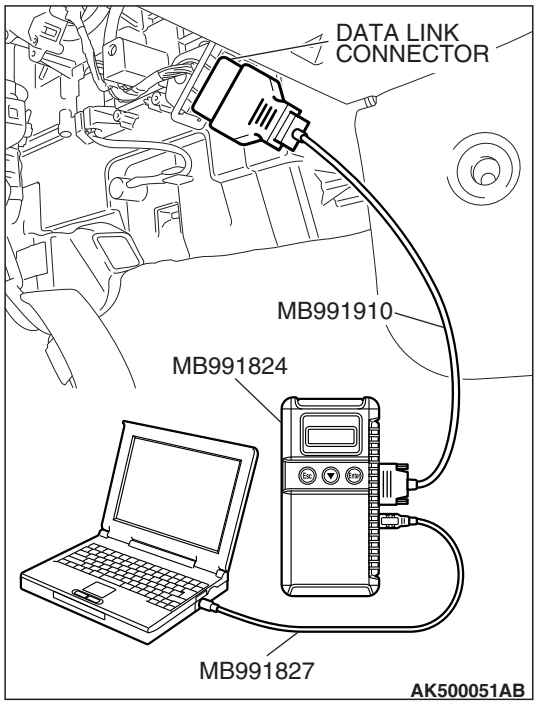
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.





STEP 12. Check for open circuit and short circuit to ground between vehicle speed sensor connector B-104 (terminal No. 1) and ECM connector B-18 (terminal No. 14).
Q: Is the harness wire in good condition?

YES : Then go to Step 13.
NO : Repair it. Then go to Step 17.



STEP 13. 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.

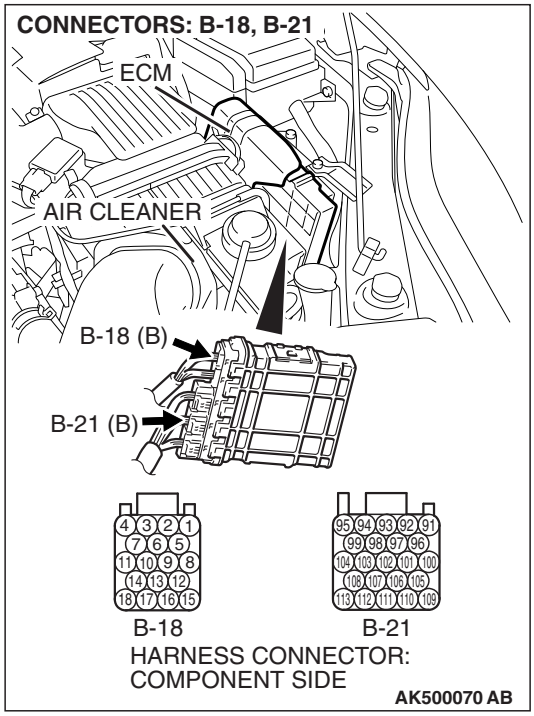
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991958 to the data reading mode for item 4, Vehicle Speed Sensor.
- Check that the speedometer and MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).

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

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM. When the ECM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

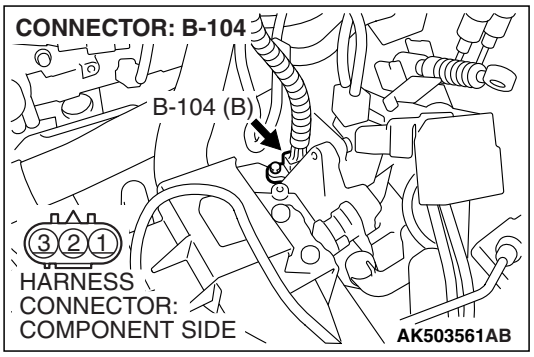


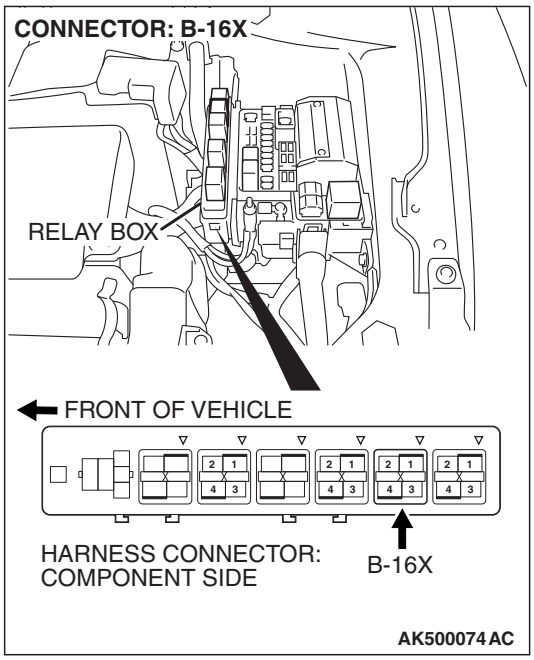
STEP 14. Check connectors B-18 and B-21 at ECM for damage.

Q: Is the 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.





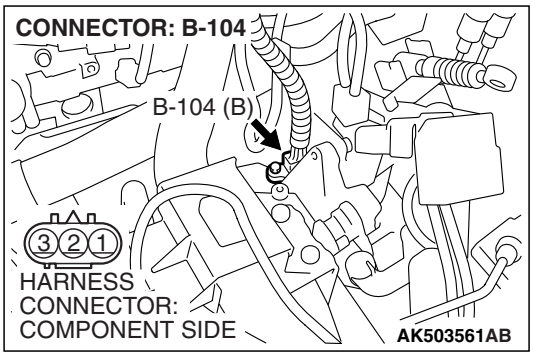
STEP 15. Check for harness damage between MFI relay connector B-16X (terminal No. 4) and vehicle speed sensor connector B-104 (terminal No. 3).

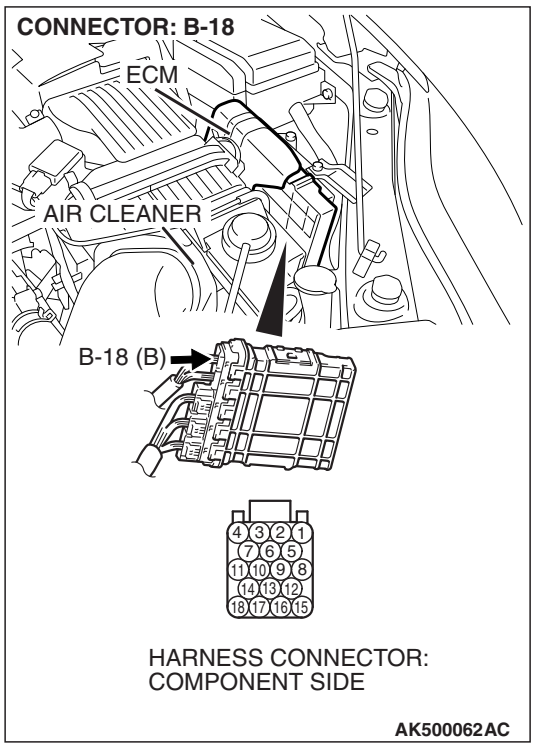
Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair it. Then go to Step 17.

STEP 16. Check for harness damage between vehicle speed sensor connector B-104 (terminal No. 1) and ECM connector B-18 (terminal No. 14).

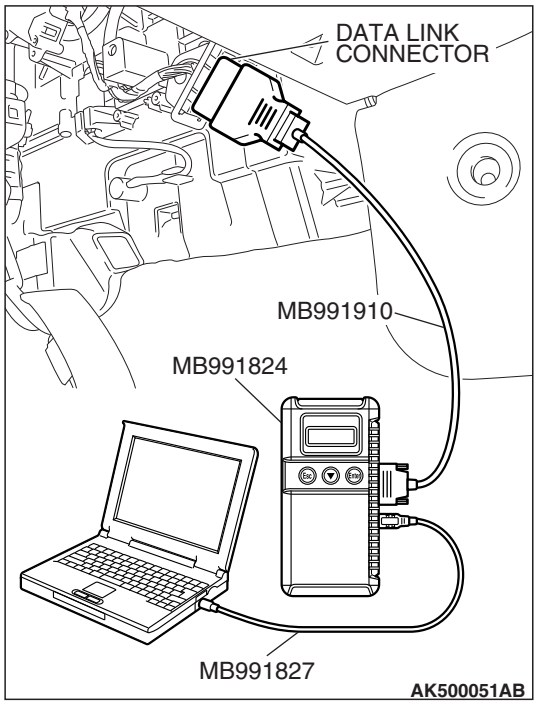




NOTE: Check harness after checking intermediate connectors A-15 and C-28 If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.

Q: Is the harness wire in good condition?

YES : Go to Step 17.
NO : Repair it. Then go to Step 17.



STEP 17. 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 MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?
YES : The inspection is complete.
NO : Retry the troubleshooting.

DTC P0506: Idle Control Sytem RPM Lower Than Expected

⚠ CAUTION
If DTC P0506 has been set, TCL related DTC U1120 is also set. After P0506 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION
- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM <M/T> or the PCM <A/T> 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

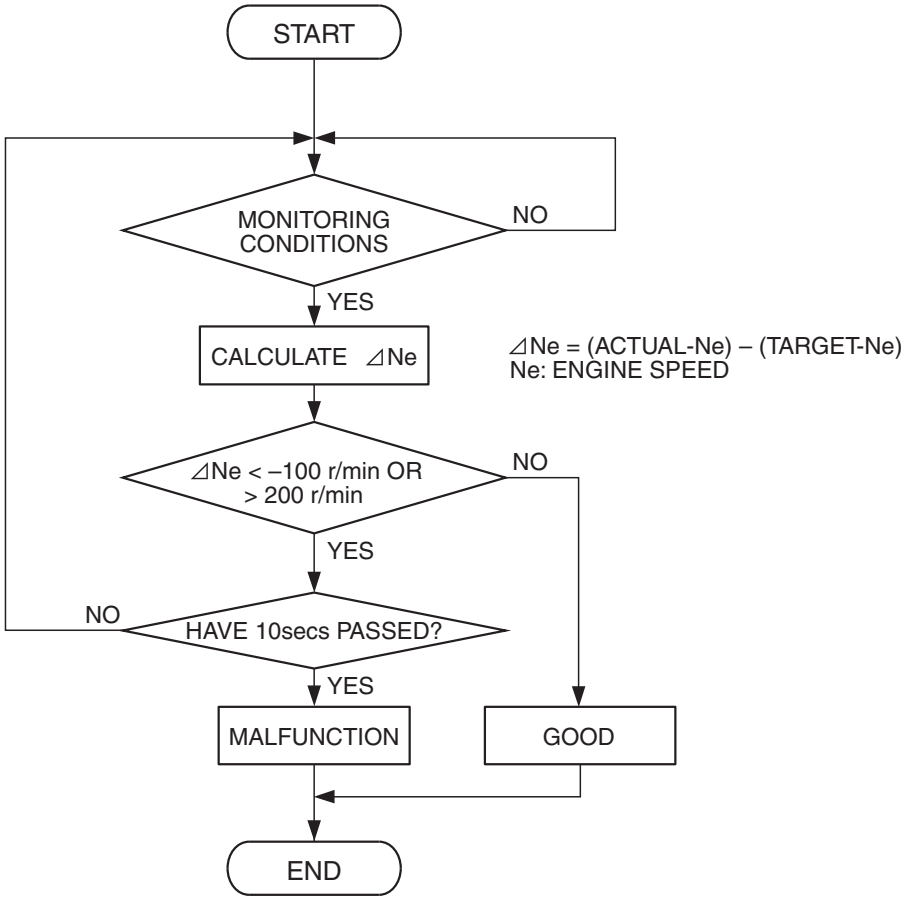
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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



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Check Conditions

- Under the closed loop idle speed control.
- The engine coolant temperature is more than 41°C (105°F).
- Battery positive voltage is higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than –10°C (14°F).
- 3 seconds have elapsed from the start of the previous monitoring.
- Target throttle actuator control motor position is more than 512 steps.

Judgement Criterion

- The actual idle speed is more than 100 r/min lower than the target idle speed for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13B-6.

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools

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

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

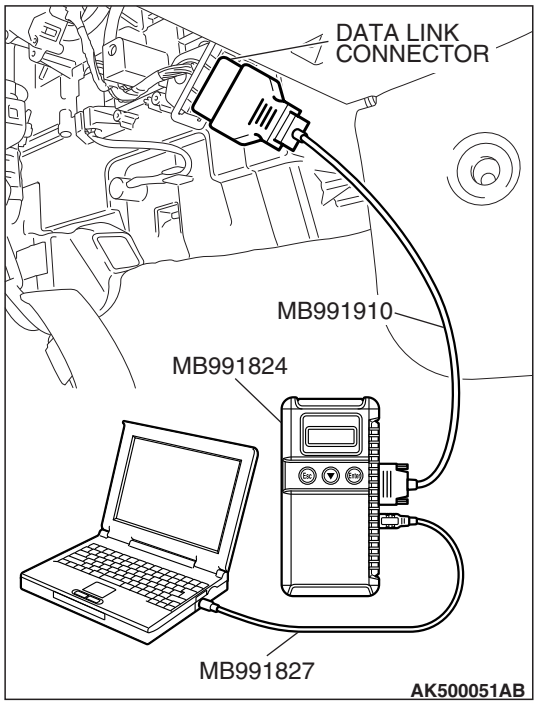
⚠ CAUTION

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

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

Q: Is the diagnostic trouble code other than P0506 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
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-1275. 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-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0506 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 4.
NO : The inspection is complete.

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STEP 4. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13B-6.

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

Q: Is DTC P0506 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0507: Idle Control Sytem RPM Higher Than Expected

⚠ CAUTION

If DTC P0507 has been set, TCL related DTC U1120 is also set. After P0507 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM <M/T> or the PCM <A/T> 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)

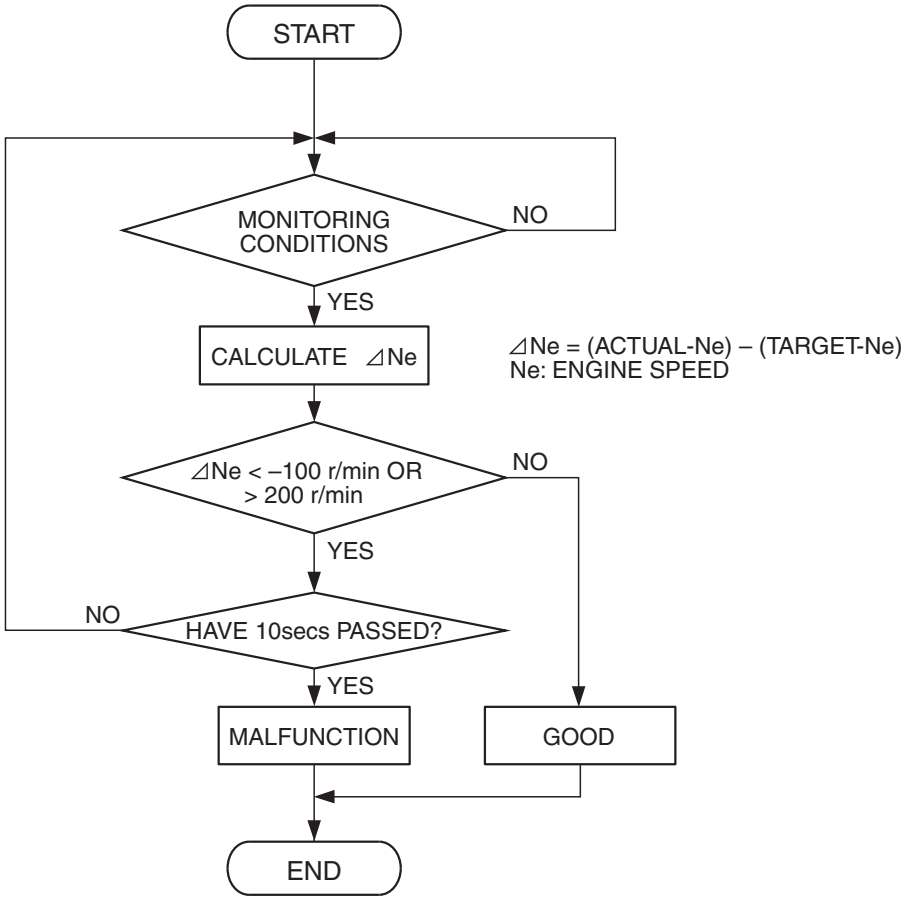
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

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



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Check Conditions

- Under the closed loop idle speed control.
- Engine coolant temperature is higher than 41°C (105°F).
- Battery positive voltage is higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than –10°C (14°F).
- 3 seconds have elapsed from the start of the previous monitoring.
- Target throttle actuator control motor position is 0 step.

Judgement Criterion

- Actual idle speed has continued to be higher than the target idle speed by 200 r/min (300 r/min*) or more for 10 seconds.

*: Specs in parentheses are applicable if the maximum air temperature during the previous operation was more than 45°C (113°F).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13B-6.

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

- Intake system vacuum leak.
- Throttle body assy failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools

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

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

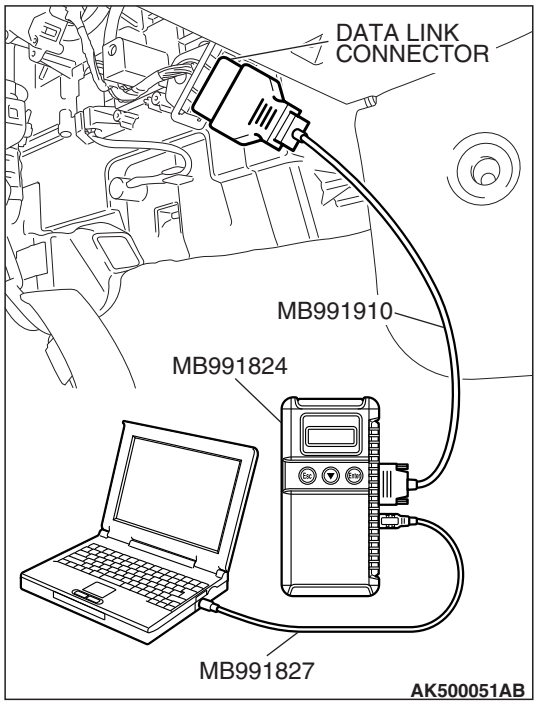
⚠ CAUTION

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

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

Q: Is the diagnostic trouble code other than P0507 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.



STEP 2. Check the intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair or replace 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 18 P.13B-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0507 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 4.
NO : The inspection is complete.

TSB Revision

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-6.

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

Q: Is DTC P0507 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0513: Immobilizer Malfunction

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> monitors the communication condition with the immobilizer-ECU. When an abnormality in communication is found, ECM <M/T> or PCM <A/T> prevents engine start.

DTC SET CONDITIONS

Check Condition

- Ignition switch: ON

Judgment Criterion

- When the communication error between ECM <M/T> or PCM <A/T> and the immobilizer-ECU continues for 2 seconds or more.

or

- When it was different in the encrypted code sent from immobilizer-ECU and operation result by ECM <M/T> or PCM <A/T>.

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

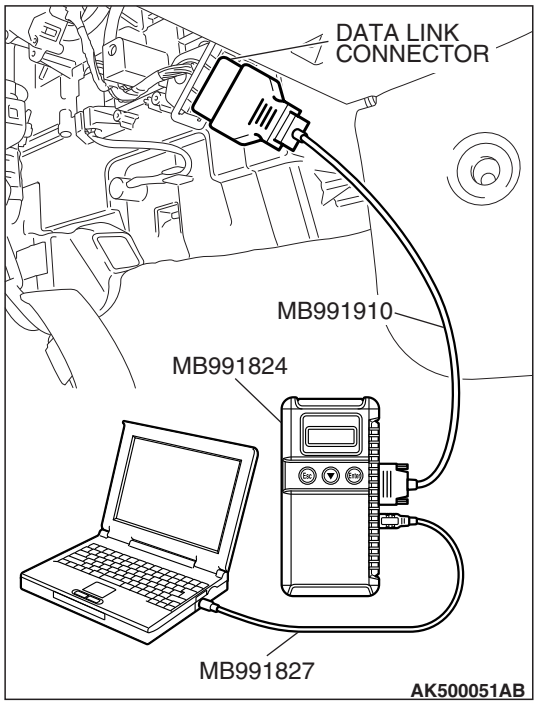
- Malfunction of harness or connector.
- Malfunction of immobilizer-ECU.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

NOTE: The vehicle having the optional remote control engine starter can possibly store the diagnosis code when the remote control engine starter fails. In that case, make the vehicle condition to the one before installing the remote control engine starter. Check that the engine starts. If the engine starts, carry out the troubleshooting of the installation instructions packaged together with the remote control engine starter. If the engine does not start, carry out the following troubleshooting.



STEP 1. Using scan tool MB991958, read the immobilizer 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 immobilizer-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

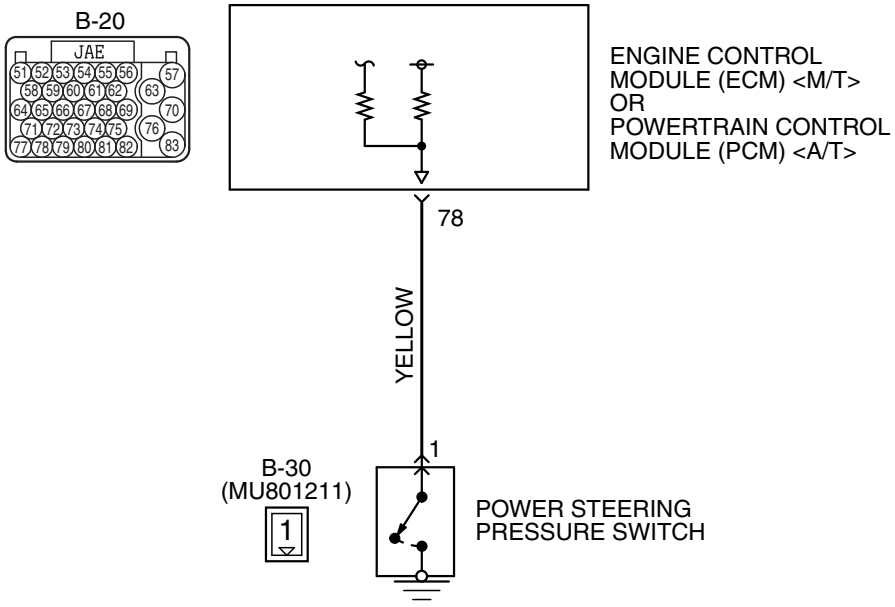
Q: Is the immobilizer-DTC set?

YES : Refer to GROUP 54A, IImmobilizer System – Diagnostic Trouble Code Chart P.54A-22.

NO : If DTC P0513 is output again after the MFI-DTC has been erased, Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.Then check that the DTC P0513 does not reset.

DTC P0551: Power Steering Pressure Switch Circuit Range/Performance

Power Steering Pressure Switch Circuit



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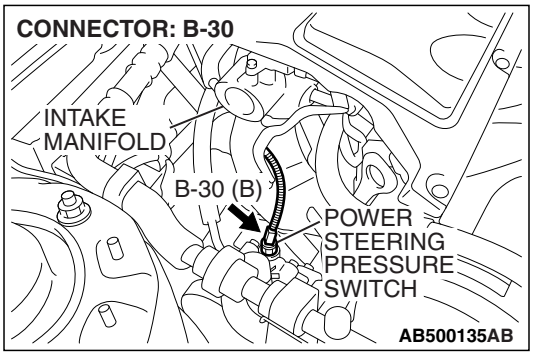

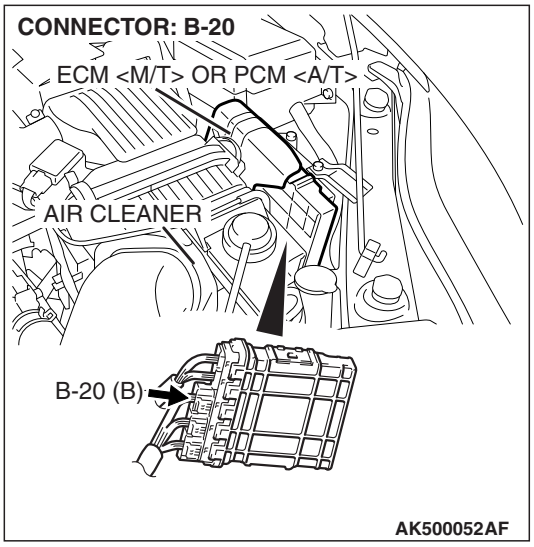

CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM <M/T> or the PCM <A/T> (terminal No. 78) via the resistor in the ECM <M/T> or the PCM <A/T>.

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 <M/T> or the PCM <A/T>.

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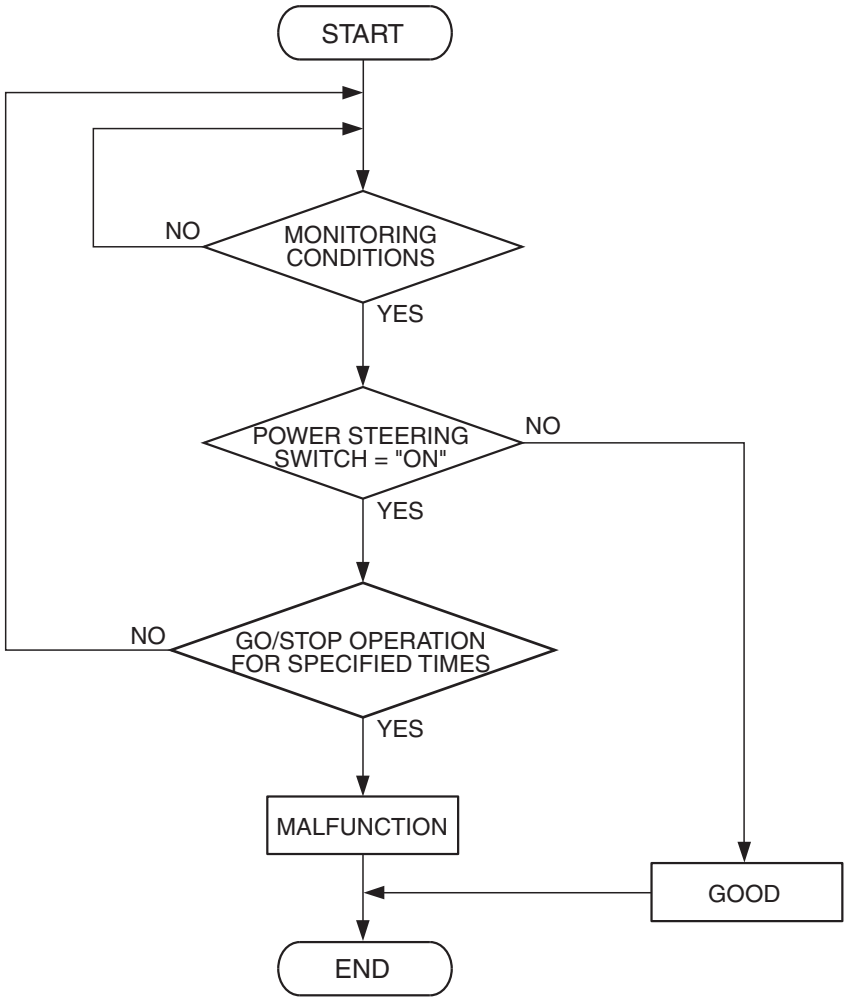
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM <M/T> or the PCM <A/T> checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

DESCRIPTIONS OF MONITOR METHODS

Power steering pressure switch stays on during specified go/stop operations.

DTC SET CONDITIONS

Logic Flow Chart



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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

TSB Revision

Check Conditions

- Engine coolant temperature is higher than 15°C (86°F).
- Drive for 4 seconds or more with the vehicle speed is 50 km/h (31 mph) or more. Stop the vehicle [vehicle speed is 1.5 km/h (1.0 mph) or less]. Repeat 10 times or more.

Judgement Criterion

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

OBD-II DRIVE CYCLE PATTERN

None.

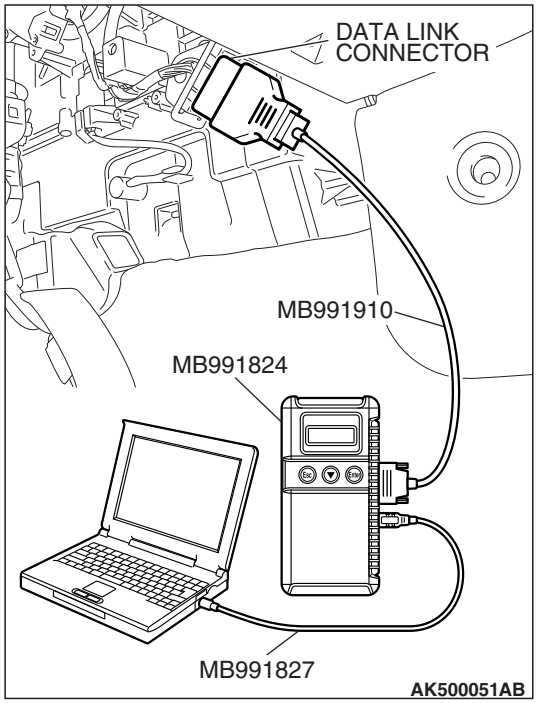
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Power steering pressure switch failed.
- Open or shorted power steering pressure switch circuit, harness damage, or connector damage.
- PCM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

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

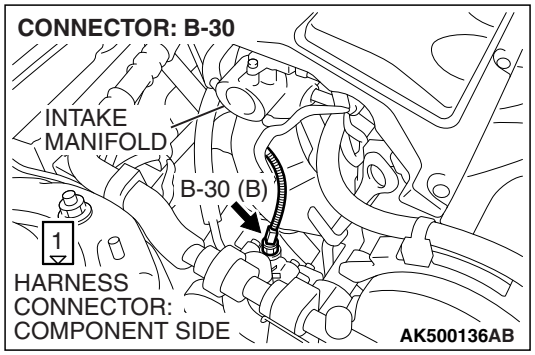
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" will be displayed.
  - If the steering wheel is turned while idling, "ON" will be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

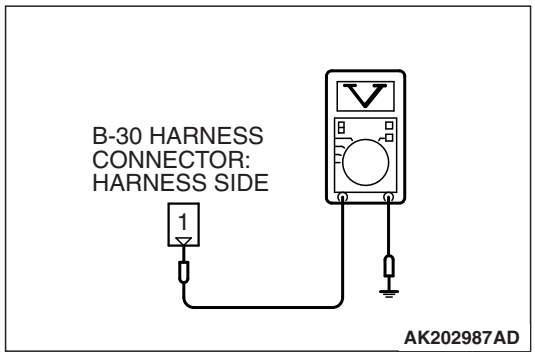
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Go to Step 2.

STEP 2. Measure the power supply voltage at power steering pressure switch connector B-30 by backprobing.



(1) Do not disconnect the connector B-30.
(2) Start the engine and run at idle.



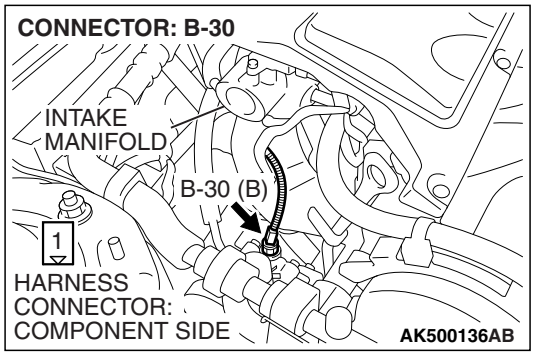
(3) Measure the voltage between terminal No. 1 and ground by backprobing.
- When steering wheel is not turned, voltage should be battery positive voltage.
- When steering wheel is turned, voltage should be 1 volt or less.

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

Q: Is the measured voltage within the specified range?

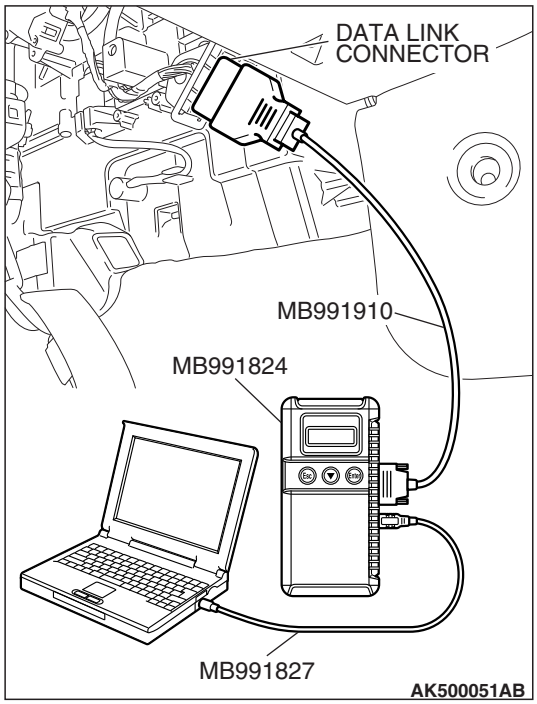
YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check harness connector B-30 at power steering pressure switch for damage.



Q: Is the harness connector in good condition?

YES : Go to Step 4.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.



STEP 4. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

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

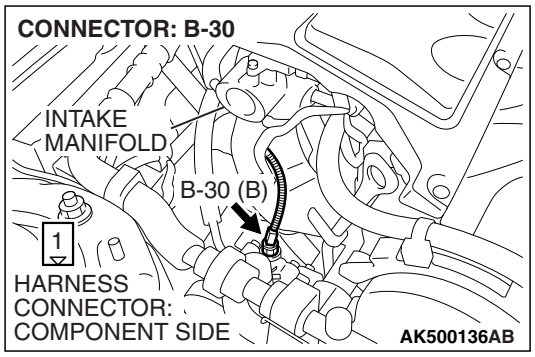
(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
- If the steering wheel is not turned while idling, "OFF" will be displayed.
- If the steering wheel is turned while idling, "ON" will be displayed.

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

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 14.

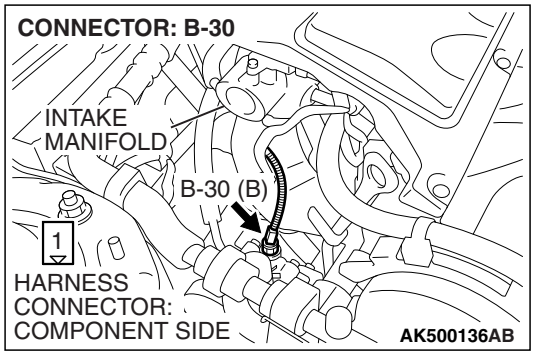


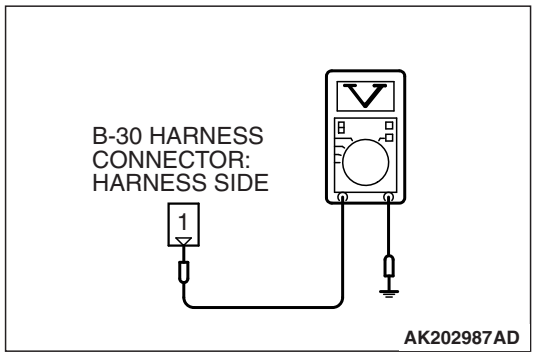
STEP 5. Check harness connector B-30 at power steering pressure switch for damage.

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 14.





STEP 6. Measure the power supply voltage at power steering pressure switch harness side connector B-30.

(1) Disconnect the connector B-30 and measure at the harness side.

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

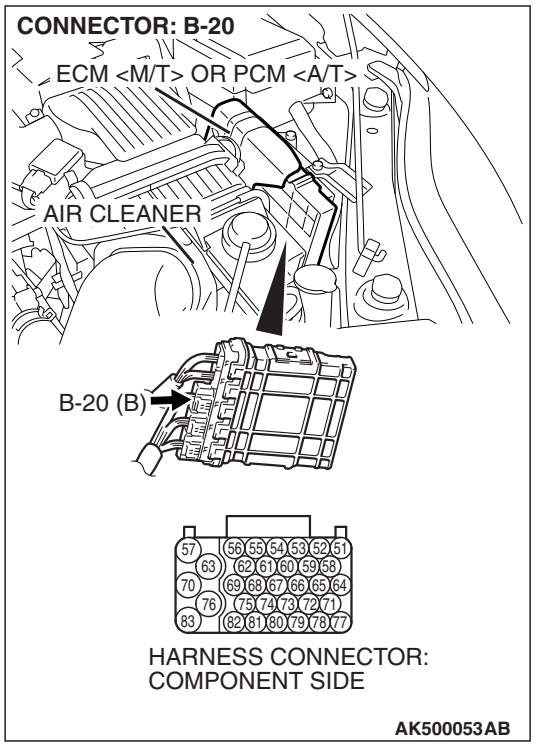
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

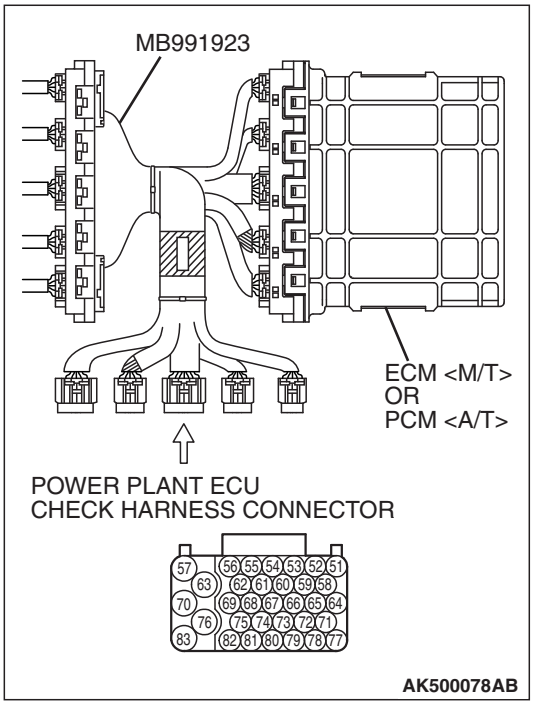
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 11.

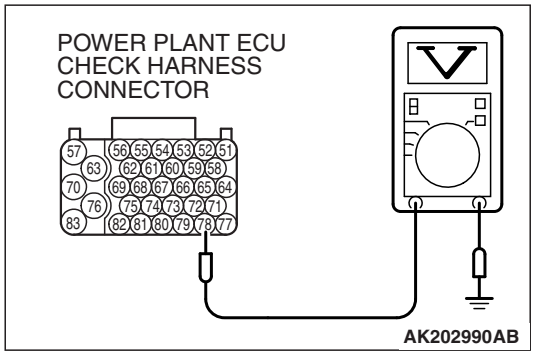
NO : Go to Step 7.





STEP 7. Measure the power supply voltage at ECM <M/T> or PCM <A/T> connector B-20 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Disconnect the power steering pressure switch connector B-30.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between terminal No. 78 and ground.
- Voltage should be between battery positive voltage.

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

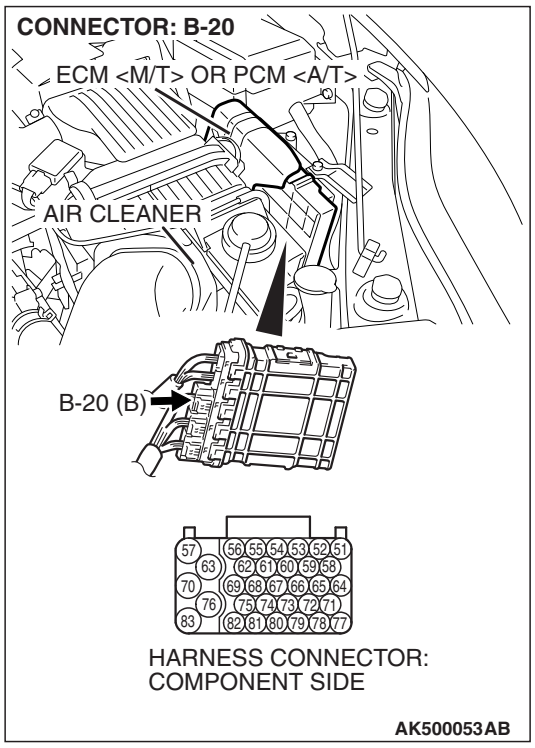
Q: Is battery positive voltage (approximately 12 volts) present?

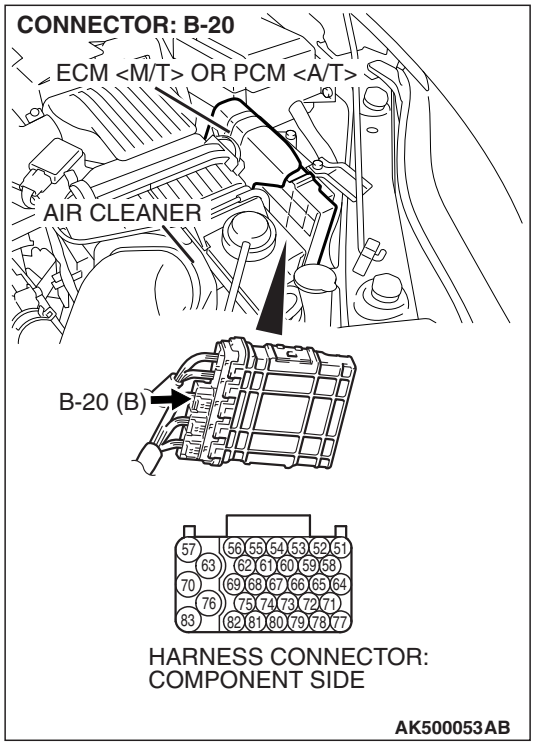
YES : Go to Step 8.
NO : Go to Step 9.

STEP 8. Check harness connector B-20 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between power steering pressure switch connector B-30 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 78) because of open circuit. Then go to Step 14.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.





STEP 9. Check harness connector B-20 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

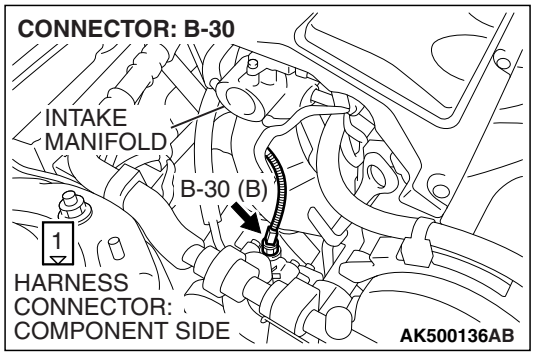
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.

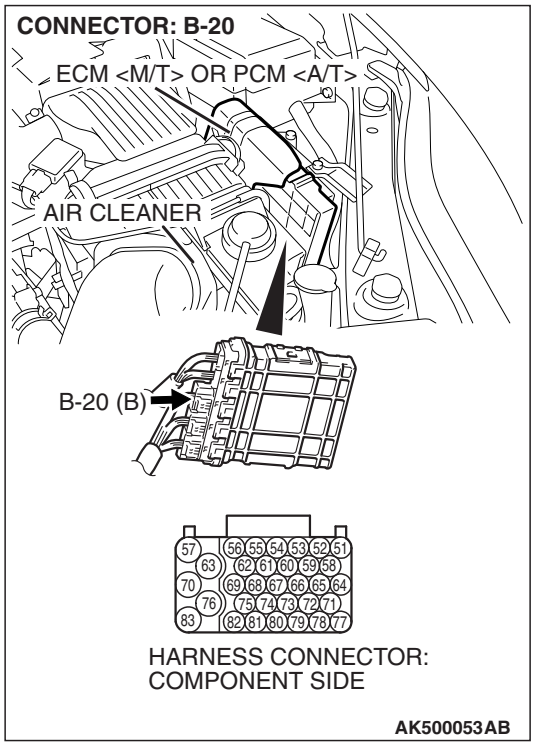
STEP 10. Check for short circuit to ground between power steering pressure switch connector B-30 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 78).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 14.

NO : Repair it. Then go to Step 14.





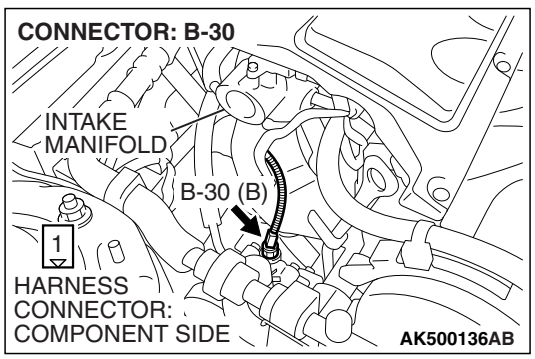
STEP 11. Replace the power steering pressure switch.

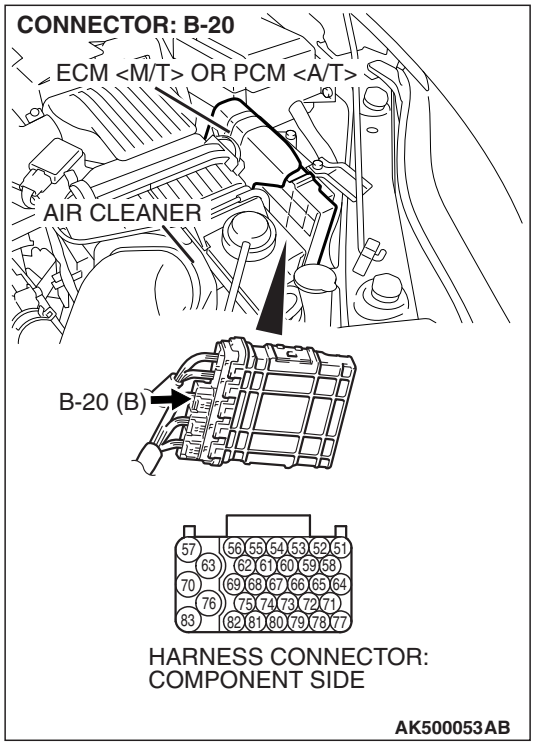
(1) Replace the power steering pressure switch.
(2) Check the trouble symptoms.
(3) Read in the diagnostic trouble code (DTC).

Q: Is DTC P0551 set?

YES : Go to Step 12.

NO : Go to Step 14.



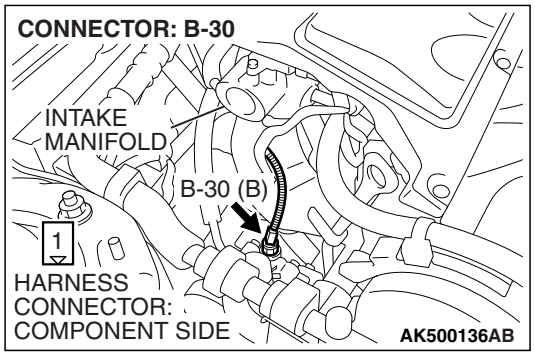


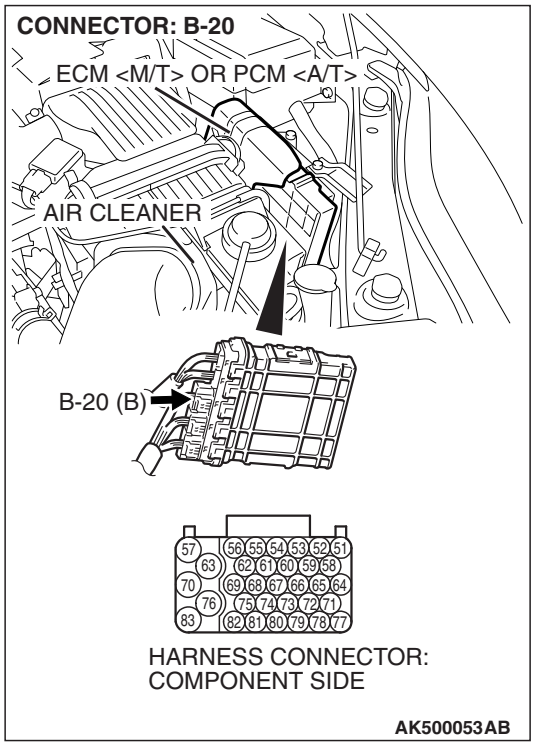
STEP 12. Check harness connector B-20 at ECM <M/T> or PCM <A/T> for damage.

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 14.



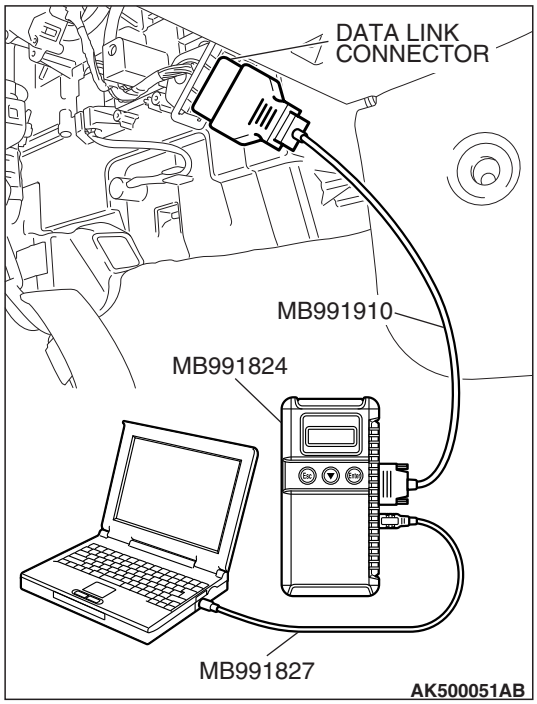


STEP 13. Check for harness damage between power steering pressure switch connector B-30 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 78).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 14.

NO : Repair it. Then go to Step 14.



STEP 14. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
- If the steering wheel is not turned while idling, "OFF" will be displayed.
- If the steering wheel is turned while idling, "ON" will be displayed.

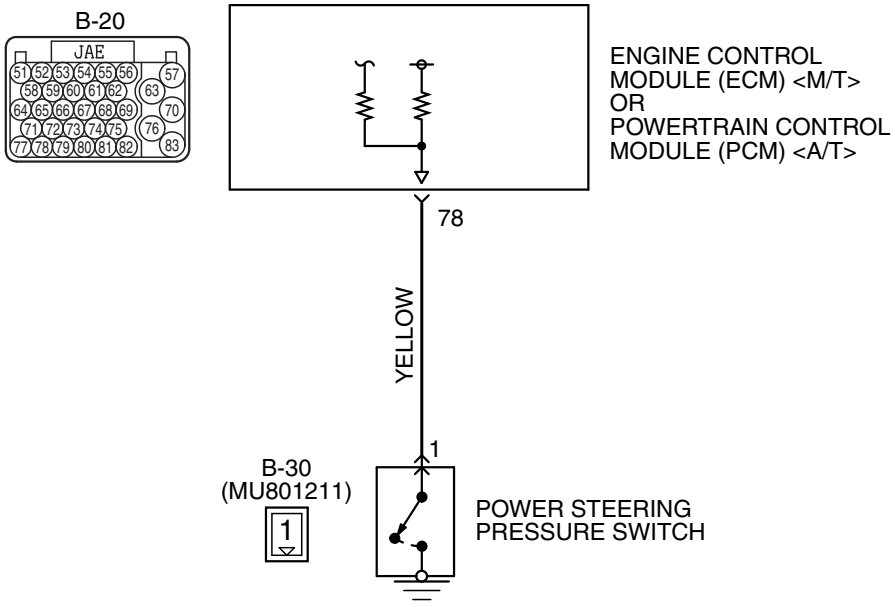
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

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

DTC P0554: Power Steering Pressure Switch Circuit Intermittent

Power Steering Pressure Switch Circuit



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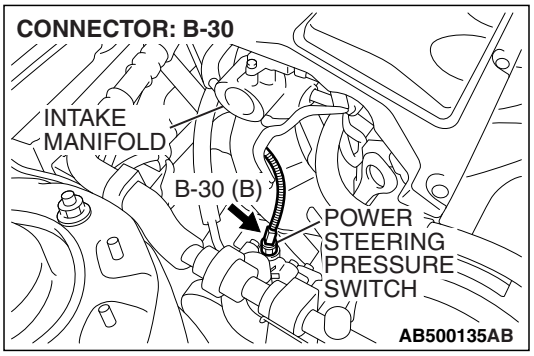

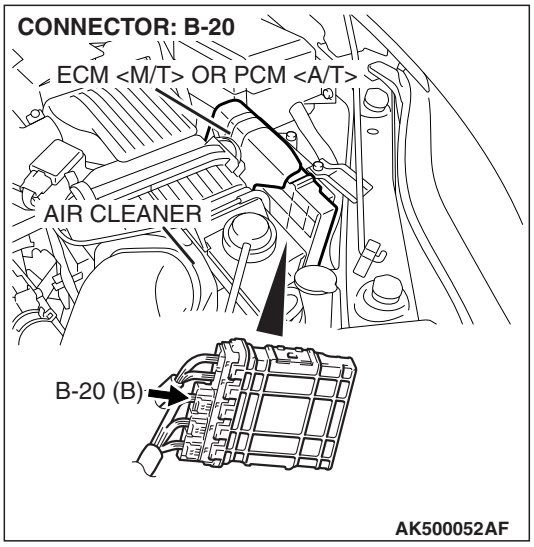

CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM <M/T> or the PCM <A/T> (terminal No. 78) via the resistor in the the ECM <M/T> or the PCM <A/T>.

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 <M/T> or the PCM <A/T>.

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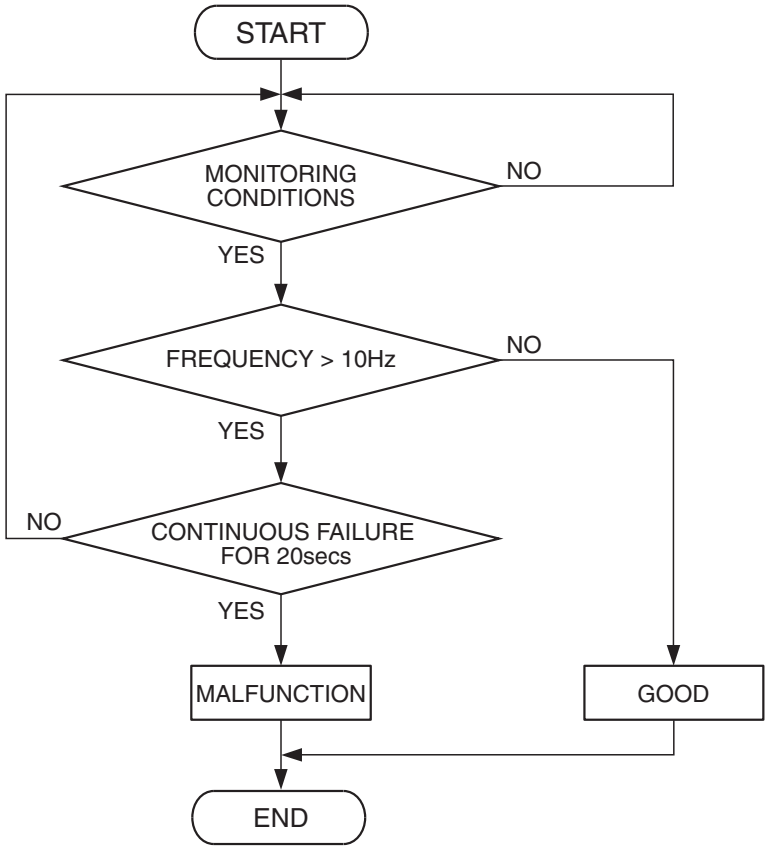
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM <M/T> or the PCM <A/T> 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.

DTC SET CONDITIONS

Logic Flow Chart



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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

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Check Conditions

- Engine coolant temperature is higher than 15°C (59°F).
- Vehicle speed is higher than 50 km/h (31 mph).

Judgement Criterion

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13B-6.

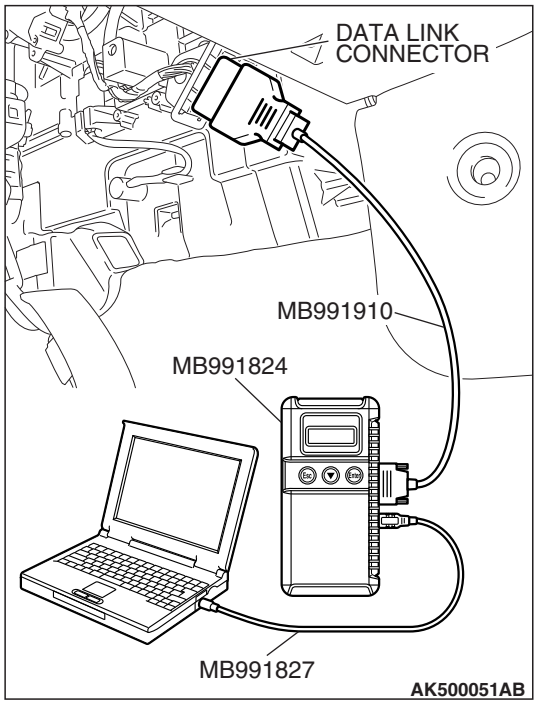
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- 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. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" will be displayed.
  - If the steering wheel is turned while idling, "ON" will be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.
NO : Go to Step 2.

STEP 2. Check the power steering fluid level.

Refer to GROUP 37, On-Vehicle Service – Fluid Level Check P.37-19.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 7.
NO : Go to Step 3.

STEP 3. Check the power steering pressure switch.
Refer to GROUP 37, On-Vehicle Service – Power Steering Pressure Switch CheckP.37-25.

Q: Are there any abnormalities?

YES : Replace the power steering pressure switch. Then go to Step 7.
NO : Go to Step 4.

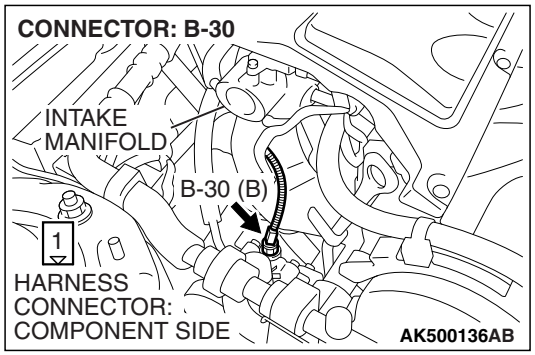
STEP 4. Check the oil pump pressure.
Refer to GROUP 37, On-Vehicle Service – Oil Pump Pressure Test P.37-3.

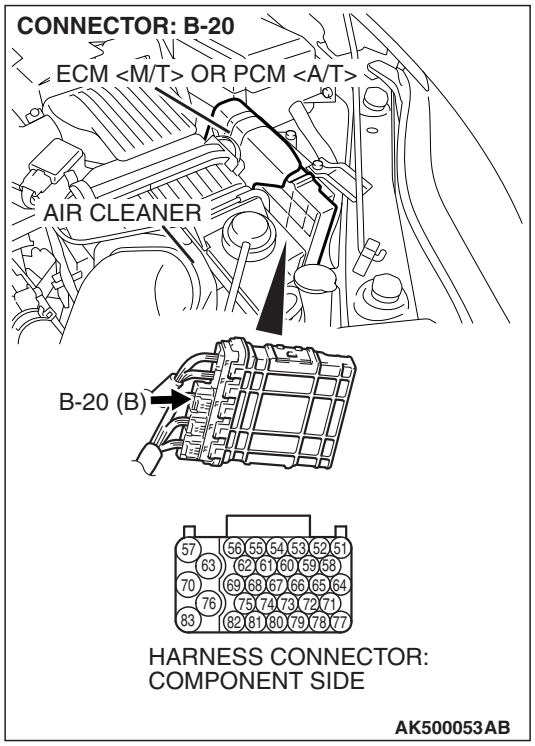
Q: Are there any abnormalities?

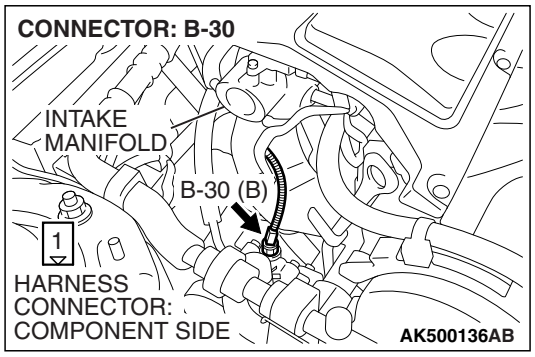
YES : Repair it. Then go to Step 7.
NO : Go to Step 5.

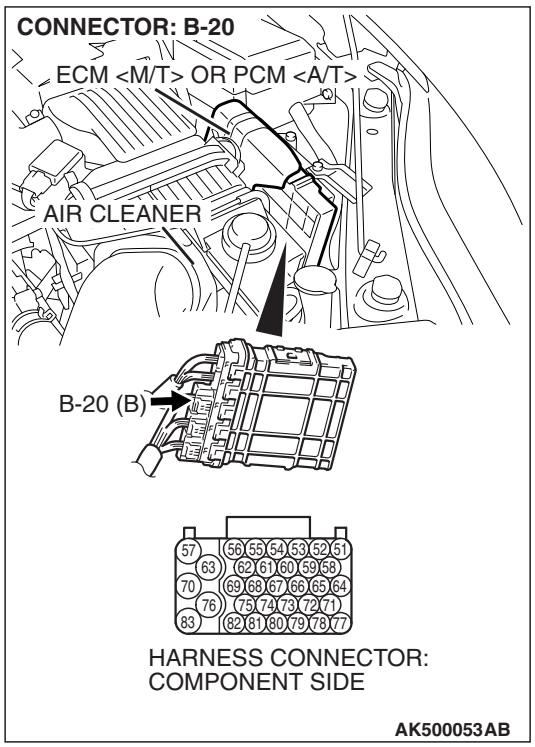
STEP 5. Check harness connector B-30 at the power steering pressure switch and harness connector B-20 at PCM for damage.
Q: Is the harness connector in good condition?

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









STEP 6. Check for harness damage between power steering pressure switch connector B-30 (terminal No. 1) and PCM connector B-20 (terminal No. 78).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 7.

NO : Repair it. Then go to Step 7.

STEP 7. 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 17 P.13B-6.

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

Q: Is the DTC P0554 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0603: EEP ROM Malfunction

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> stored the information such as the idle learned value and so on in the memory of ECM <M/T> or PCM <A/T>.

DESCRIPTIONS OF MONITOR METHODS

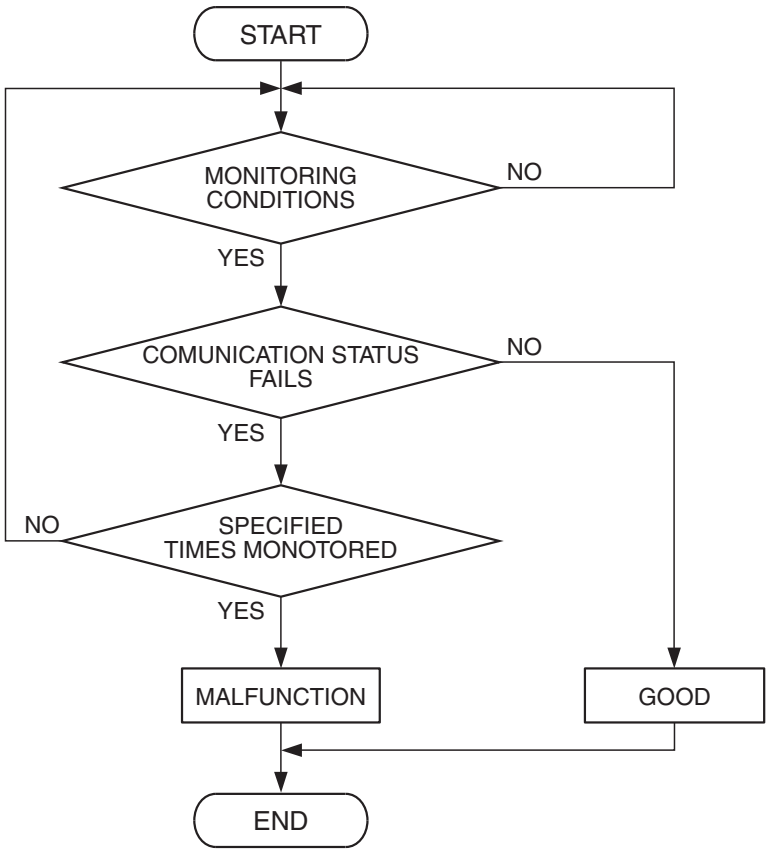
To check whether the information such as the idle learned value and so on is stored in the memory of ECM <M/T> or PCM <A/T>.

MONITOR EXECUTION

Once per driving cycle

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition

- Ignition switch is in "ON" position.

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

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Judgement Criterion

- The latest data that was flashed while the ignition switch was in "LOCK" (OFF) position are not stored correctly.

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

- ECM failed. <M/T>
- PCM failed. <A/T>

OBD-II DRIVE CYCLE PATTERN

None.

DIAGNOSIS

Required Special Tools:

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

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

⚠ CAUTION

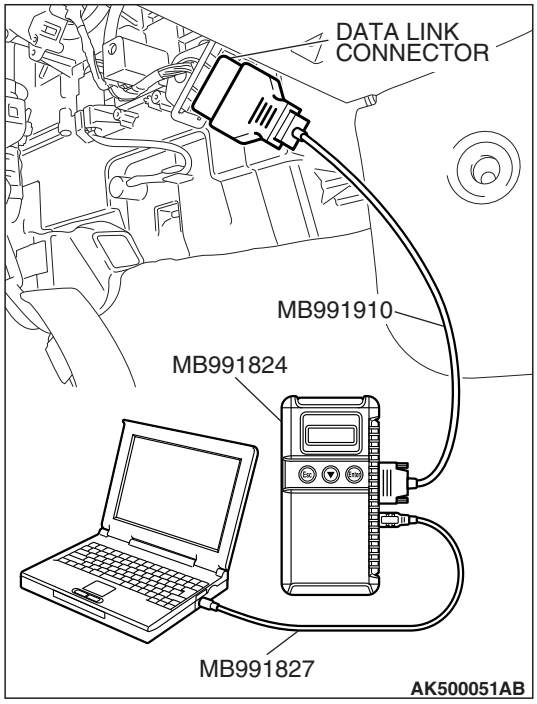
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

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

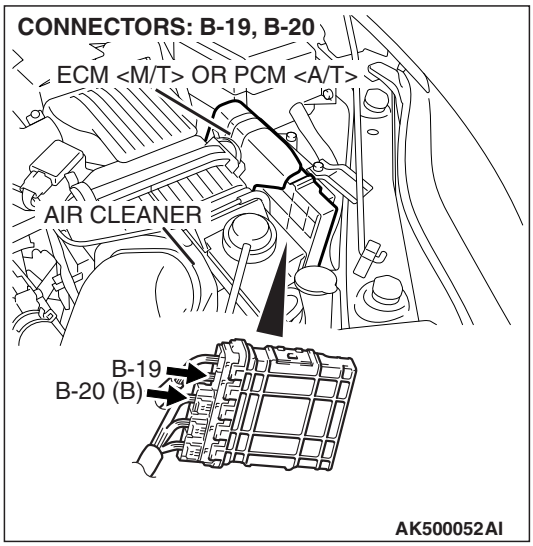
Q: Is DTC P0603 set?

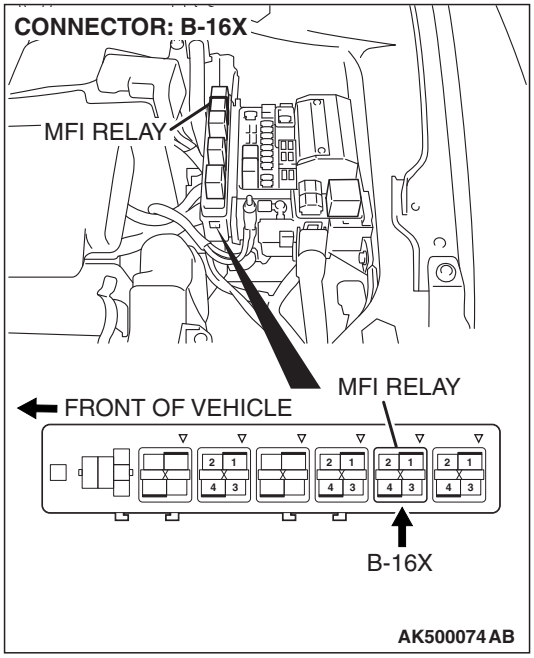
YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

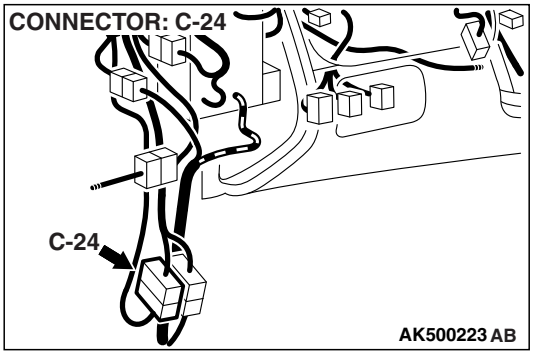
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

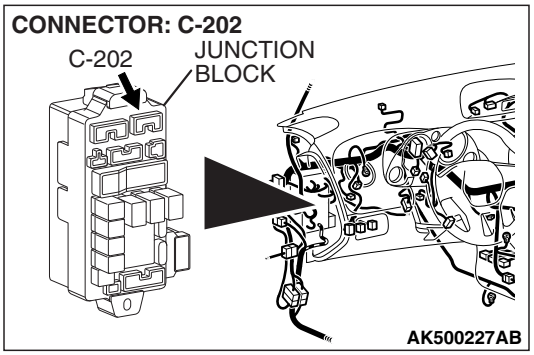


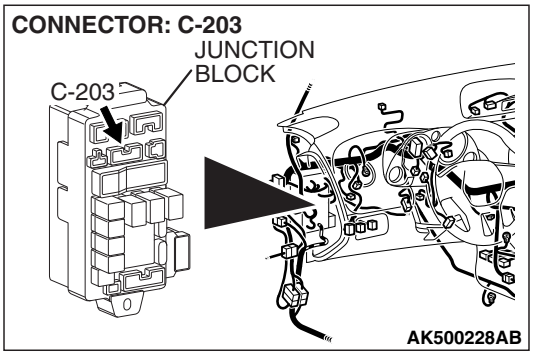
DTC P0606: Engine Control Module <M/T> or Powertrain Control Module <A/T> Main Processor Malfunction

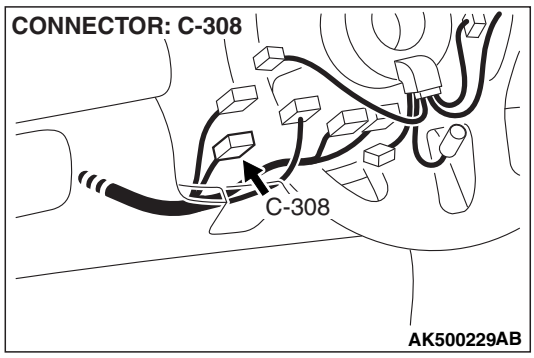












POWERTRAIN CONTROL MODULE MAIN PROCESSOR MALFUNCTION

- Refer to Inspection Procedure 28 – Power Supply System and Ignition Switch – IG System P.13B-1178.

CIRCUIT OPERATION

- Refer to Inspection Procedure 28 – Power Supply System and Ignition Switch – IG System P.13B-1178.

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TECHNICAL DESCRIPTION

- Throttle actuator control module processor checks the ECM <M/T> or the PCM <A/T> 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 should be input for 0.5 second.

OBD-II DRIVE CYCLE PATTERN

None.

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

- MFI relay failed.
- Shorted MFI relay circuit or connector damage.
- Open or shorted ignition switch-IG circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

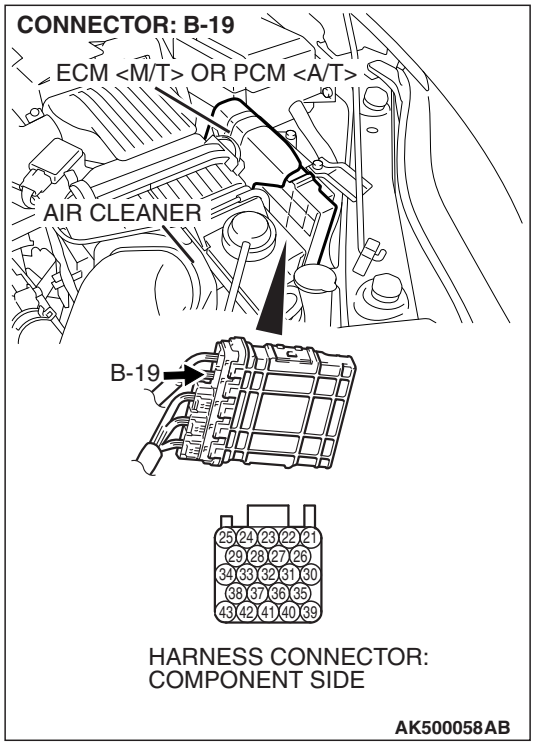
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check the battery.

Refer to GROUP 54A, Battery – On-vehicle Service – Battery Test P.54A-7.

Q: Are there any abnormalities?

YES : Replace the battery. Then go to Step 9.
NO : Go to Step 2.



STEP 2. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

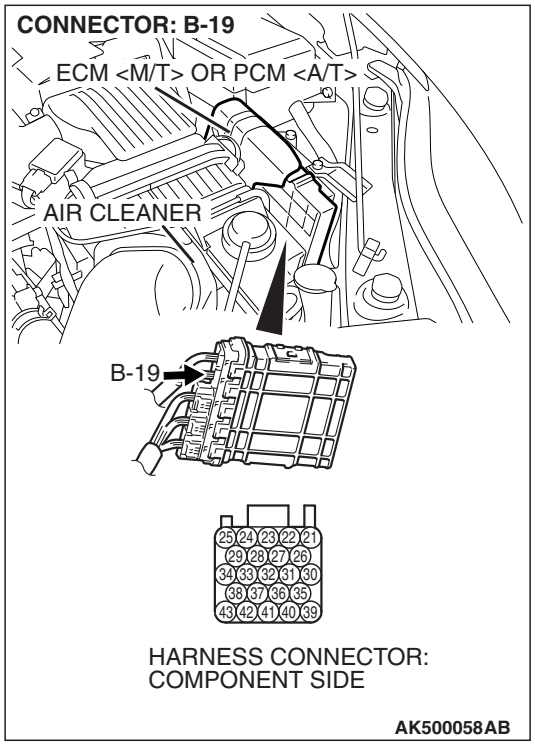
YES : Go to Step 3.

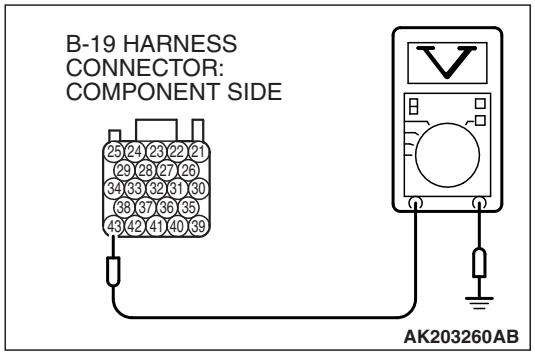
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

STEP 3. Measure the ignition switch-IG signal voltage at PCM harness side connector B-19.

(1) Disconnect the connector B-19 and measure at the harness side.

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





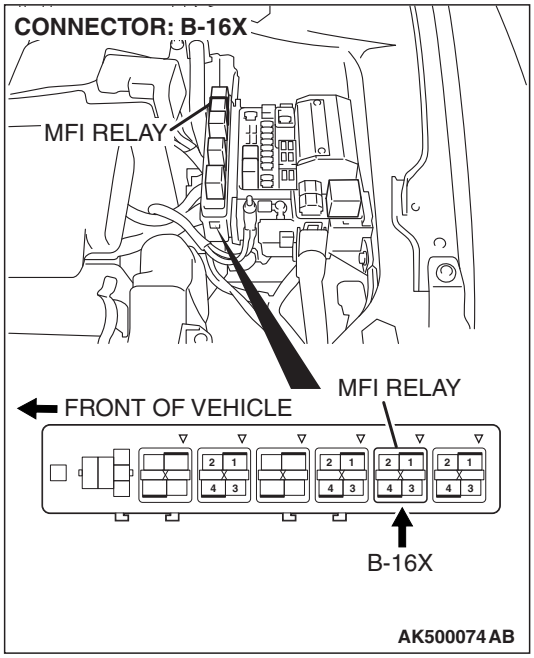
(3) Measure the voltage between terminal No. 43 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 4.

NO : Check harness connector C-24, C-202 and C-203 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 ignition switch connector C-308 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 43) because of open circuit or short circuit to ground. Then go to Step 9.



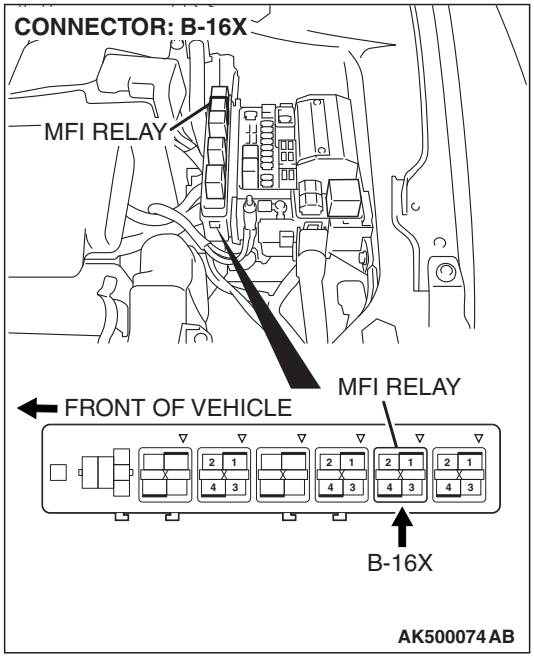
STEP 4. Check harness connector B-16X at MFI relay for damage.

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.

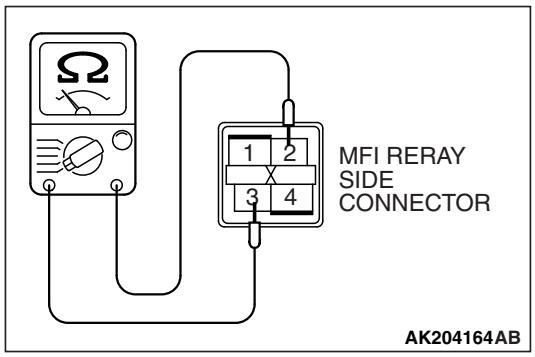
STEP 5. Check the MFI relay.



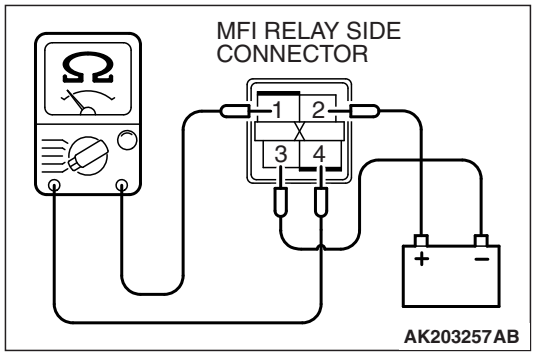
⚠ CAUTION

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

(1) Remove the MFI relay.



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



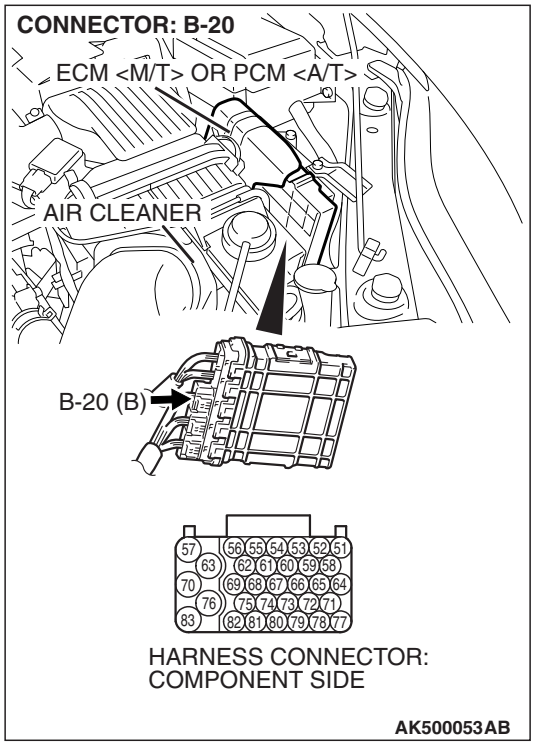
(3) Use jumper wires to connect MFI relay terminal No. 2 to the positive battery terminal and terminal No. 3 to the negative battery terminal.
(4) Check for continuity between the MFI relay terminals No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.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

(5) Install the MFI relay.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the MFI relay. Then go to Step 9.

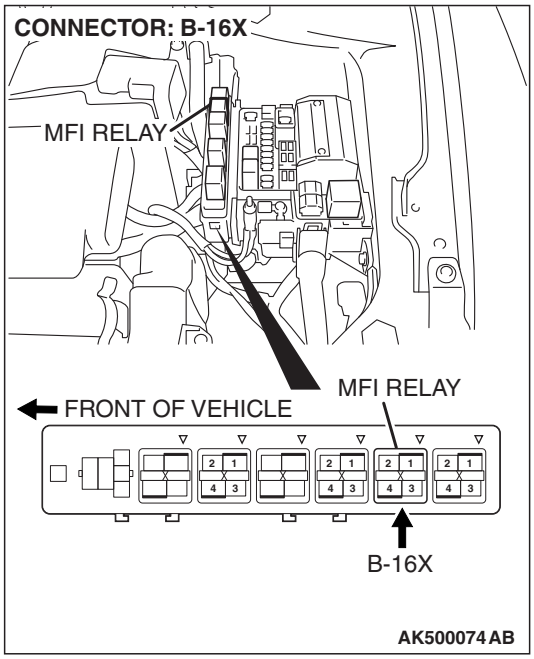


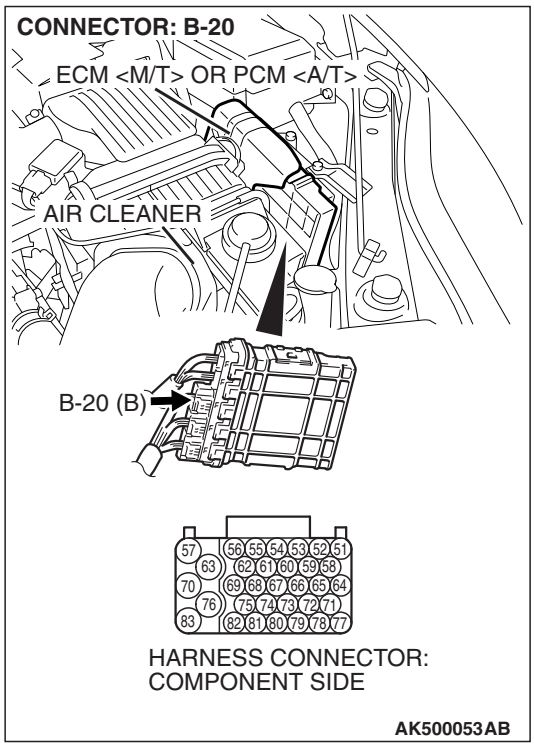
STEP 6. Check harness connector B-20 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 7.

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



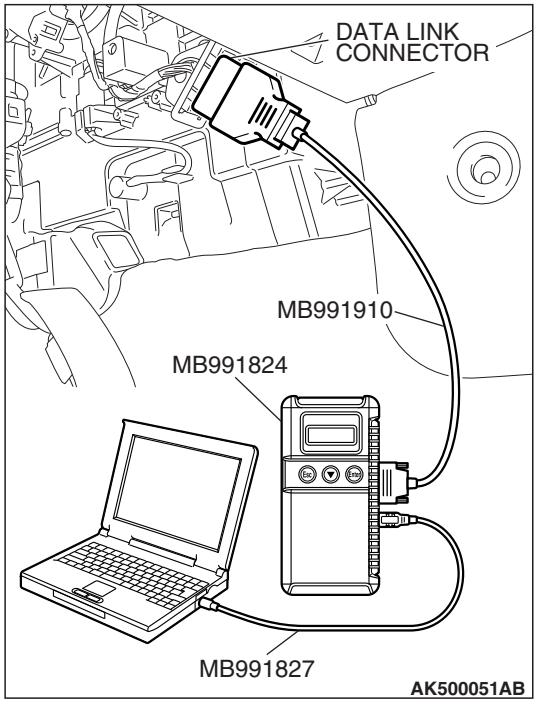


STEP 7. Check for short circuit to ground between MFI relay connector B-16X (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 52).

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

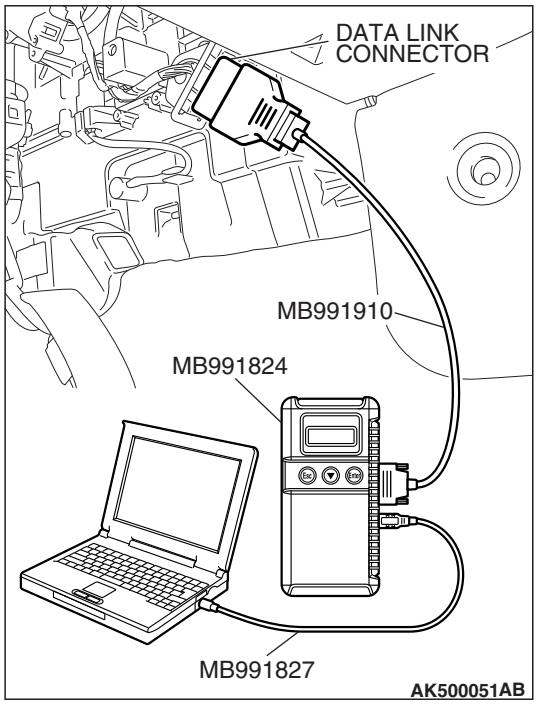
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 P0606 set?

YES : Replace the ECM <M/T> or PCM <A/T>. When the ECM <M/T> or PCM <A/T> is replaced, register the encrypted code. Refer to GROUP 54A, Immobilizer System – Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.



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.

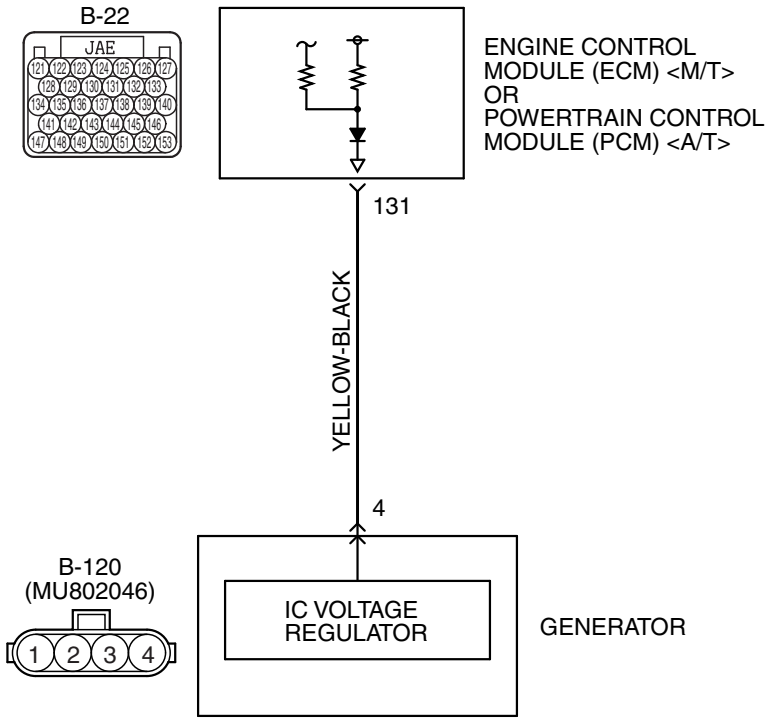
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0606 set?

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

DTC P0622: Generator FR Terminal Circuit Malfunction

Generator Circuit



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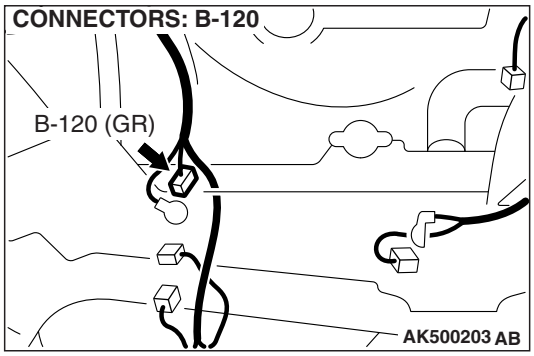

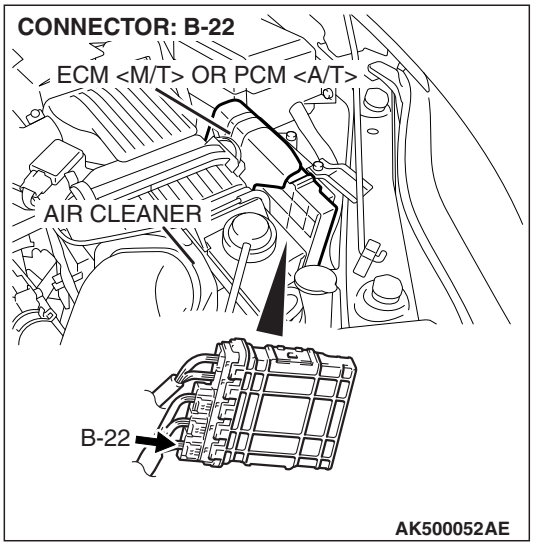

CIRCUIT OPERATION

- The ECM <M/T> or the PCM <A/T> (terminal No. 131) apply a battery positive voltage into the generator FR terminal No. 4 via resistance inside the unit.

TECHNICAL DESCRIPTION

- When the generator field coils are controlled, the generator FR terminal inputs signal to the ECM <M/T> or the PCM <A/T>.

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- The ECM <M/T> or the PCM <A/T> detects the generator output with the input signal, and controls the idle air control motor according to the generator output.

DTC SET CONDITIONS

Check Conditions

- Engine speed is higher than 50 r/min.

Judgement Criteria

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

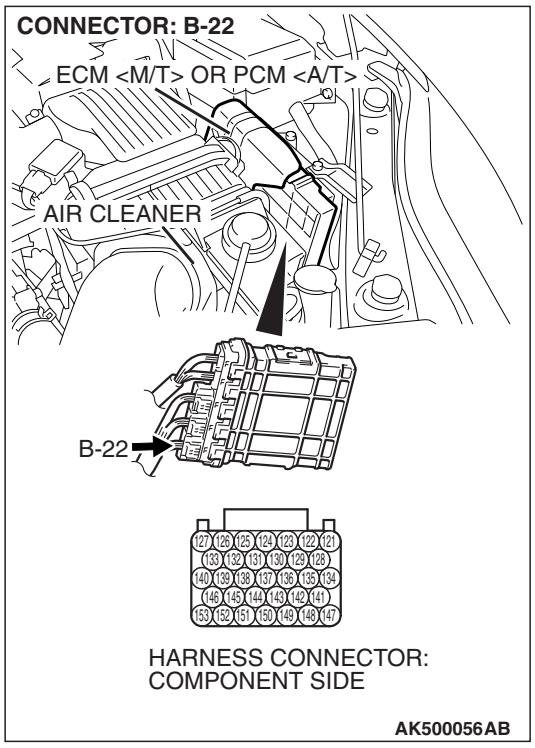
TROUBLESHOOTING HINTS (The most likely causes for this code to be set area:)

- Generator failed.
- Open or shorted circuit in generator FR terminal circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

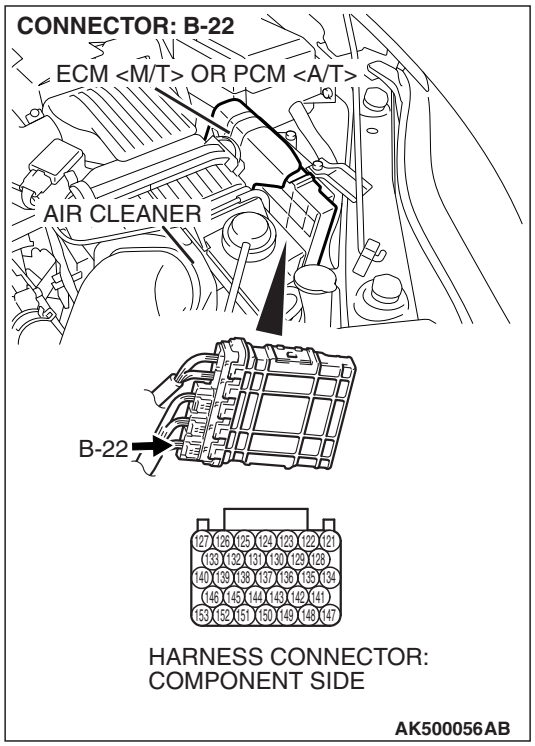


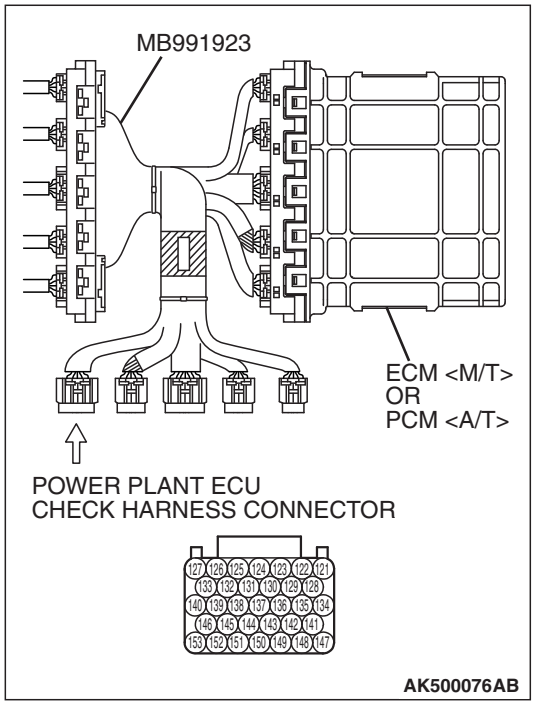
STEP 1. Check harness connector B-22 at ECM <M/T> or PCM <A/T> connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2.

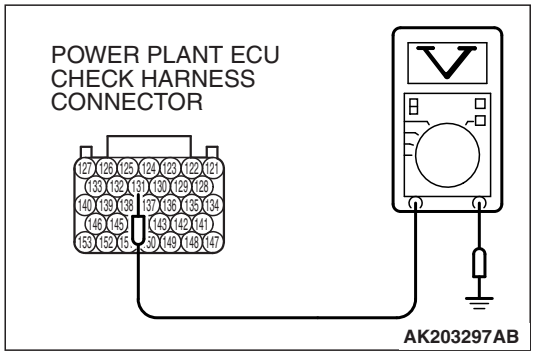
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.





STEP 2. Measure the voltage at ECM <M/T> or PCM <A/T> connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 131 and ground.

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

a. Engine: warming up
b. Radiator fan: stopped
c. Headlight switch: OFF to ON
d. Rear defogger switch: OFF to ON
e. Stoplight switch: OFF to ON

- Voltage should be drop.

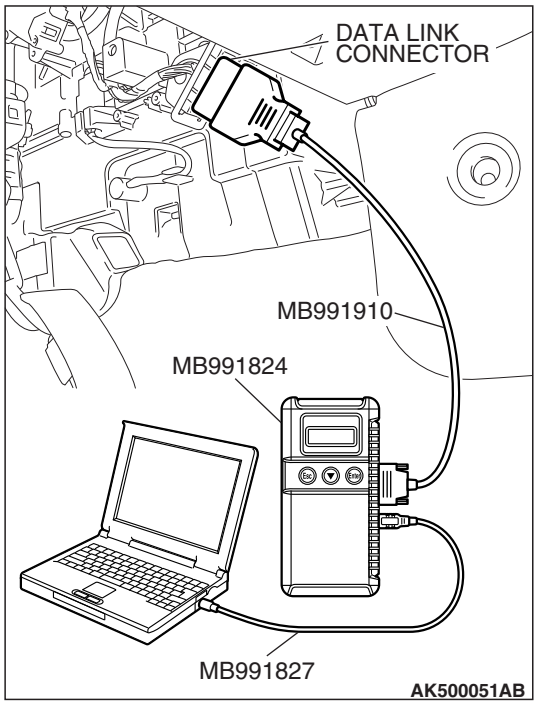
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Did the measured voltage drop?

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

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

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

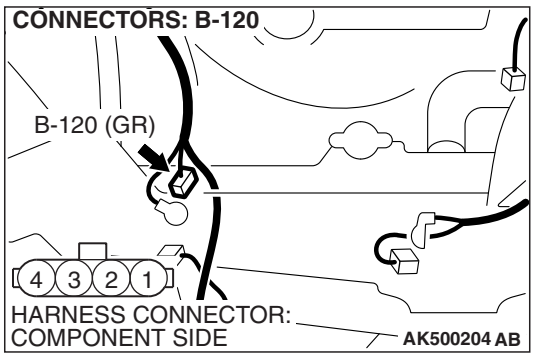


(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0622 set?

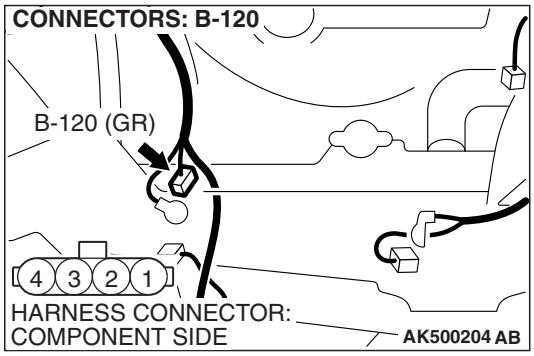
YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 4. Check harness connector B-120 at generator connector for damage.



Q: Is the harness connector in good condition?

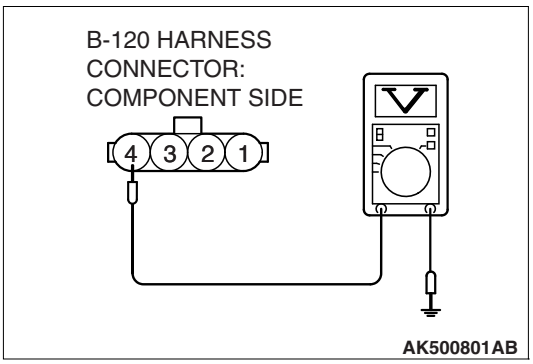
YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.



STEP 5. Measure the voltage at generator harness side connector B-120.

(1) Disconnect the connector B-120 and measure at the harness side.

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



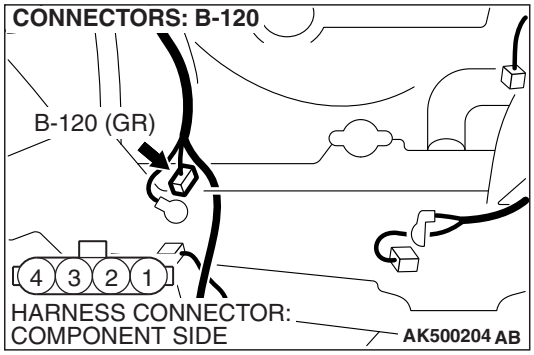
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should measure battery positive voltage.

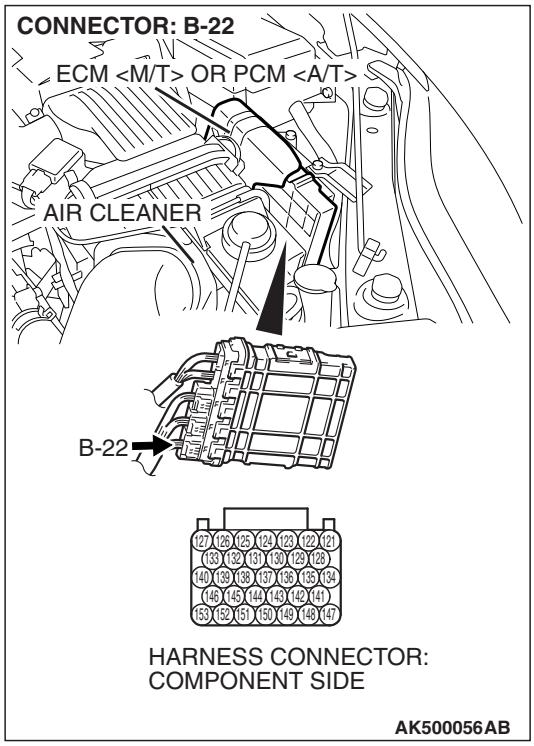
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 7.

NO : Go to Step 6.



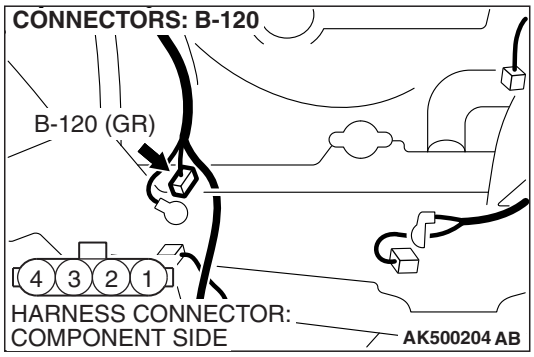


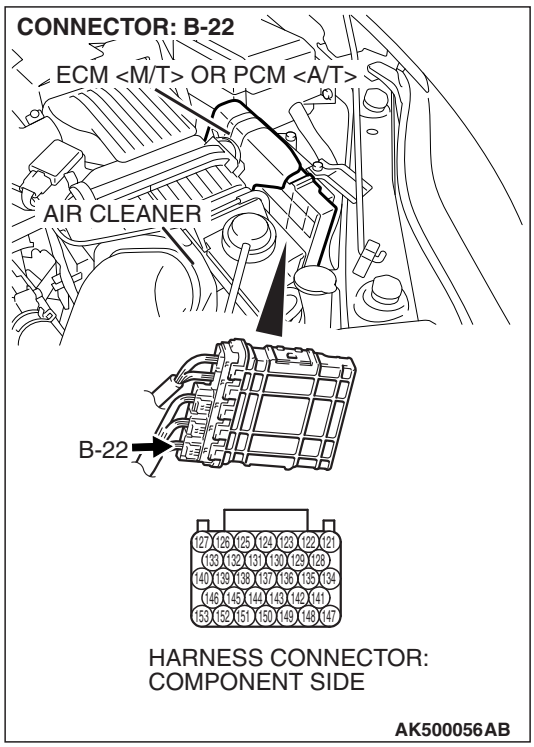
STEP 6. Check for open circuit and short circuit to ground between generator connector B-120 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 131).

Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.

NO : Repair it. Then go to Step 8.



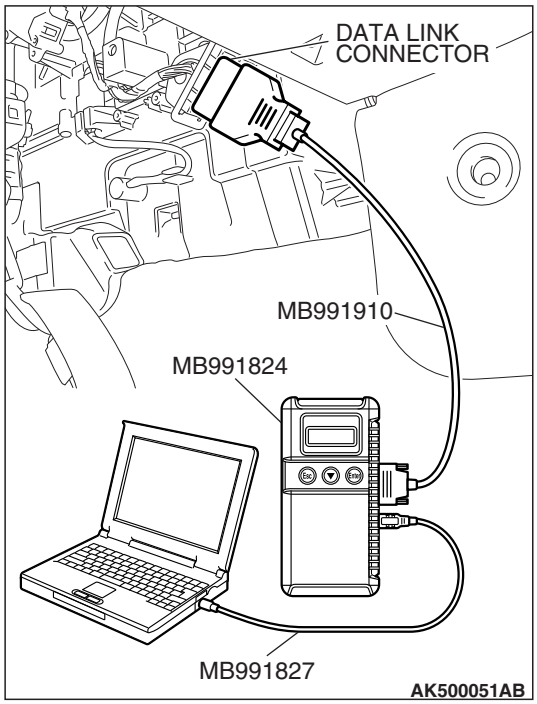


STEP 7. Check for harness damage between generator connector B-120 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 131).

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) Read the DTC.
(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 <M/T> or the PCM <A/T> by the vehicle manufacturer.

DESCRIPTIONS OF MONITOR METHODS

The ECM <M/T> or the PCM <A/T> checks whether the VIN is being entered 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)

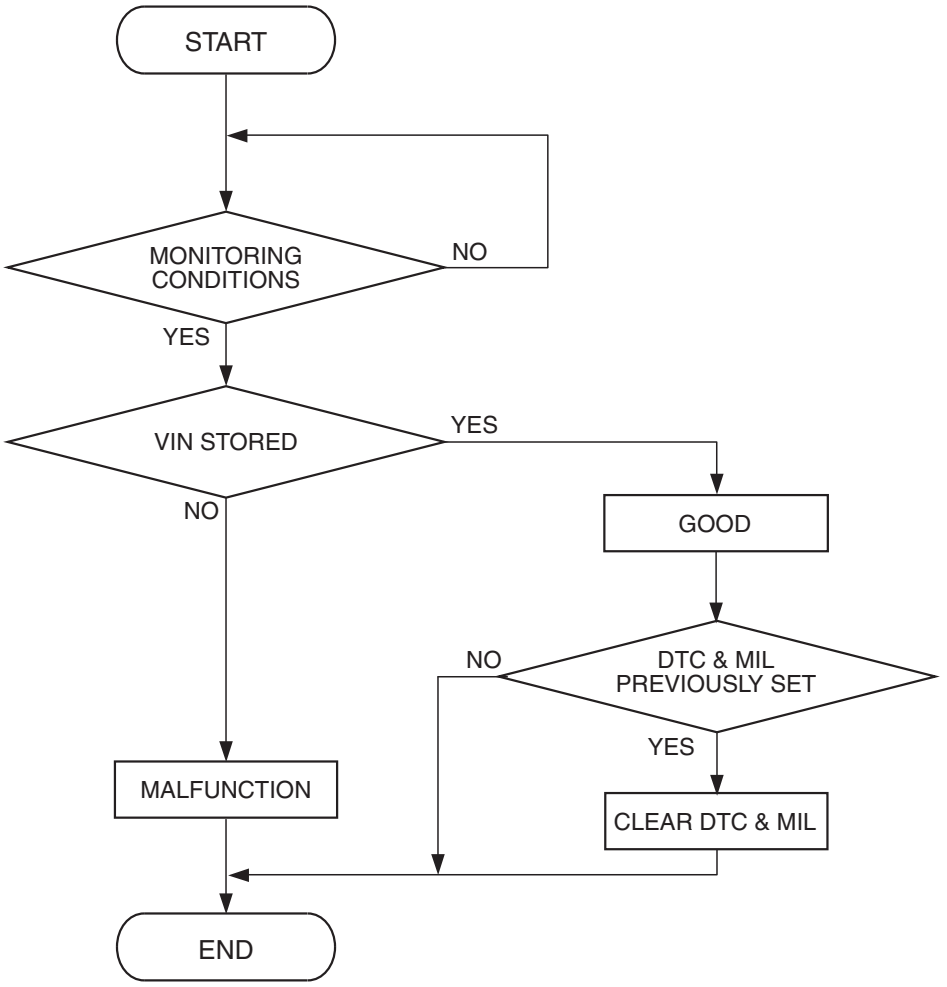
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions
- Ignition switch is in "ON" position.
- EEP ROM is normal.

Judgement Criterion
- VIN (current) has not been written.

OBD-II DRIVE CYCLE PATTERN

None.

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

- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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

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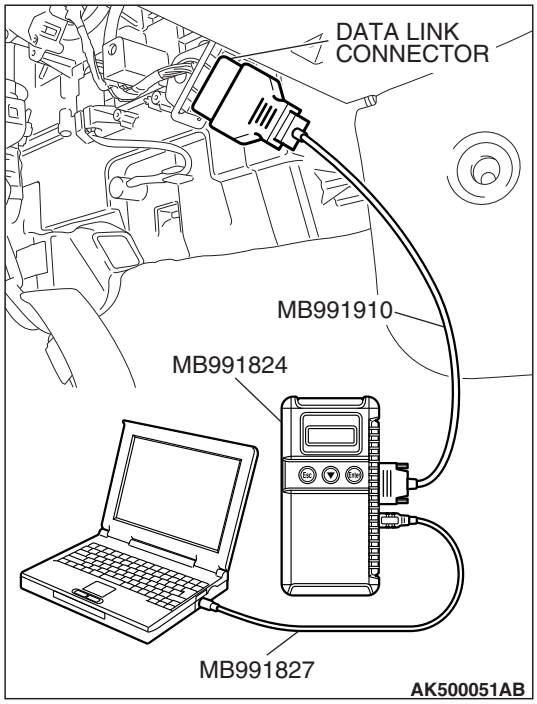


STEP 1. Using scan tool MB991958, check VIN Information.

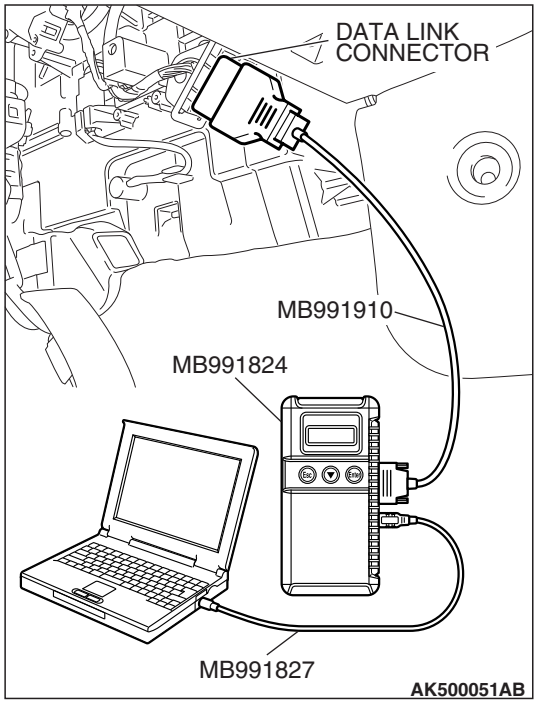
⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Set scan tool MB991958 to the coding mode for VIN Information.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Has VIN (current) been written?

YES : Go to Step 2.
NO : Write VIN. Then go to Step 3.



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

(1) Turn the ignition switch to the "ON" position.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0630 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

TSB Revision

STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC)
(1) Turn the ignition switch to the "ON" position.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0630 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

NO : The inspection is complete.

DTC P0638: Throttle Actuator Control Motor Circuit Range/Performance Problem

⚠ CAUTION
If DTC P0638 has been set, TCL related DTC U1120 is also set. After P0638 has been diagnosed, don't forget to erase DTC U1120.

THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P2101 – Throttle Actuator Control Motor Circuit P.13B-960.

CIRCUIT OPERATION

- Refer to DTC P2101 – Throttle Actuator Control Motor Circuit P.13B-960.

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> checks the electronic controlled throttle system for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

Difference between throttle position sensor (main) output and target opening is greater than the specified value.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Check Conditions

- Battery positive voltage is higher than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.35 and 4.8 volts.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is more than 0.04 volt.

Judgement Criterion

- Throttle position sensor (main) output voltage has continued to be higher than the target throttle position sensor (main) voltage by 0.5 volt or more for 0.5 second.

Check Conditions

- Battery positive voltage is higher than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.35 and 4.8 volts.

Judgement Criterion

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 1 volt or higher for 1 seconds.

OBD-II DRIVE CYCLE PATTERN

None.

TSB Revision

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. <M/T>
- PCM failed. <A/T>

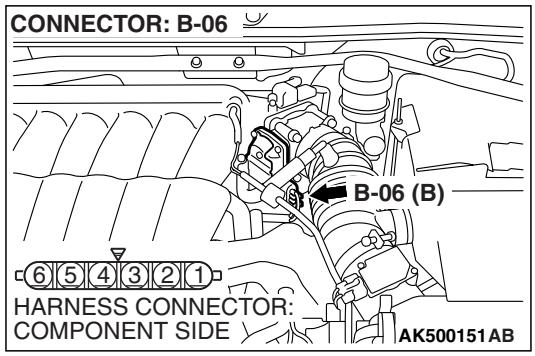
DIAGNOSIS

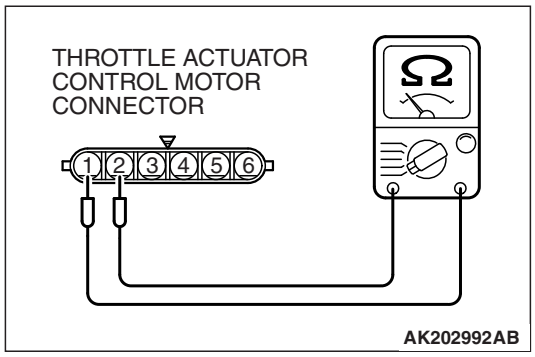
Required Special Tools:

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

STEP 1. Check the throttle actuator control motor.

(1) Disconnect the connector B-06.





(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 2.

Standard value: 0.3 – 80 Ω [at 20°C (68°F)]

Q: Is the measured resistance between 0.3 and 80 ohms [at 20°C (68°F)]?

YES : Go to Step 2.

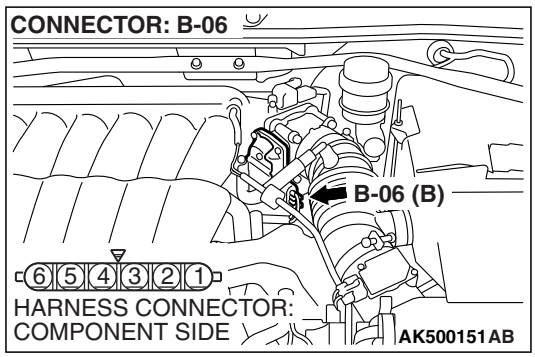
NO : Replace the throttle body assembly. Then go to Step 7.

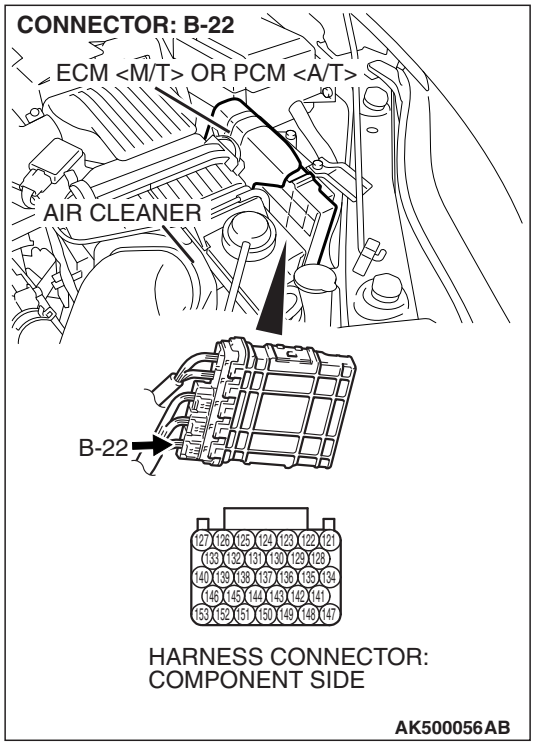
STEP 2. Check harness connector B-06 at throttle actuator control motor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

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



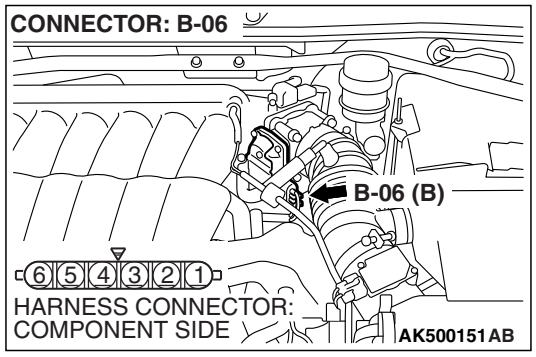


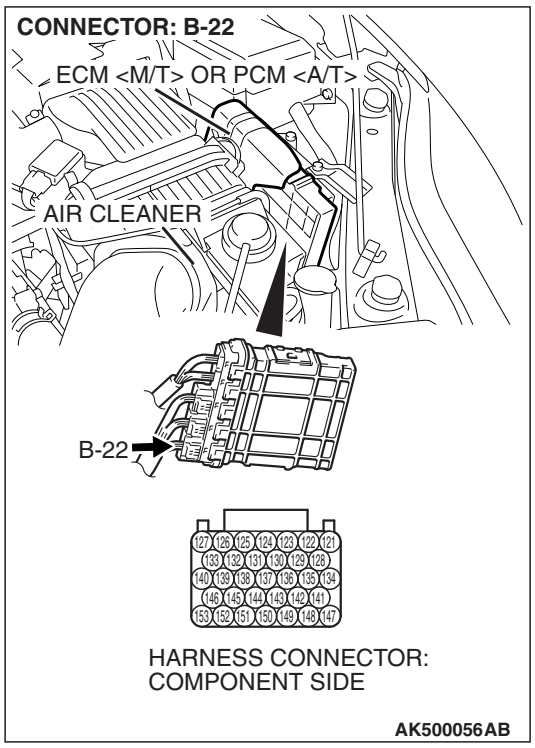
STEP 3. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

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



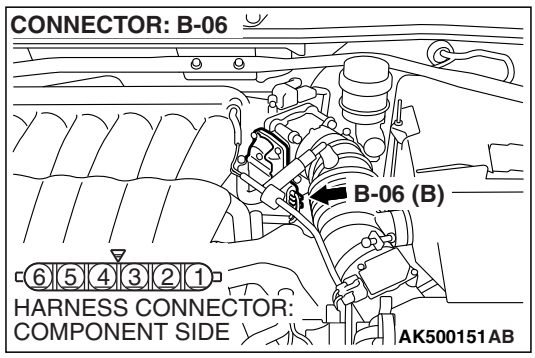


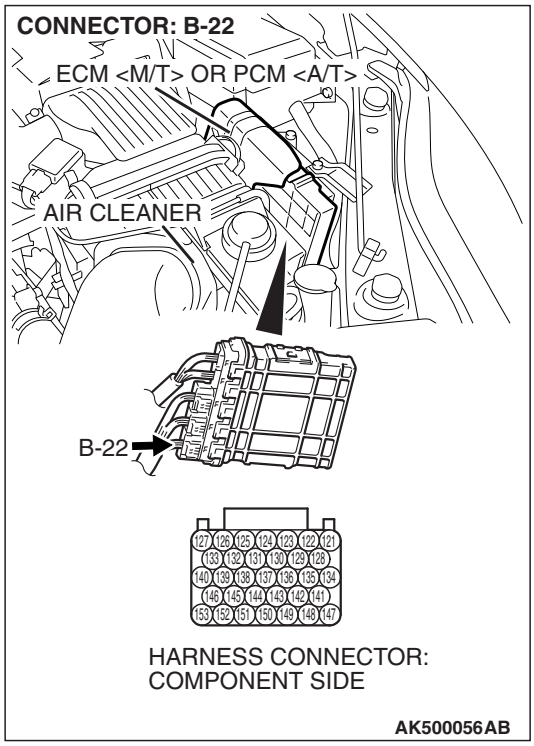
STEP 4. Check for harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and PCM connector B-22 (terminal No. 147).

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair it. Then go to Step 7.



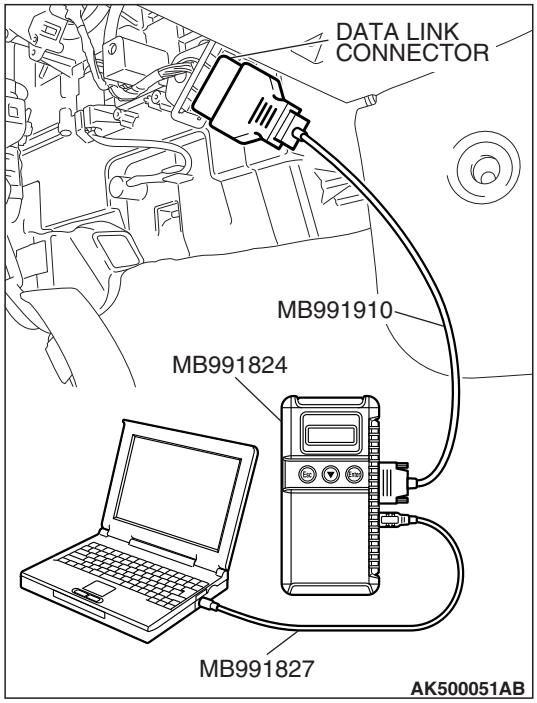


STEP 5. Check for harness damage between throttle actuator control motor connector B-06 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 141).

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

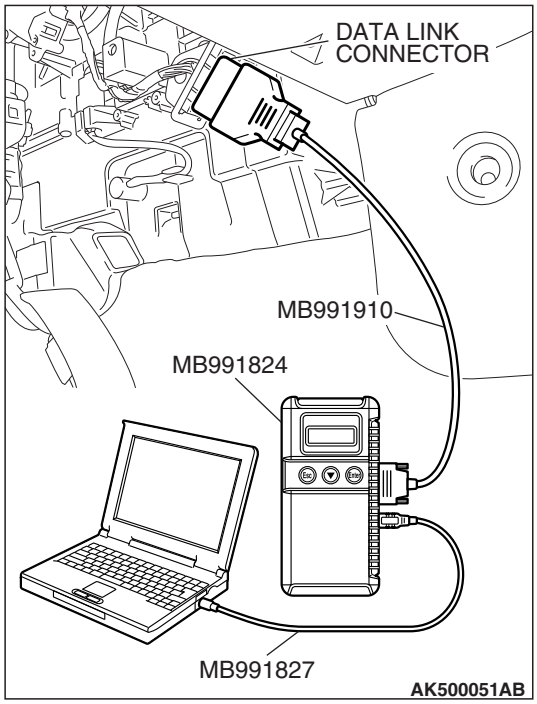
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

(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 or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.



STEP 7. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC P0638 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0642: Throttle Position Sensor Power Supply

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> checks the throttle position sensor power voltage for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor source voltage is smaller than the specified value.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Check Condition

- Battery positive voltage is higher than 6.3 volts.

Judgement Criterion

- Throttle position sensor power voltage should be 4.1 volts or less for 0.3 second.

OBD-II DRIVE CYCLE PATTERN

None.

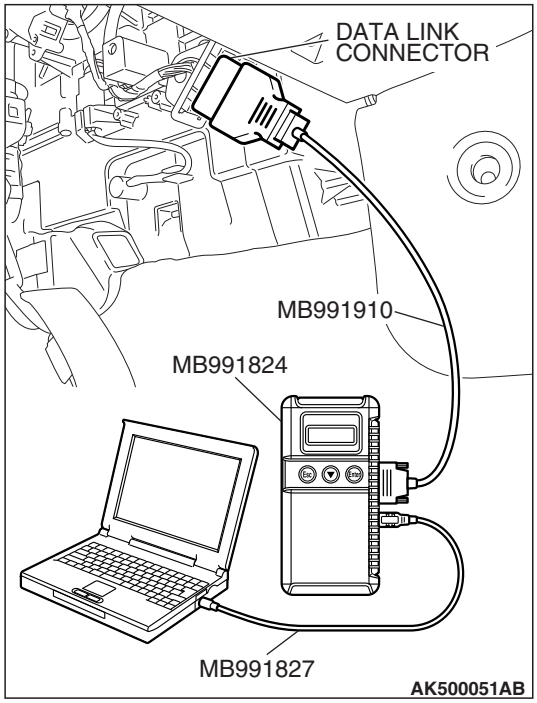
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

Q: Is DTC P0642 set?

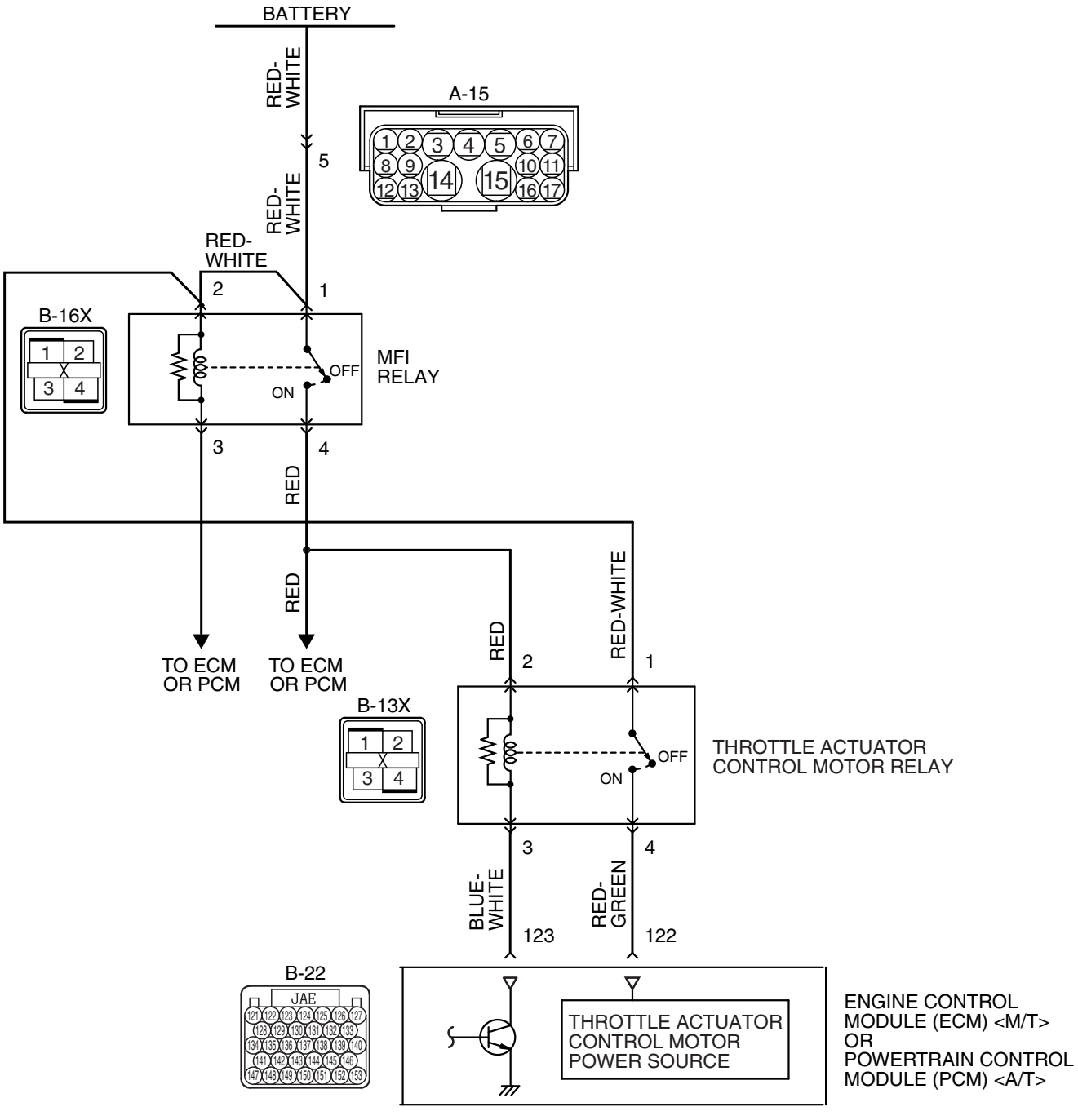
YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

DTC P0657 Throttle Actuator Control Motor Relay Circuit Malfunction

⚠ CAUTION
If DTC P0657 has been set, TCL related DTC U1120 is also set. After P0657 has been diagnosed, don't forget to erase DTC U1120.

Throttle Actuator Contorol Motor Relay Circuit



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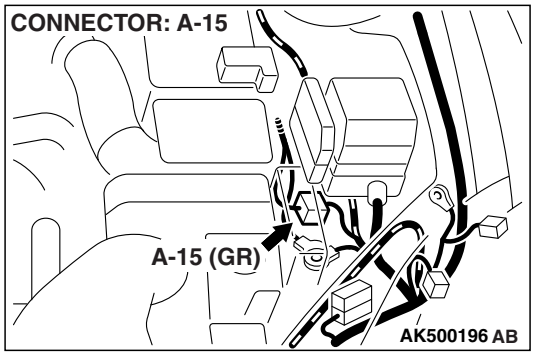
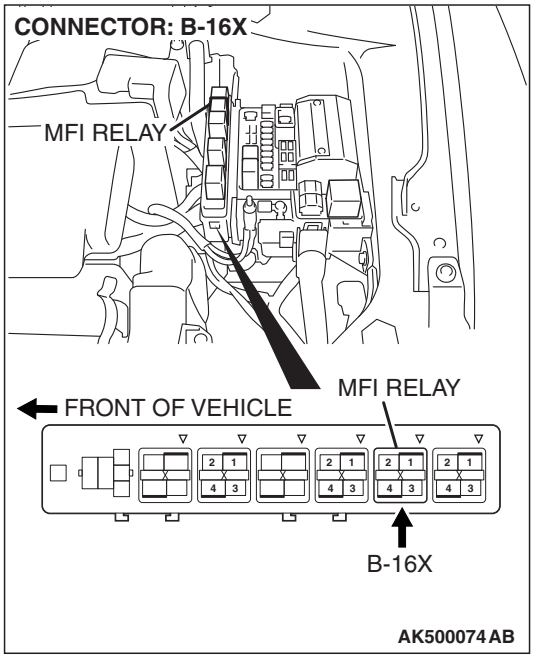
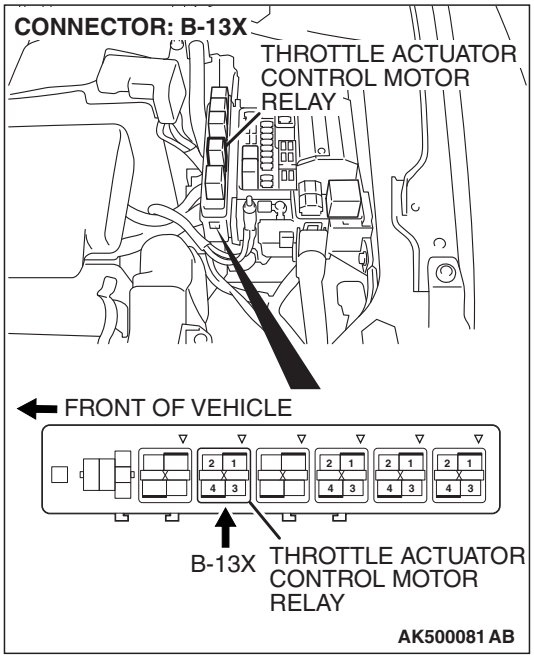
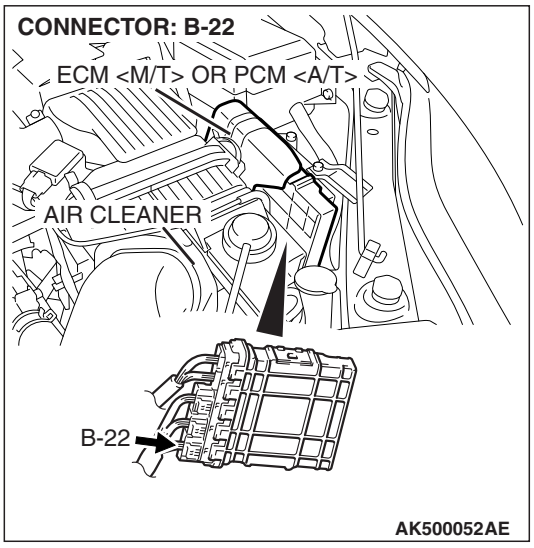
TSB Revision









CIRCUIT OPERATION

- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 1).
- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 2) from the MFI relay (terminal No. 4).
- ECM <M/T> or PCM <A/T> (terminal No. 123) 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. 4) to the ECM <M/T> or the PCM <A/T> (terminal No. 122).

TECHNICAL DESCRIPTION

- When the ignition switch ON signal is input into the ECM <M/T> or the PCM <A/T>, the ECM <M/T> or the PCM <A/T> 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

TSB Revision

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

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

DTC SET CONDITIONS

Check Condition
- Battery positive voltage is higher than 8.3 volts.

Judgement Criterion
- The power line voltage of the electronic controlled throttle system should be 6.0 volts or less for 0.35 seconds.

OBD-II DRIVE CYCLE PATTERN

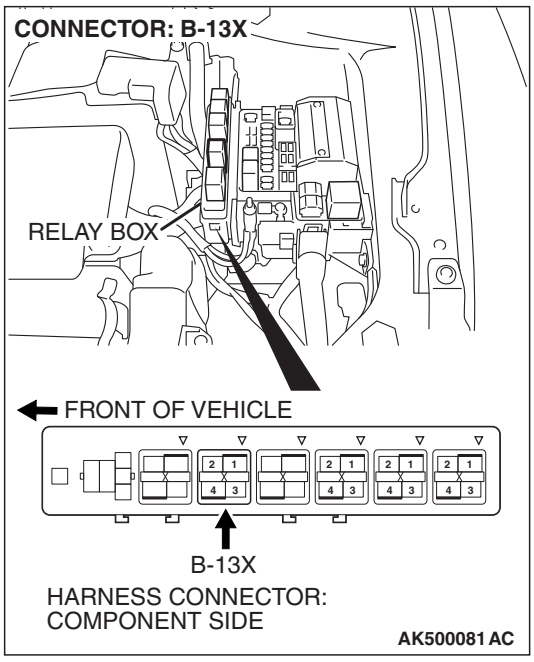
None.

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

- Throttle actuator control motor relay failed or mal-adjusted.
- Open or shorted throttle actuator control motor relay circuit, or loose connector.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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



STEP 1. Check harness connector B-13X at throttle actuator control motor relay for damage.
Q: Is the harness connector in good condition?

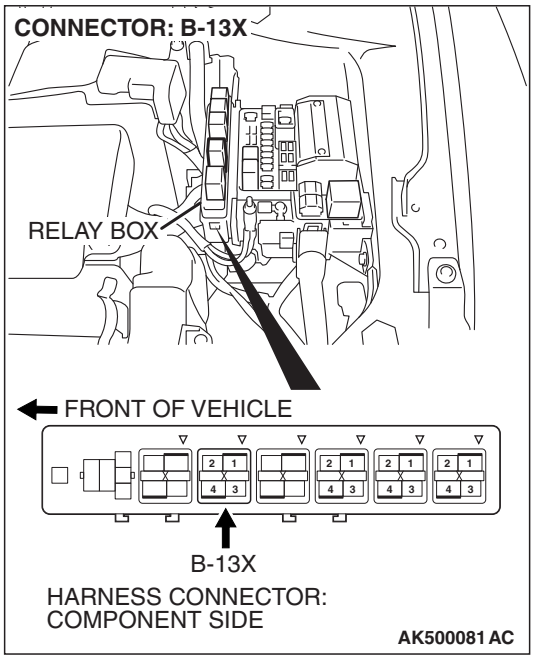
YES : Go to Step 2.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.

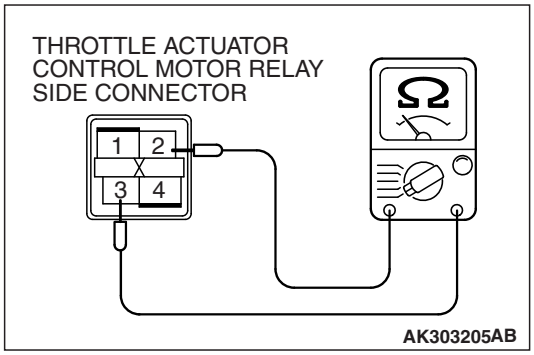
STEP 2. Check the throttle actuator control motor relay.

⚠ CAUTION

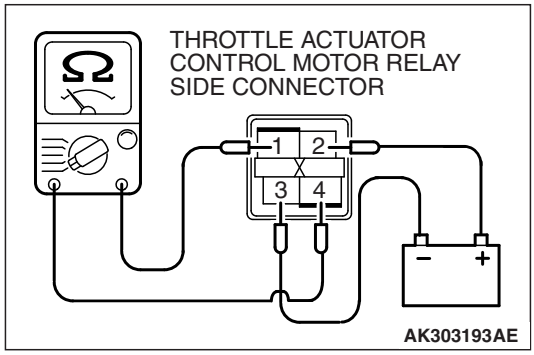
Because it is not possible to distinguish the top and the bottom of the throttle actuator control motor relay, inspect with the triangle mark printed on the relay facing upward.

(1) Remove the throttle actuator control motor relay.





(2) Check for continuity between the throttle actuator control motor relay terminal No. 2 and No. 3.
- There should be continuity (approximately 70 ohms).



(3) Use jumper wires to connect throttle actuator control motor relay terminal No. 2 to the positive battery terminal and terminal No. 3 to the negative battery terminal.
(4) Check the continuity between the throttle actuator control motor relay terminal No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.
- Should be less than 2 ohms. (Negative battery terminal connected.)
- Should be open loop. (Negative battery terminal disconnected.)

(5) Install the throttle actuator control motor relay.

Q: Is the measured resistance normal?

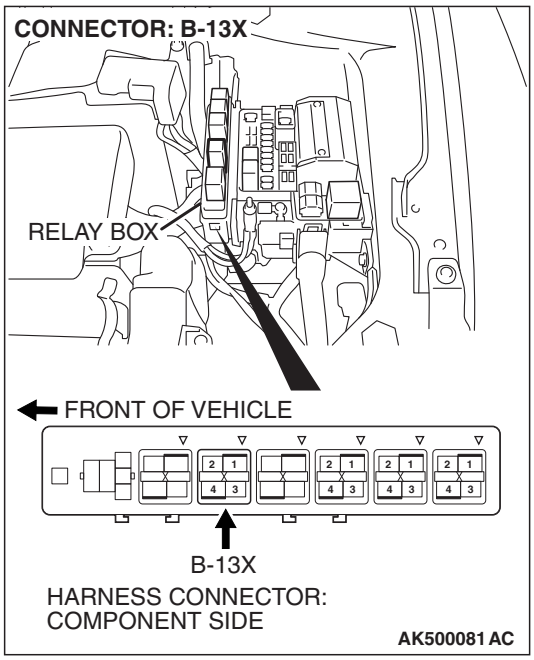
YES : Go to Step 3.
NO : Replace the throttle actuator control motor relay. Then go to Step 14.

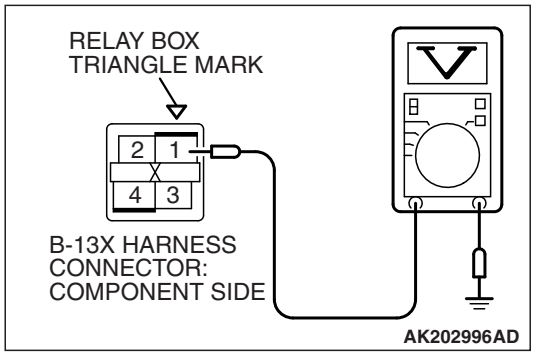
STEP 3. Measure the power supply voltage at throttle actuator control motor relay harness side connector B-13X

⚠ CAUTION

Because it is not possible to distinguish the top and the bottom of the throttle actuator control motor relay, inspect with the triangle mark printed on the relay connector at the wiring harness, inspect it by using triangle mark on the junction block as a reference.

(1) Disconnect the connector B-13X and measure at the harness side.





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

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

YES : Go to Step 4.

NO : Check harness connector A-15 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector A-15 is in good condition, repair it because of open circuit or short circuit to ground between battery and throttle actuator control motor relay connector B-13X (terminal No. 1). Then go to Step 14.

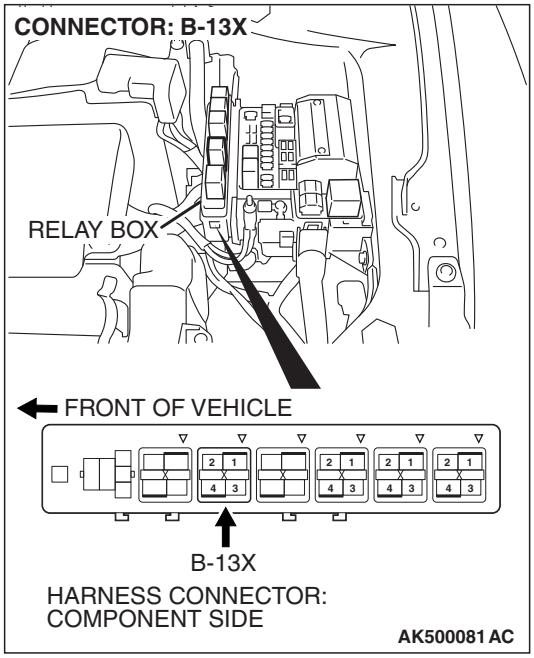
STEP 4. Measure the power supply voltage at throttle actuator control motor relay harness side connector B-13X.

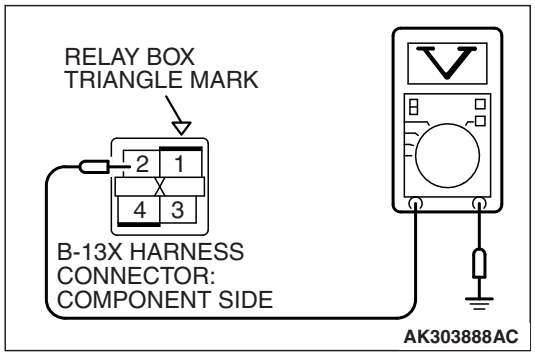
⚠ CAUTION

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

(1) Disconnect the connector B-13X and measure at the harness side.

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



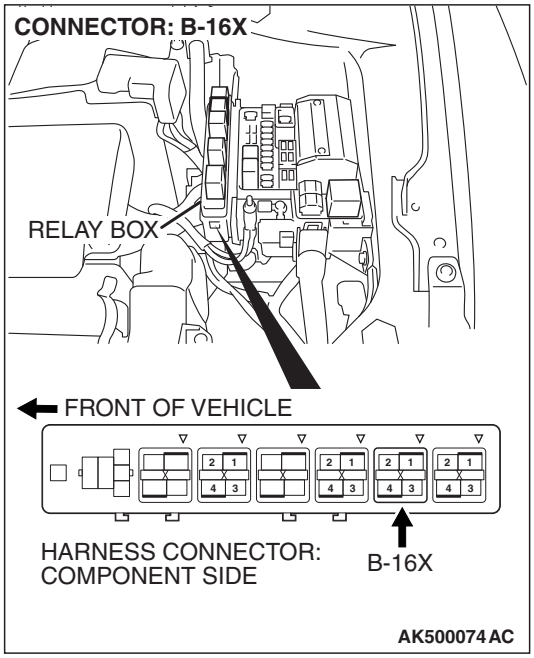


(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.
NO : Go to Step 5.



STEP 5. Check harness connector B-16X at MFI relay for damage.

Q: Is the harness connector in good condition?

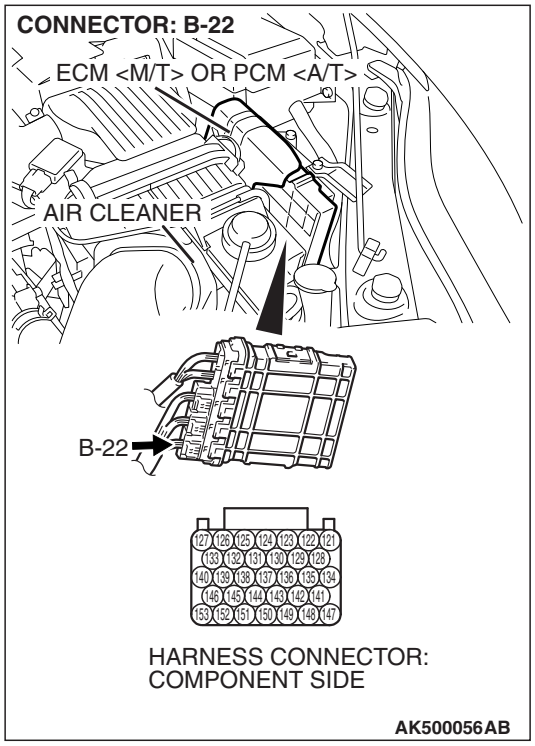
YES : Repair harness wire between MFI relay connector B-16X (terminal No. 4) and throttle actuator control motor relay connector B-13X (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 14.

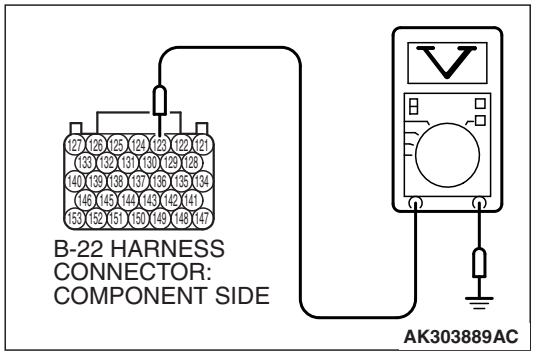
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.

STEP 6. Measure the power supply voltage at ECM <M/T> or PCM <A/T> harness side connector B-22.

(1) Disconnect the connector B-22 and measure at the harness side.

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





(3) Measure the voltage between terminal No. 123 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?

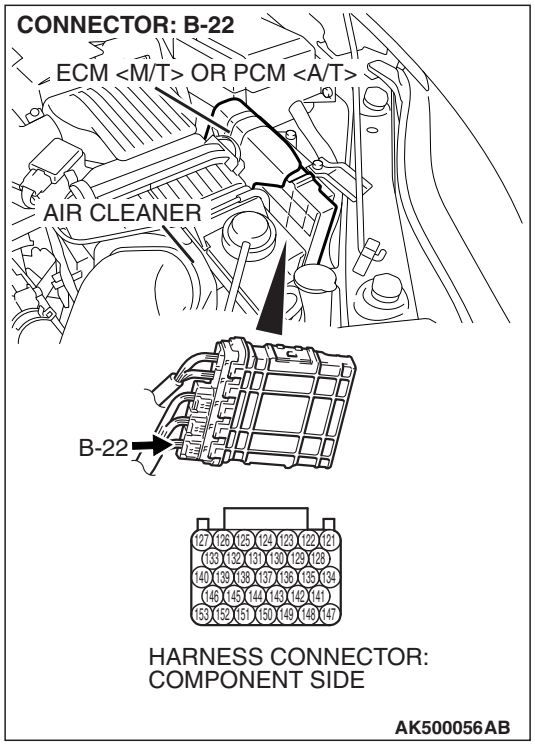
YES : Go to Step 7.

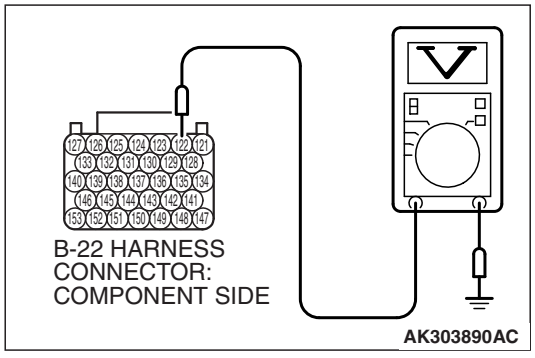
NO : Repair harness wire between throttle actuator control motor relay connector B-13X (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 123) because of open circuit or short circuit to ground. Then go to Step 14.

STEP 7. Measure the power supply voltage at ECM <M/T> or PCM <A/T> harness side connector B-22.

(1) Disconnect the connector B-22 and measure at the harness side.

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





(3) Measure the voltage between terminal No. 122 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 10.

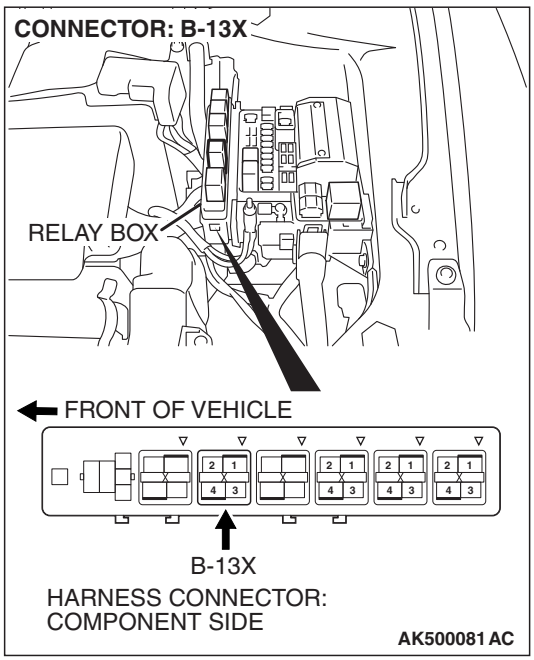
NO : Go to Step 8.

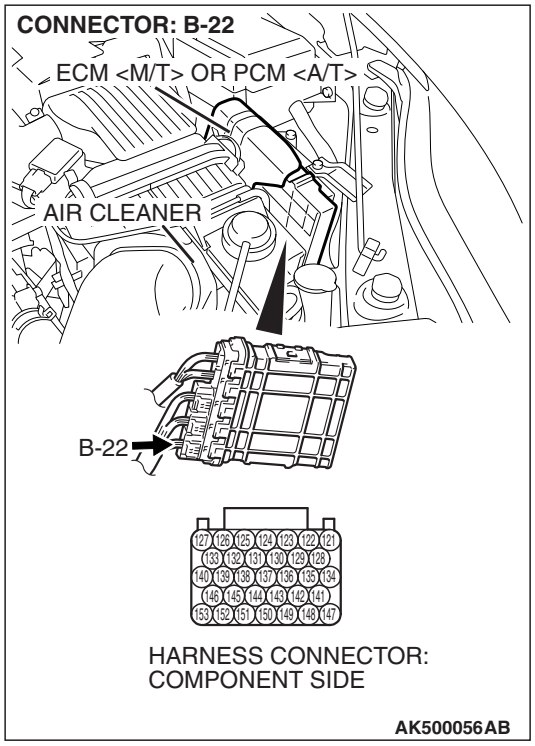
STEP 8. Check for open circuit and short circuit to ground between throttle actuator control motor relay connector B-13X (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 122).

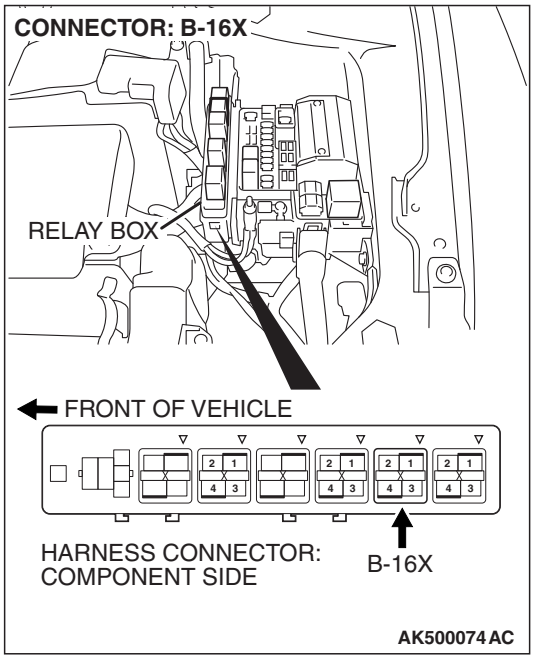
Q: Is the harness wire in good condition?

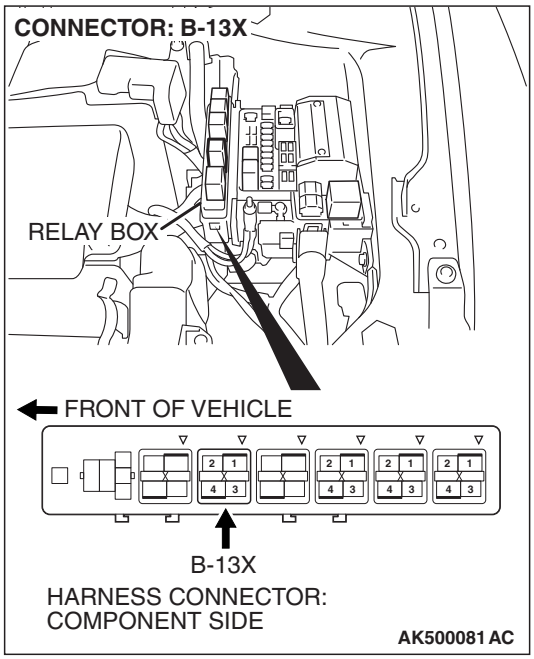
YES : Go to Step 9.

NO : Repair it. Then go to Step 14.





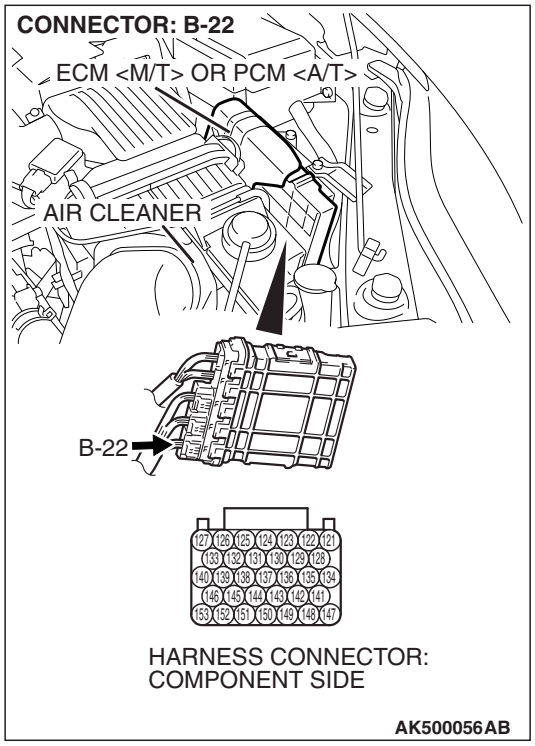




STEP 9. Check for harness damage between MFI relay connector B-16X (terminal No. 4) and throttle actuator control motor relay connector B-13X (terminal No. 2).
Q: Is the harness wire in good condition?

YES : Repair harness wire between throttle actuator control motor relay connector B-13X (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 123) because of harness damage. Then go to Step 14.

NO : Repair it. Then go to Step 14.

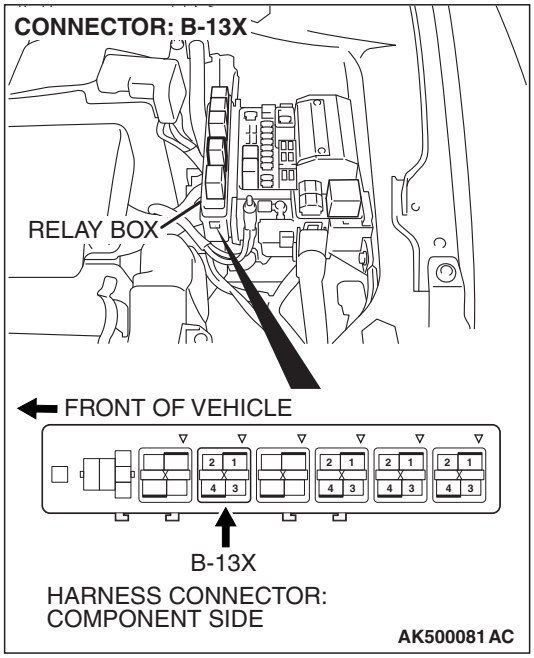


STEP 10. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.



STEP 11. Check for harness damage between battery and throttle actuator control motor relay connector B-13X (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 12.

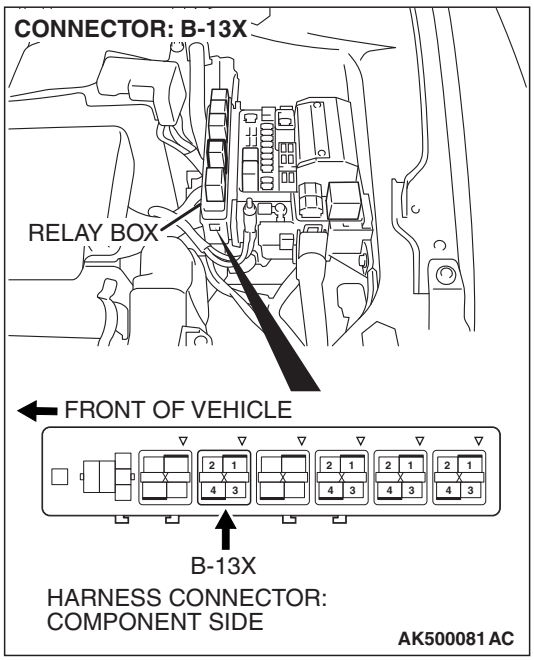
NO : Repair it. Then go to Step 14.

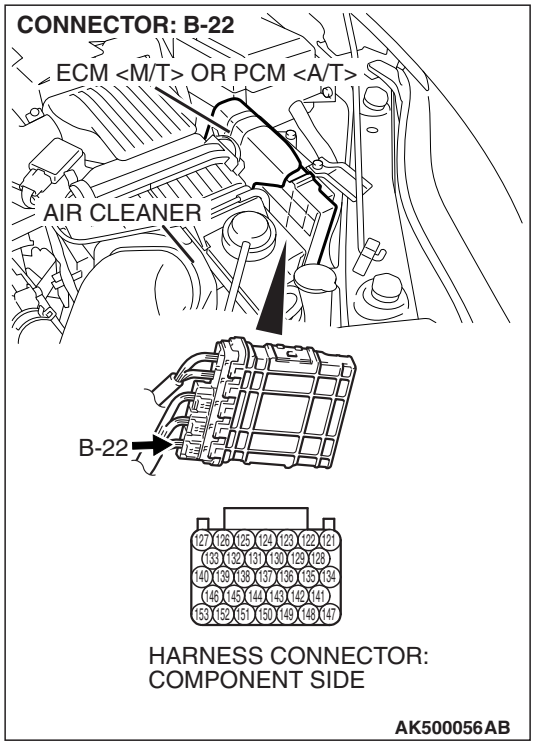
STEP 12. Check for harness damage between throttle actuator control motor relay connector B-13X (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 122).

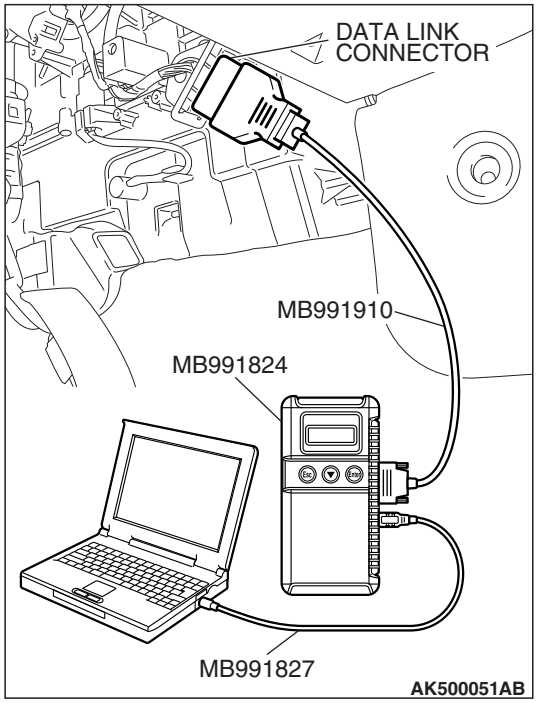
Q: Is the harness wire in good condition?

YES : Go to Step 13.

NO : Repair it. Then go to Step 14.







STEP 13. Using scan tool MB991502, read the diagnostic trouble code (DTC).

⚠ CAUTION

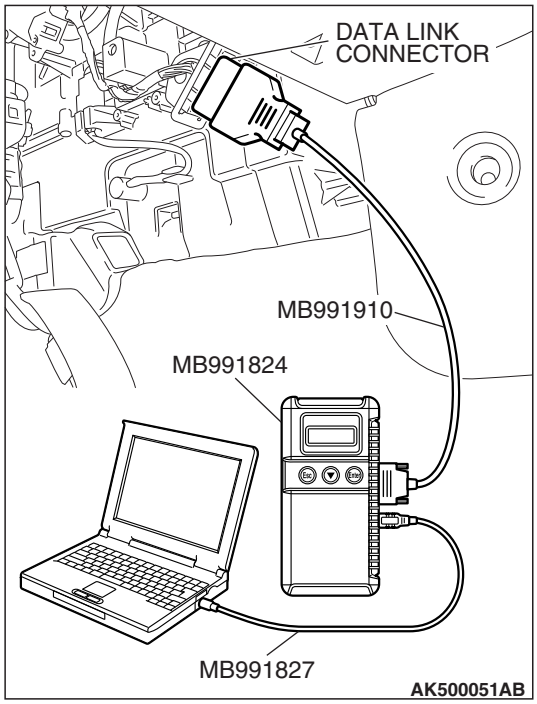
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991502.

(1) Connect scan tool MB991502 to the data link connector.
(2) 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 or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 14.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.



STEP 14. Using scan tool MB991502, read the diagnostic trouble code (DTC).

(1) Connect scan tool MB991502 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 P1506: Idle Control System RPM Lower Than Expected at Low Temperature

⚠ CAUTION
If DTC P1506 has been set, TCL related DTC U1120 is also set. After P1506 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM <M/T> or the PCM <A/T> 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)

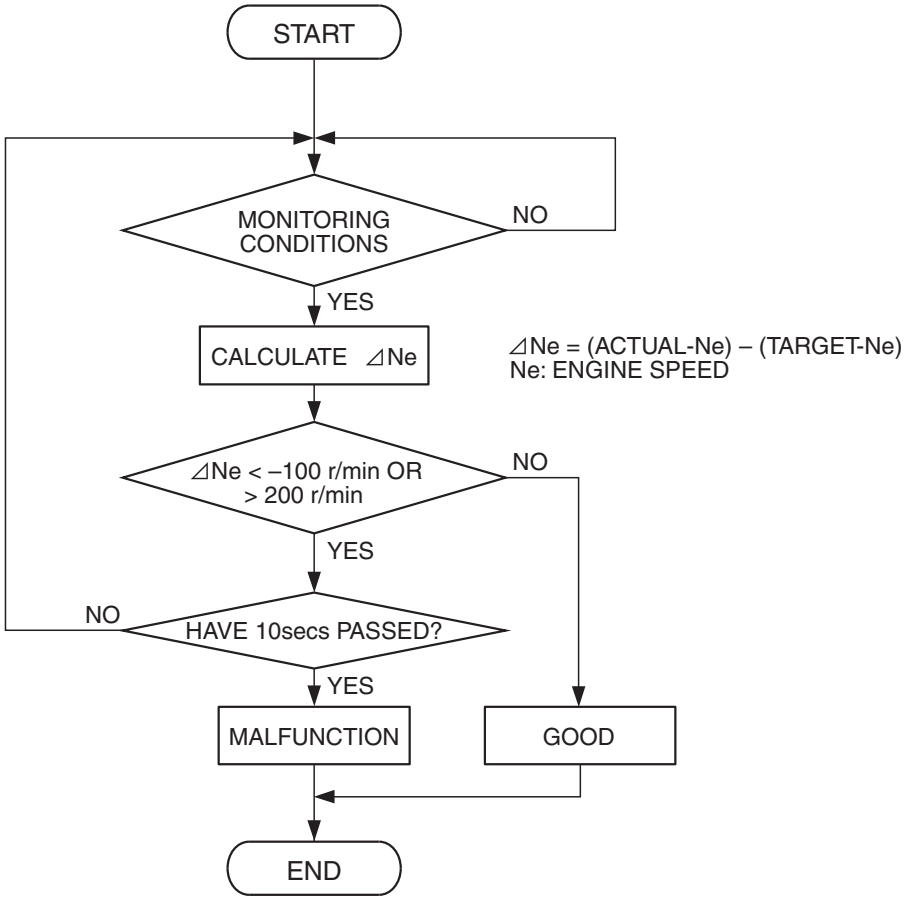
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

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



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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 higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than –10°C (14°F).
- More than 3 seconds have elapsed from the previous monitoring.
- Target throttle actuator control motor position is more than 512 steps.

Judgment Criterion

- The actual idle speed is more than 100 r/min lower than the target idle speed for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 19 P.13B-6.

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools

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

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

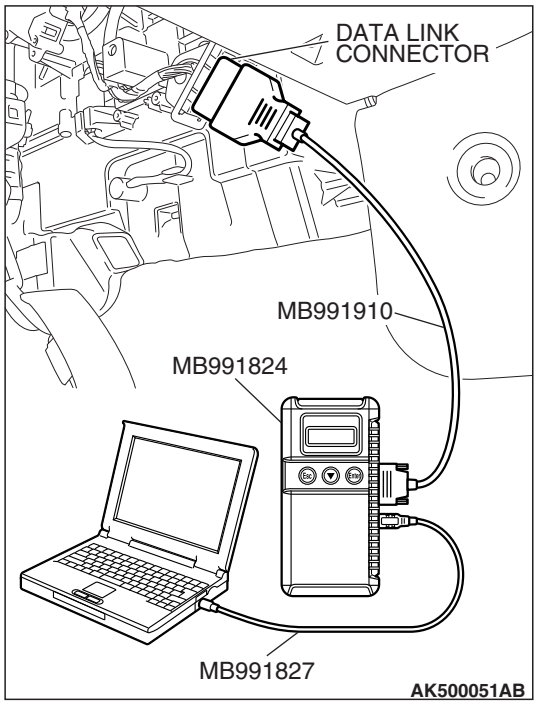
⚠ CAUTION

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

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

Q: Is the diagnostic trouble code other than P1506 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
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-1275. 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-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P1506 set?

YES : Replace the ECM or PCM. Then go to Step 4.
NO : The inspection is complete.

TSB Revision

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-6.

(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

⚠ CAUTION

If DTC P1507 has been set, TCL related DTC U1120 is also set. After P1507 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM <M/T> or the PCM <A/T> 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)

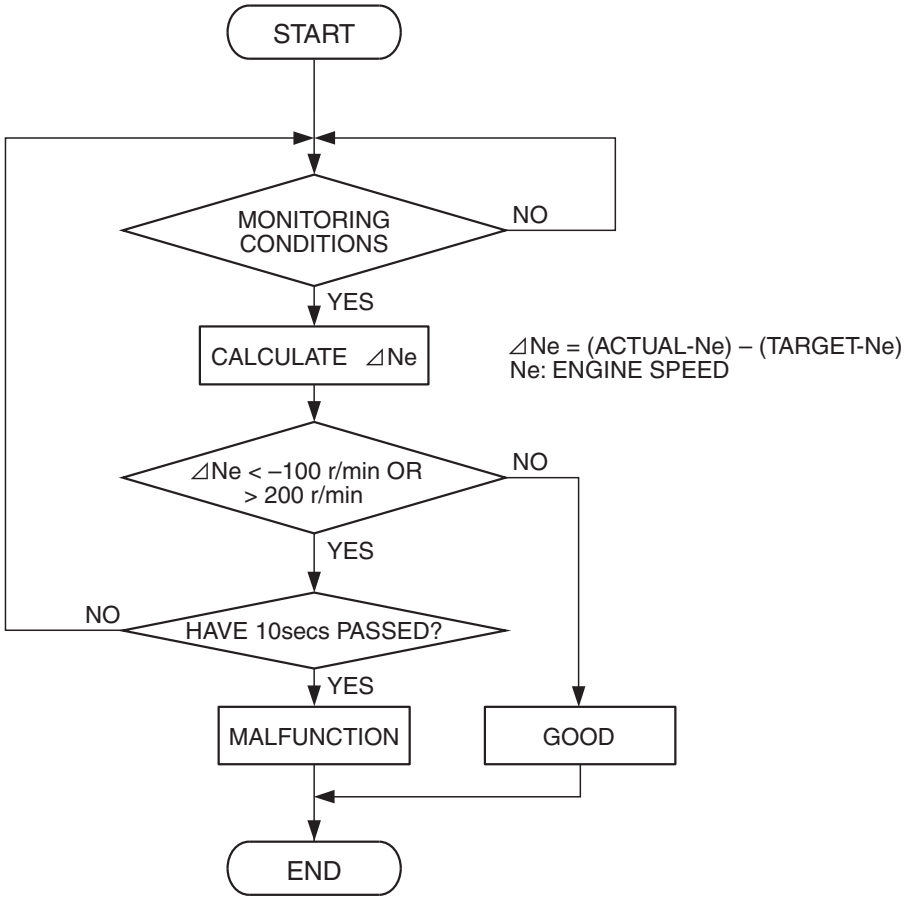
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

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



AK700577

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 higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than –10°C (14°F).
- More than 3 seconds have elapsed from the previous monitoring.
- Target throttle actuator control motor position is 0 step.

Judgement Criterion

- Actual idle speed has continued to be higher than the target idle speed by 200 r/min (300 r/min*) or more for 10 seconds.

*: Specs in parentheses are applicable if the maximum air temperature during the previous operation was more than 45°C (113°F).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 19 P.13B-6.

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

- Intake system vacuum leak.
- Throttle body assembly failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools

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

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

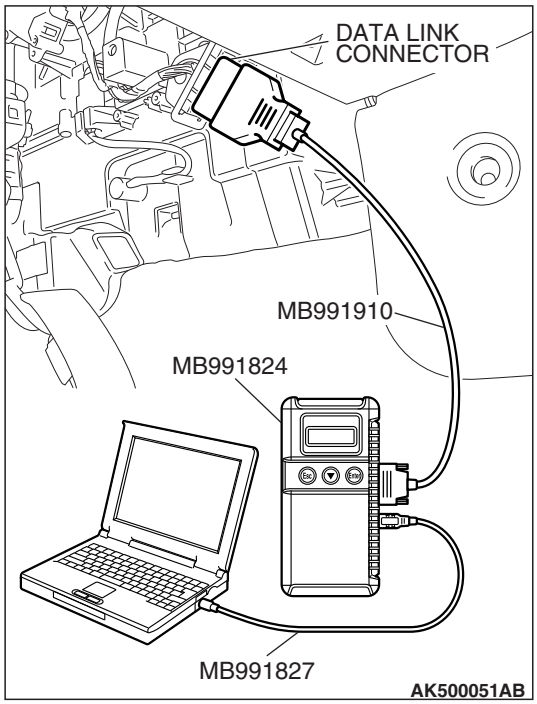
⚠ CAUTION

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

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

Q: Is the diagnostic trouble code other than P1507 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.



STEP 2. Check the intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair or replace 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-6.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P1507 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 4.
NO : The inspection is complete.

TSB Revision

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-6.

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

Q: Is DTC P1507 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P1602: Communication Malfunction (between ECM <M/T> or PCM <A/T> Main Processor and System LSI)

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> checks the communication status for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

Communication between ECM <M/T> or PCM <A/T> main processor and system LSI is impossible.

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

- ECM <M/T> or PCM <A/T> detects an error in communication between ECM <M/T> or PCM <A/T> main processor and system LSI for 0.07 second.

OBD-II DRIVE CYCLE PATTERN

None.

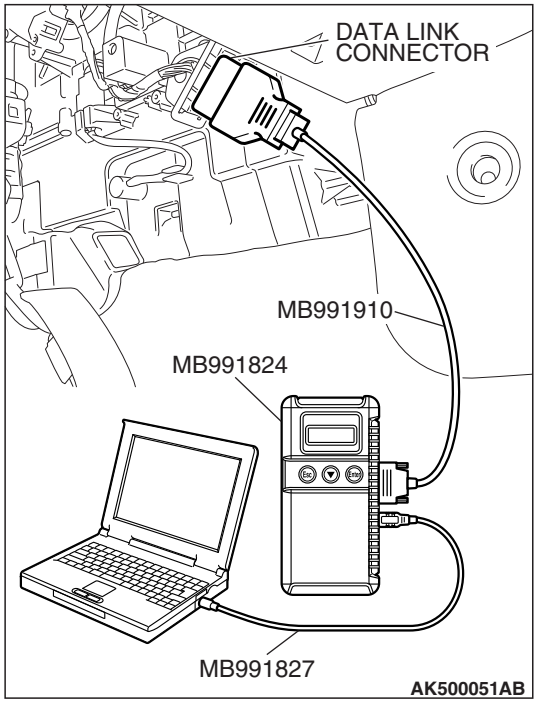
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

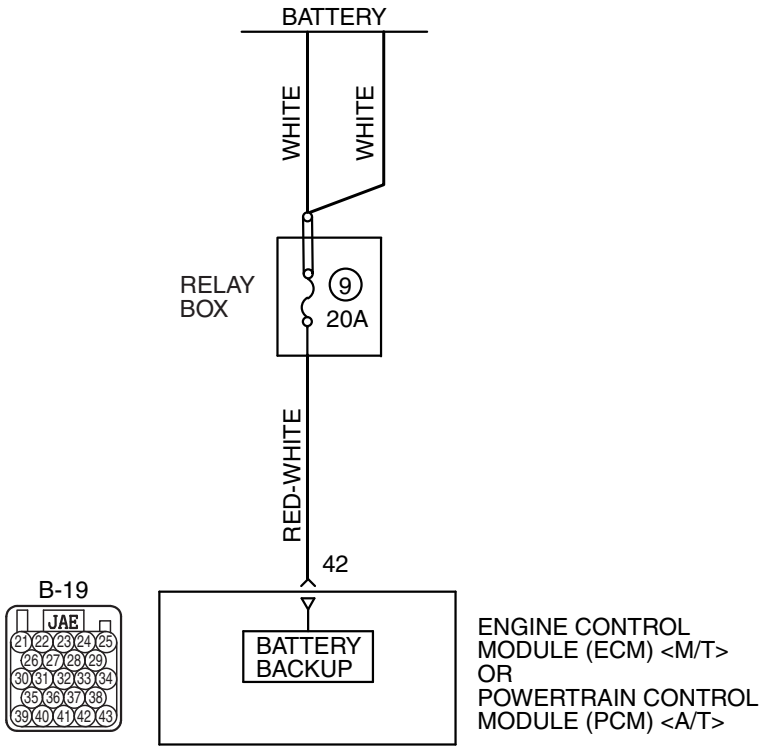
Q: Is DTC P01602 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

DTC P1603: Battery Backup Line Malfunction

Battery Backup Circuit



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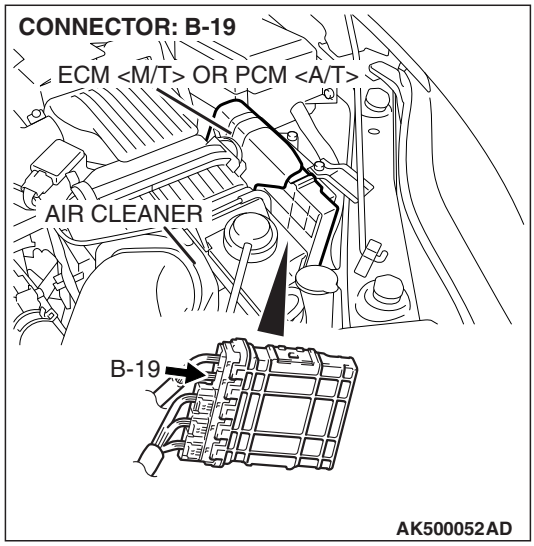


TECHNICAL DESCRIPTION

- The ECM <M/T> or the PCM <A/T> 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.

TSB Revision

MONITOR EXECUTION
Continuous

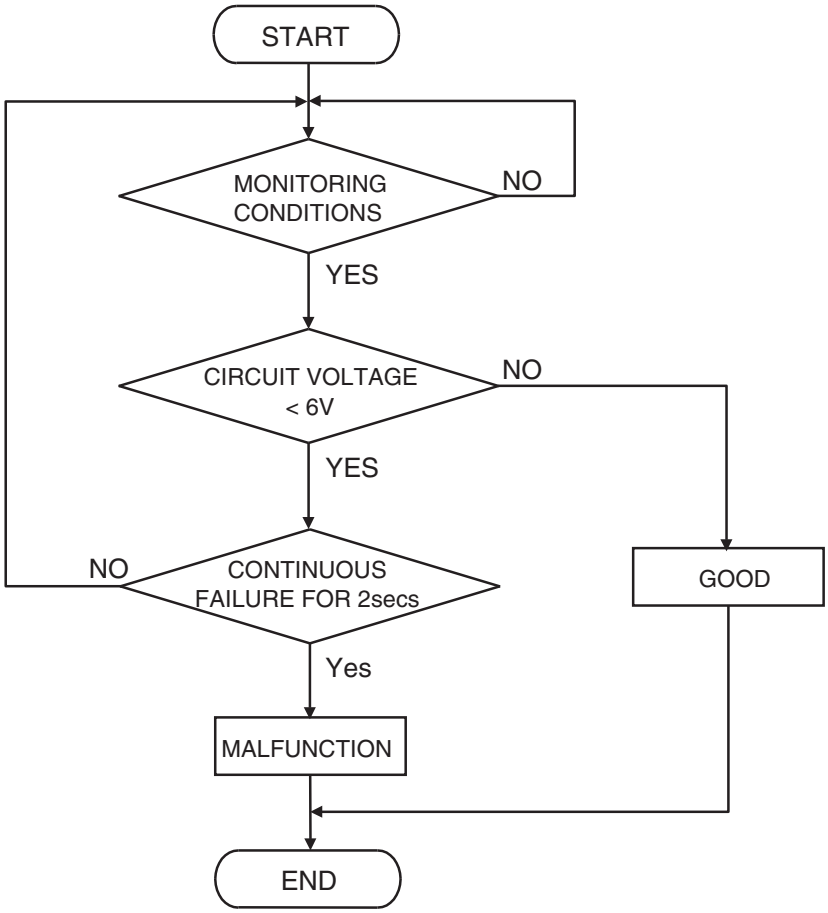
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

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

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions
- Engine starting sequence was completed.
- Battery positive voltage is higher than 10 volts.

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

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. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools:

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

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

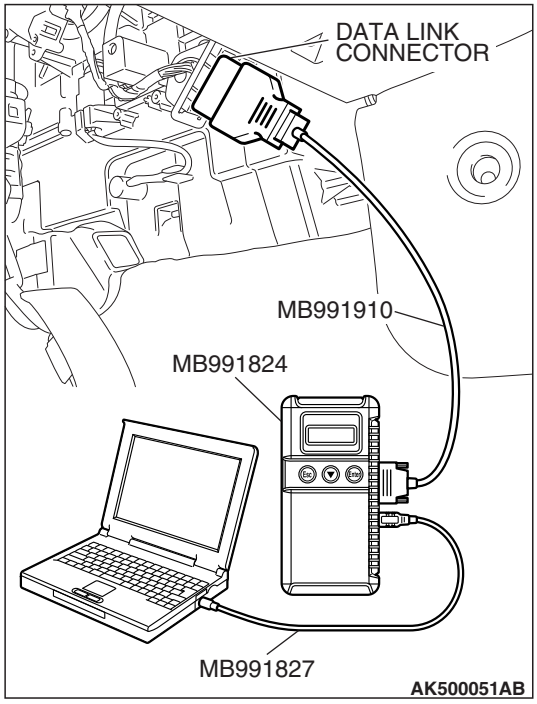
⚠ CAUTION

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.

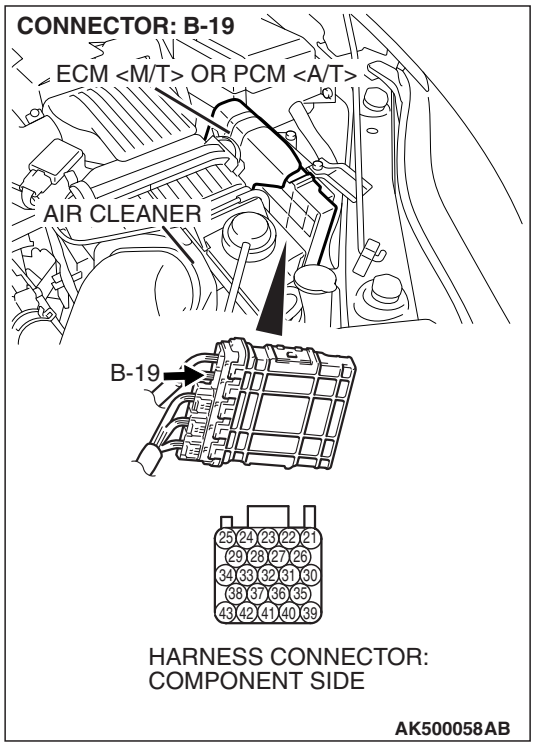
Q: Is DTC P1603 set?

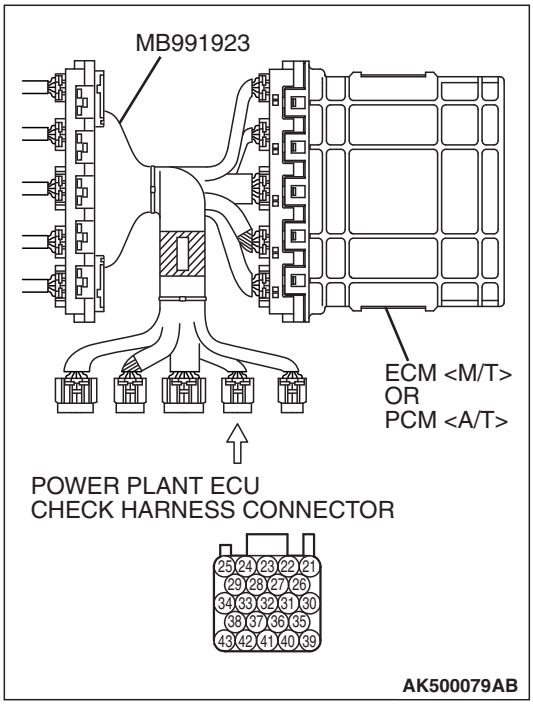
YES : Go to Step 2.
NO : The inspection is complete.

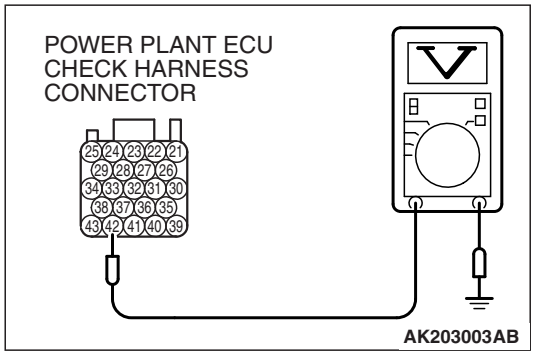


STEP 2. Measure the backup power supply voltage at ECM <M/T> or PCM <A/T> connector B-19 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.







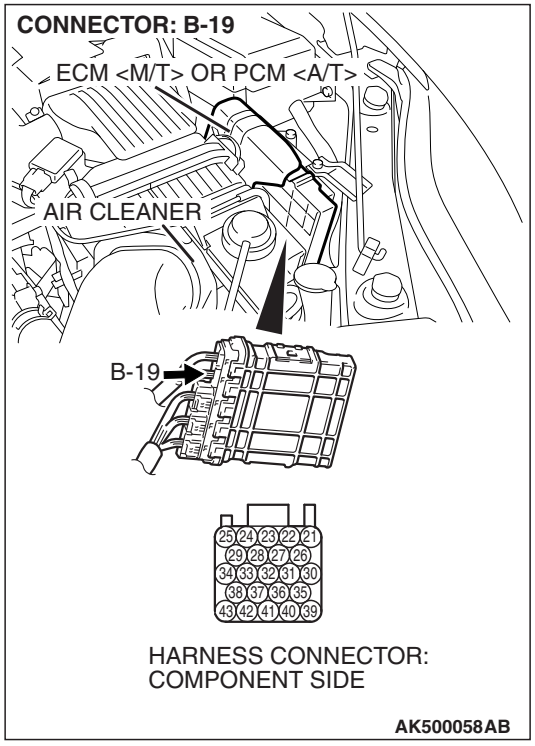
(2) Measure the voltage between terminal No. 42 and ground.
- Voltage should be battery positive voltage.

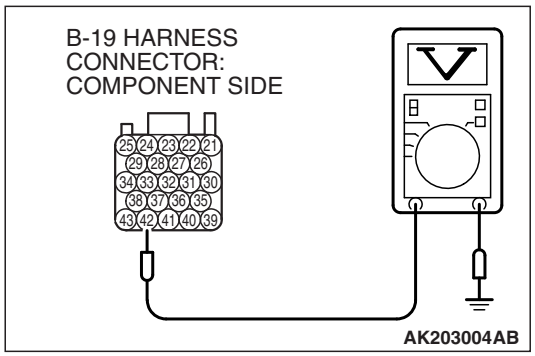
Q: Is battery positive voltage (approximately 12 volts) present?

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

STEP 3. Measure the backup power supply voltage at ECM <M/T> or PCM <A/T> harness side connector B-19.

(1) Disconnect the ECM <M/T> or the PCM <A/T> connector B-19 and measure at the harness side.

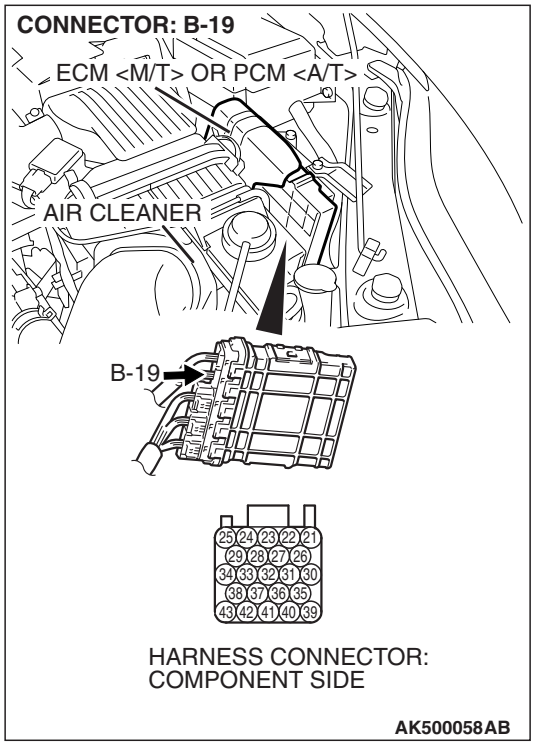




(2) Measure the voltage between terminal No. 42 and ground.
- Voltage should be battery positive voltage.

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

YES : Go to Step 4.
NO : Repair harness wire between battery and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 42) because of open circuit or short circuit to ground. Then go to Step 6.

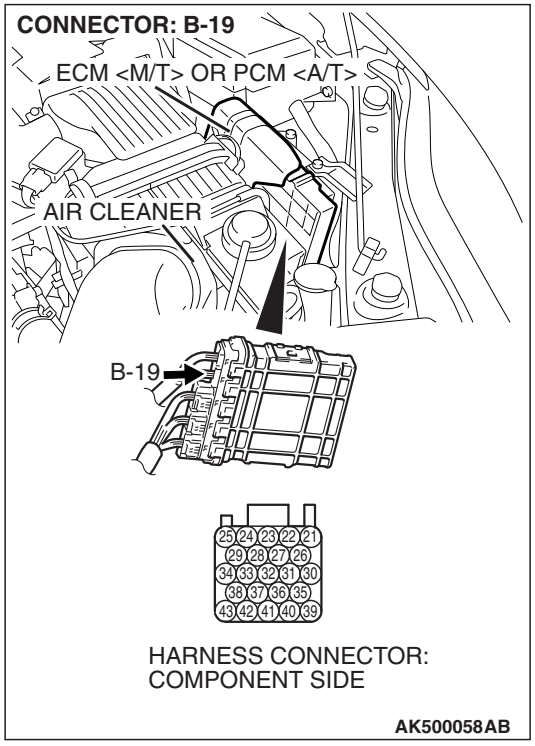


STEP 4. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between battery and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 42) because of harness damage. Then go to Step 6.

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

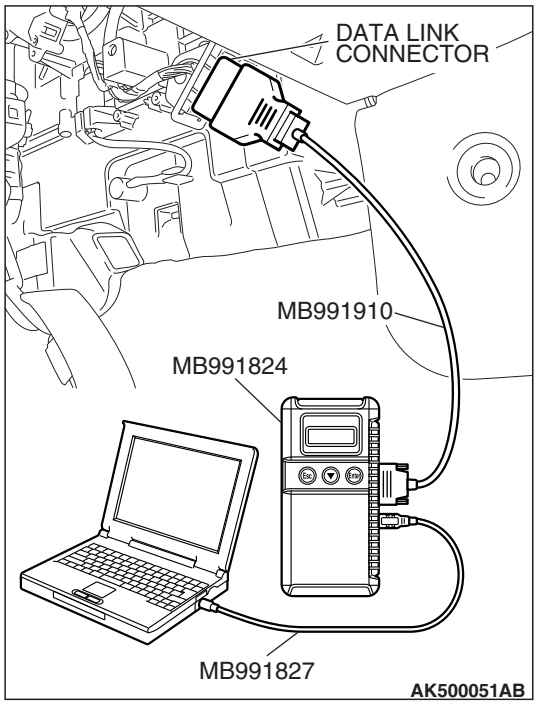


STEP 5. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.

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



STEP 6. Using scan tool 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.

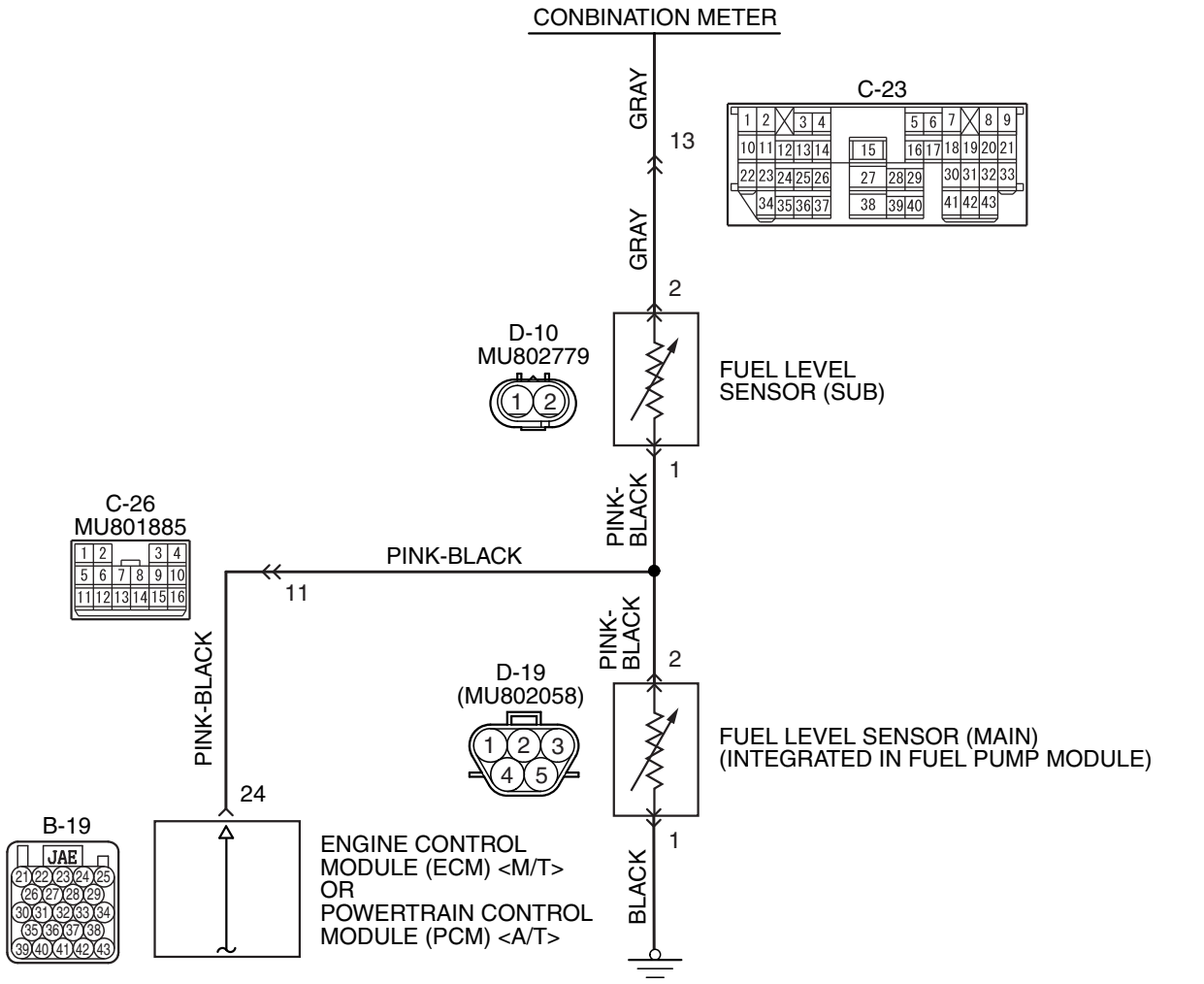
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P1603 set?

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

DTC P2066: Fuel Level Sensor (sub) Circuit Range/Performance

Fuel Level Sensor Circuit



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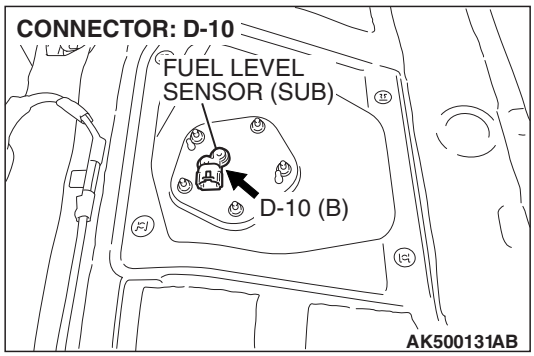

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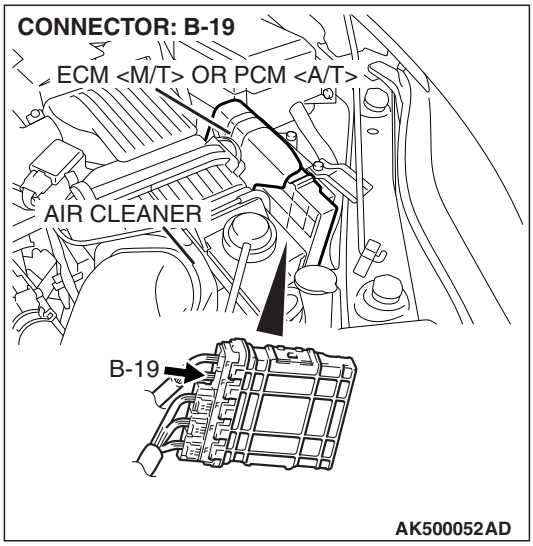
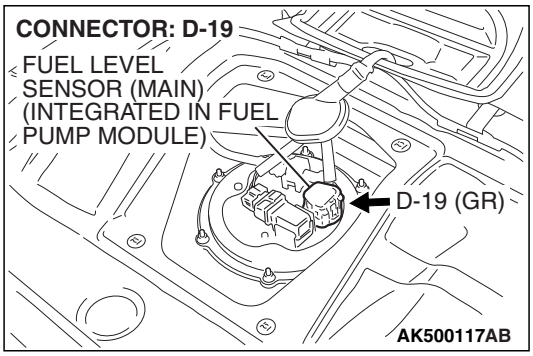
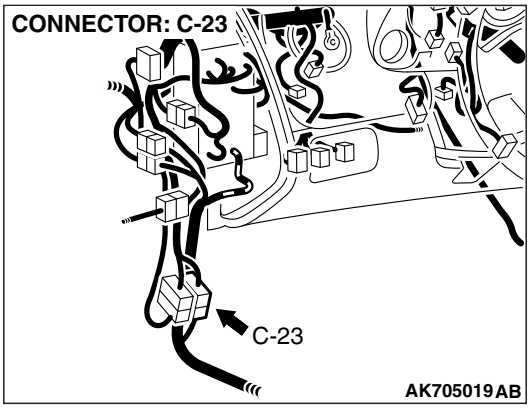
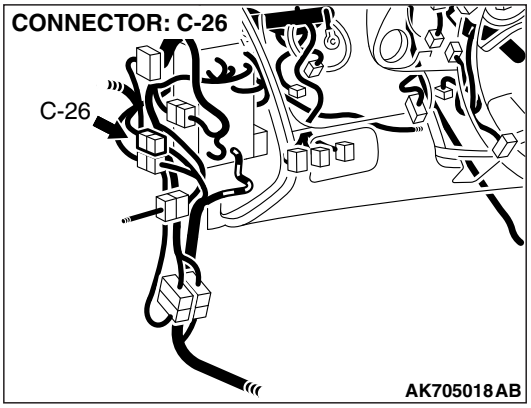








CIRCUIT OPERATION

- The fuel level sensor (sub) drive signal is input in combination meter (terminal No. 16).

TECHNICAL DESCRIPTION

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

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)

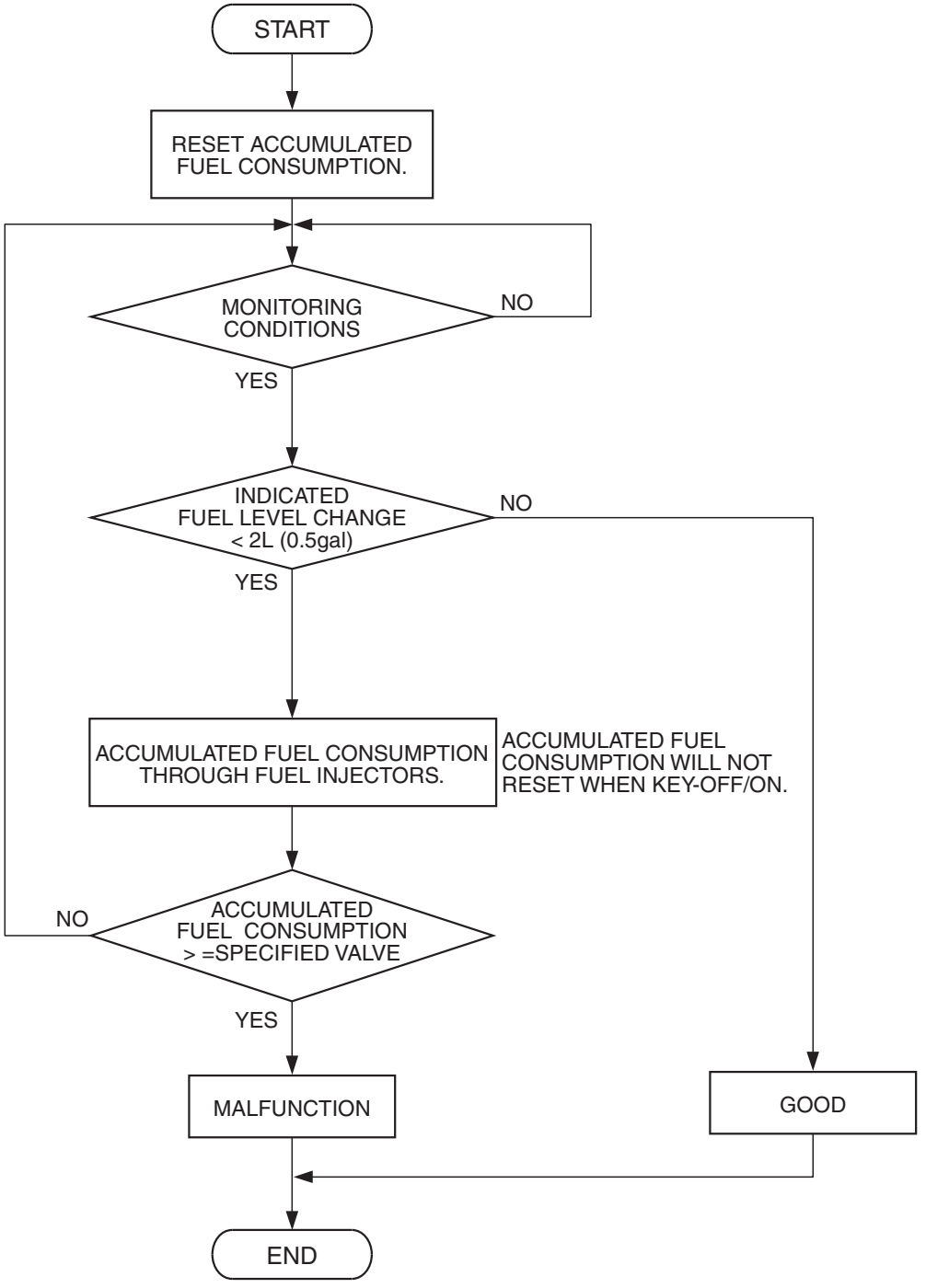
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition, Judgement Criterion

- When the fuel consumption calculated from the operation time of the injector amounts to 30 litters (7.8 gal), the diversity of the amount of fuel in tank calculated from the fuel level sensor is 2 litters (0.5 gal) or less.

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

- Fuel pump module or fuel level sensor (sub) failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

OBD-II DRIVE CYCLE PATTERN

None.

DIAGNOSIS

Required Special Tools:

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

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

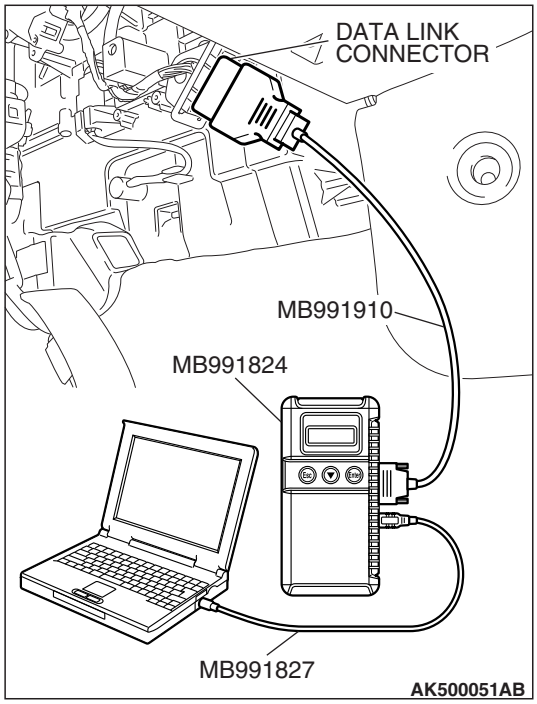
⚠ CAUTION

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

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

Q: Is DTC P0461 set?

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



STEP 2. Check fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 3.
NO : Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly – Symptom Chart P.54A-105.

STEP 3. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operates correctly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.

STEP 4. Check the fuel level sensor (sub).
Check to see if the fuel level sensor is normal. Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor – On-Vehicle Service – Fuel Level Sensor Check P.54A-134.

Q: Is the fuel level sensor (sub) normal?

YES : Go to Step 5.

NO : Replace the fuel level sensor (sub). Then go to Step 6.

STEP 5. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operates correctly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.

STEP 6. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

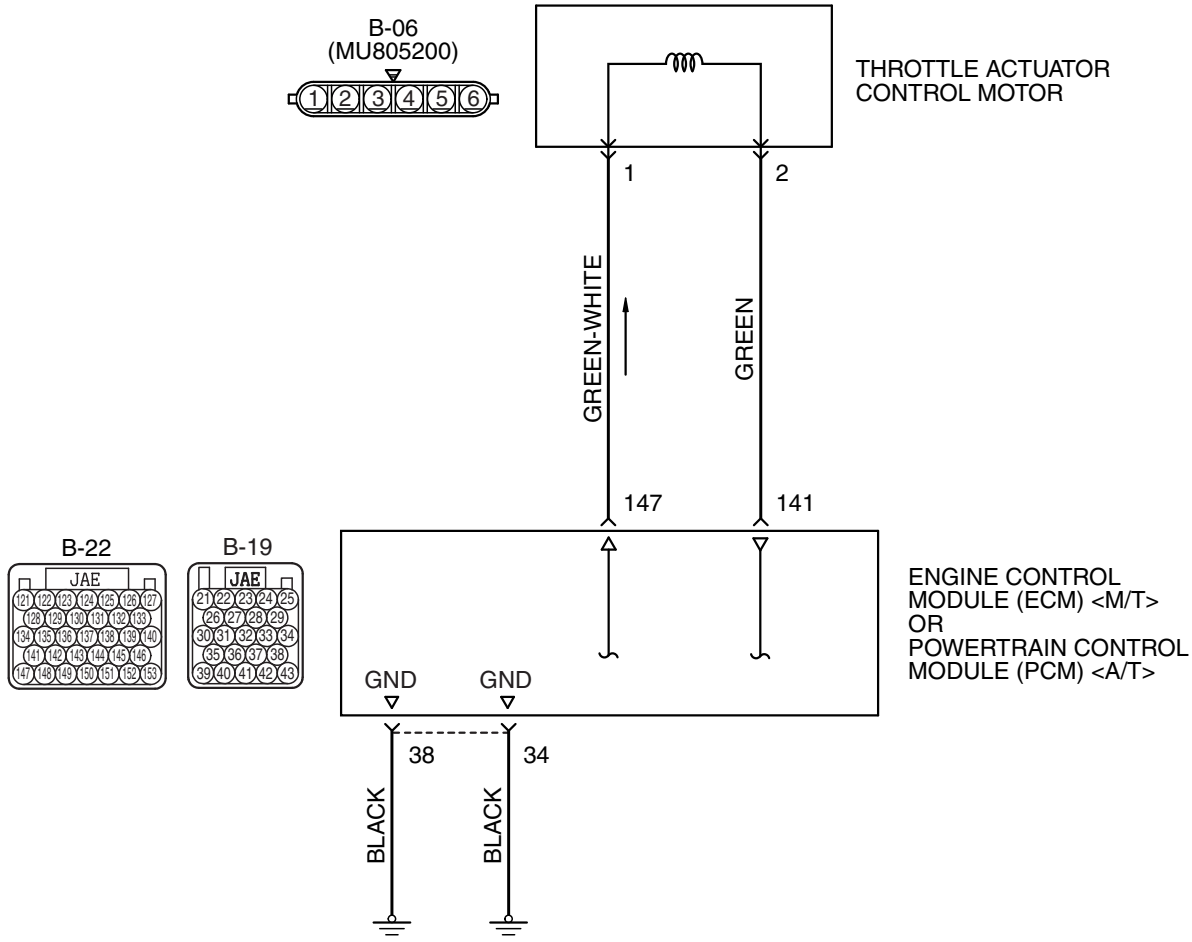
Q: Does the fuel gauge operates correctly?

YES : The inspection is complete.

NO : Retry the troubleshooting.

DTC P2100: Throttle Actuator Control Motor Circuit (Open)

Throttle Actuator Control Motor Circuit



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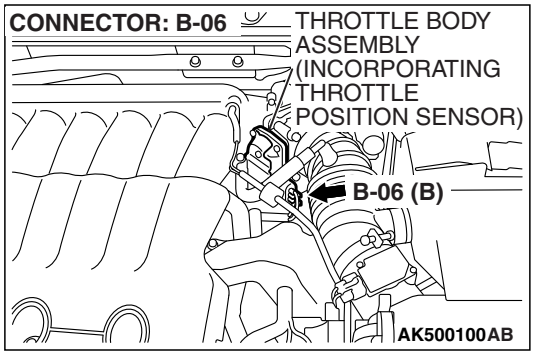

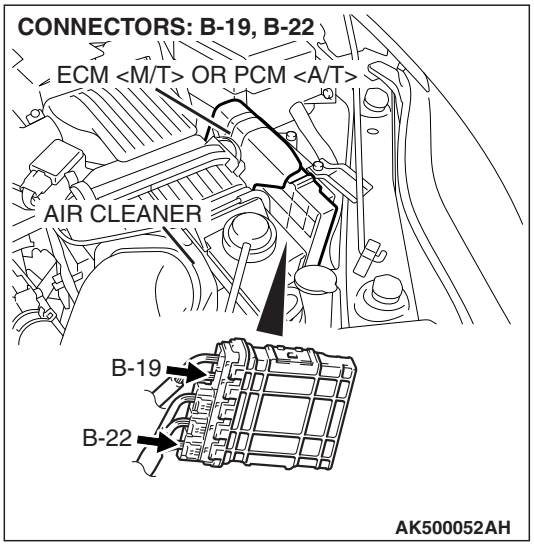

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CIRCUIT OPERATION

- Controls the current that is applied from the ECM <M/T> or the PCM <A/T> (terminals No. 141, No. 147) to the throttle actuator control motor (terminals No. 1, No. 2).

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> 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 Condition

- Battery positive voltage is higher than 8.3 volts.
- The output voltage of the (main) throttle position sensor minus the proposed output voltage becomes 0.1 volt or more.
- The output voltage of the (sub) throttle position sensor minus the proposed output voltage becomes 0.1 volt or more.
- The drive duty of the throttle actuator control motor is 100 percent or more.

or

- Battery positive voltage is higher than 8.3 volts.
- The proposed output voltage minus the output voltage of the (main) throttle position sensor becomes 0.1 volt or more.
- The proposed output voltage minus the output voltage of the (sub) throttle position sensor becomes 0.1 volt or more.
- The drive duty of the throttle actuator control motor is 100 percent or more.

Judgement Criteria

- The output voltage of the (main) throttle position sensor minus the learning value of the middle-opened degree becomes 0.2 volt or less for 0.4 second.

or

- The output voltage of the (sub) throttle position sensor minus the learning value of the middle-opened degree becomes 0.2 volt or less for 0.4 second.

OBD-II DRIVE CYCLE PATTERN

None.

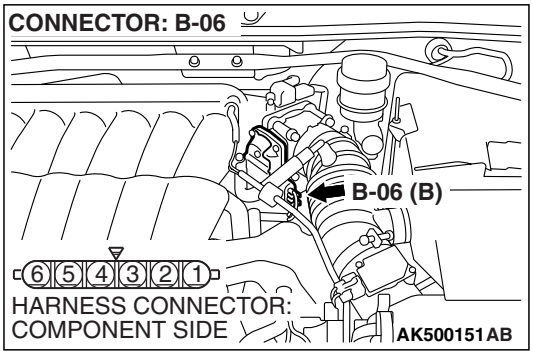
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Throttle actuator control motor failed.
- Open throttle actuator control motor circuit, harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

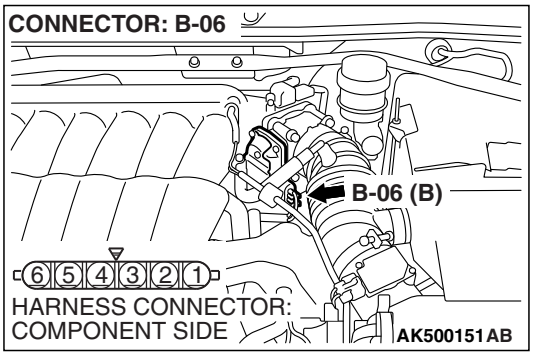


STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.

Q: Is the harness connector in good condition?

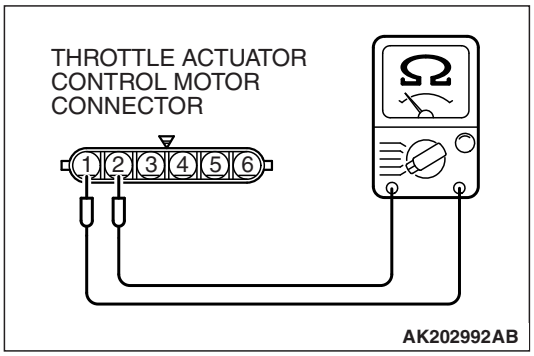
YES : Go to Step 2.

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



STEP 2. Check the throttle actuator control motor.

(1) Disconnect the connector B-06.



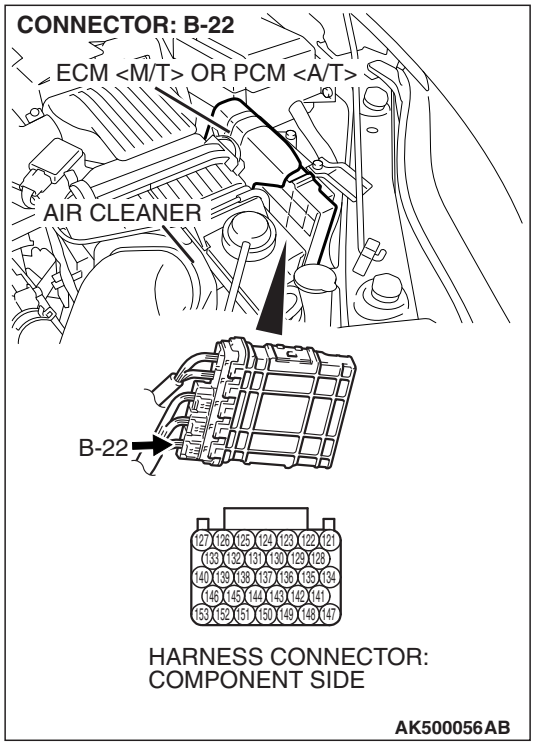
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 2.

Standard value: 0.3 – 80 Ω [at 20°C (68°F)]

Q: Is the measured resistance between 0.3 and 80 ohms [at 20°C (68°F)]?

YES : Go to Step 3.

NO : Replace the throttle body assembly. Then go to Step 8.



STEP 3. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage

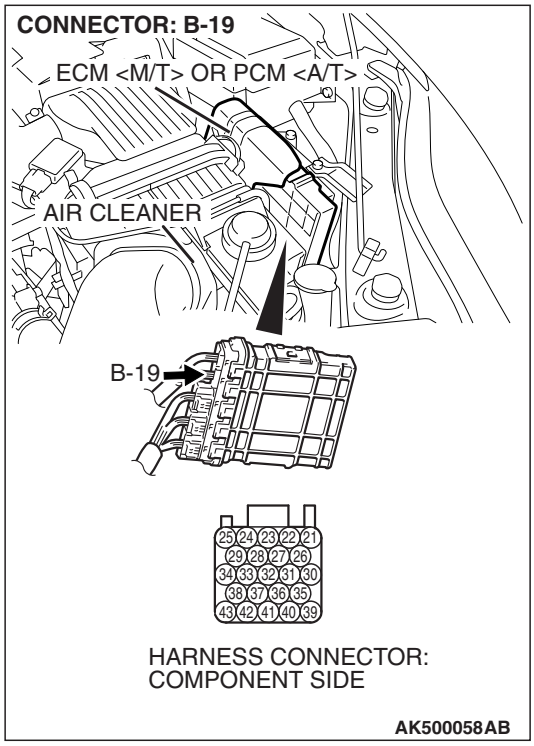
Q: Is the harness connector in good condition?

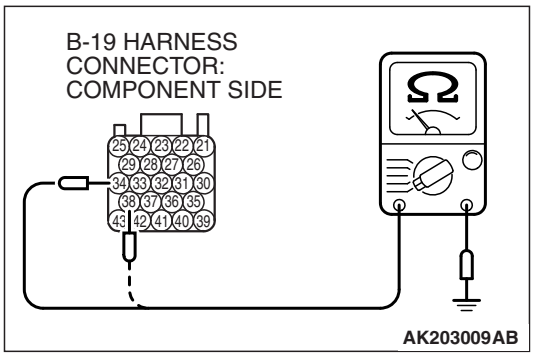
YES : Go to Step 4.

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

STEP 4. Check the continuity at ECM <M/T> or PCM <A/T> harness side connector B-19.

(1) Disconnect the connector B-19 and measure at the harness side.





(2) Measure the continuity between terminals No. 34, No. 38 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 5.

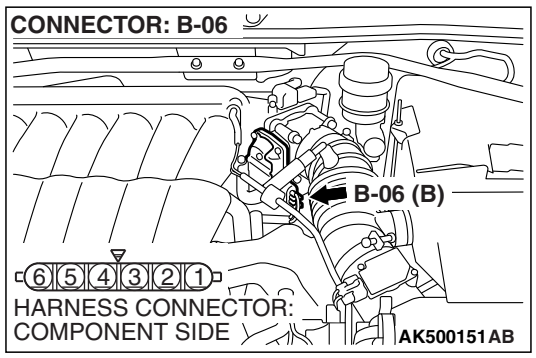
NO : Repair harness wire between ECM <M/T> or PCM <A/T> connector B-19 (terminals No. 34, No. 38) and ground because of open circuit or harness damage. Then go to Step 8.

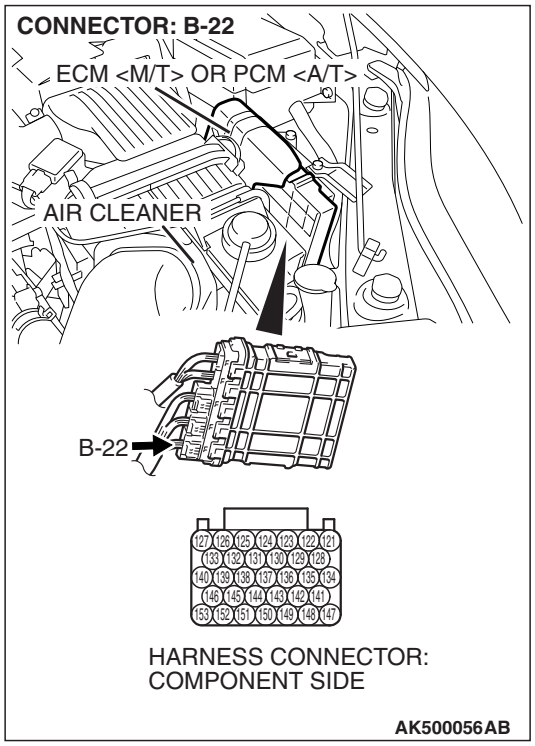
STEP 5. Check for open circuit and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 147).

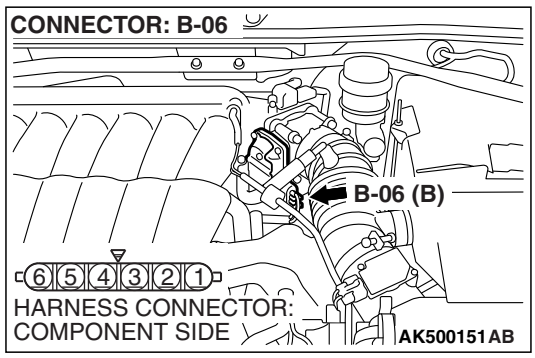
Q: Is the harness wire in good condition?

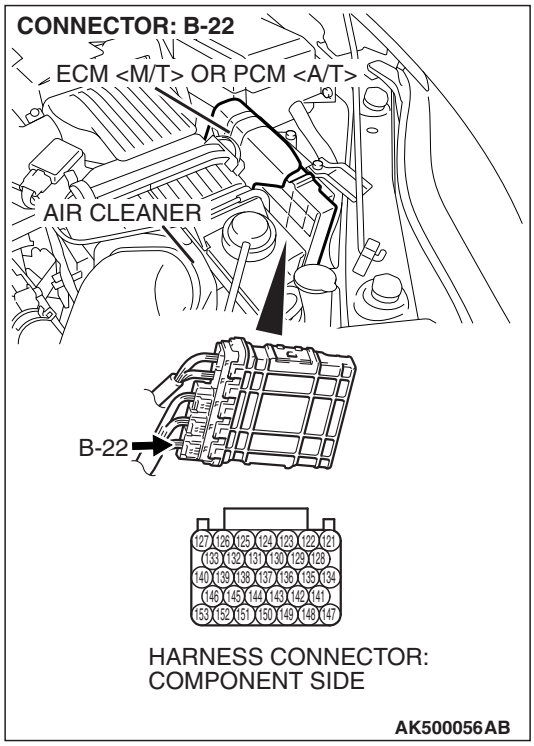
YES : Go to Step 6.

NO : Repair it. Then go to Step 8.









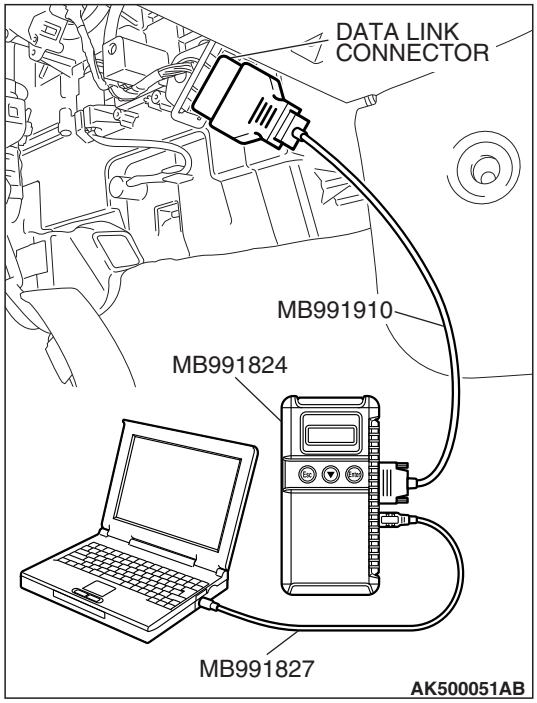
STEP 6. Check for open circuit and harness damage between throttle actuator control motor connector B-06 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 141).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 8.

STEP 7. Using scan tool MB991958, read the diagnostic trouble code (DTC).



⚠ CAUTION

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

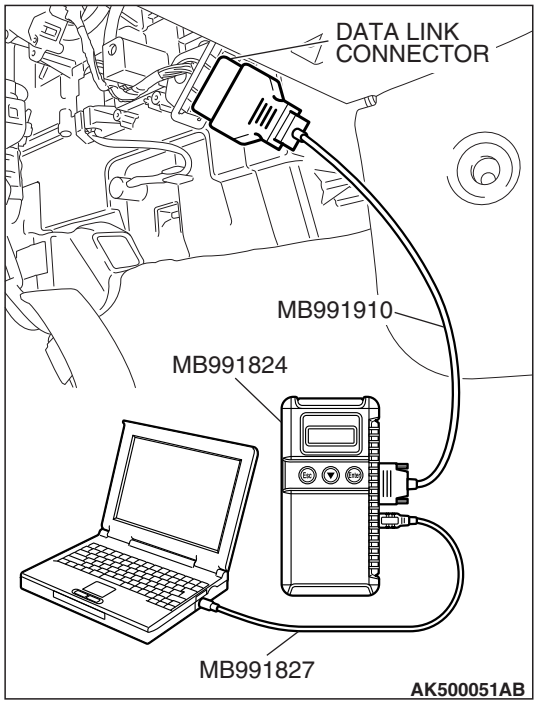
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2100 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.

STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).



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

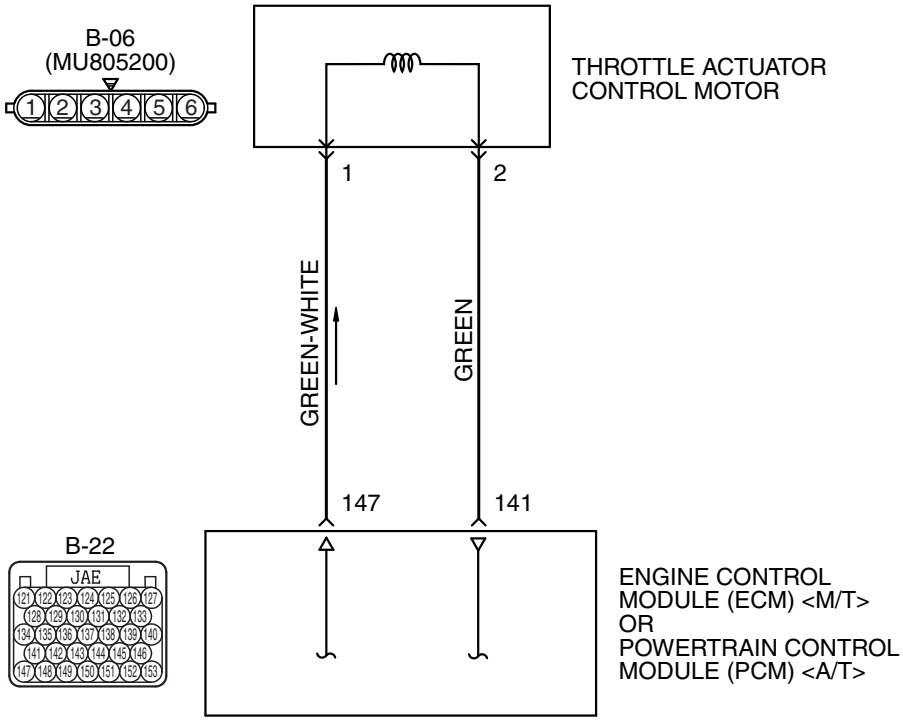
Q: Is DTC P2100 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P2101: Throttle Actuator Control Motor Magneto Malfunction

Throttle Actuator Control Motor Circuit



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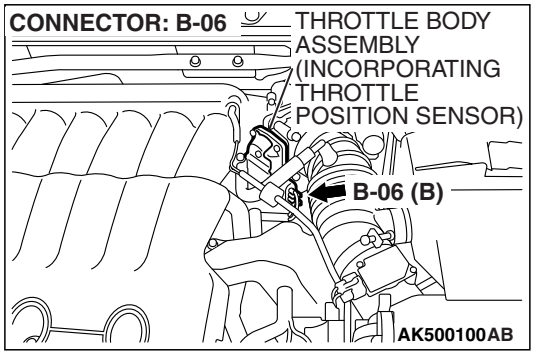

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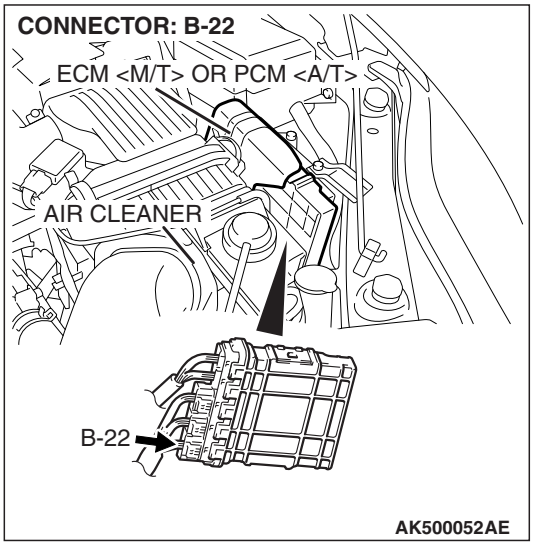

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CIRCUIT OPERATION

- Controls the current that is applied from the ECM <M/T> or the PCM <A/T> (terminals No. 141, No. 147) to the throttle actuator control motor (terminals No. 1, No. 2).

TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> check whether the throttle actuator control motor magneto has failed.

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DESCRIPTIONS OF MONITOR METHODS

Throttle actuator control motor intelligent power device detects shorted-high/low and overheat of it self.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Check Condition

- Battery positive voltage is higher than 8.3 volts.

Judgement Criterion

- The coil current of the throttle actuator control motor is 8 ampere or more for 0.3 second.

OBD-II DRIVE CYCLE PATTERN

None.

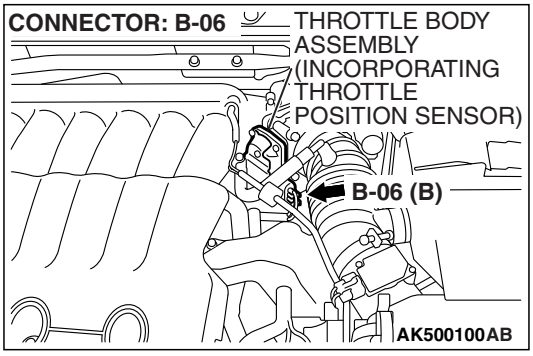
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Throttle actuator control motor failed.
- Shorted throttle actuator control motor circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

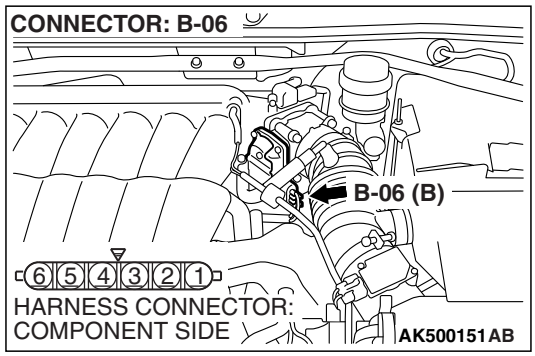


STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.

Q: Is the harness connector in good condition?

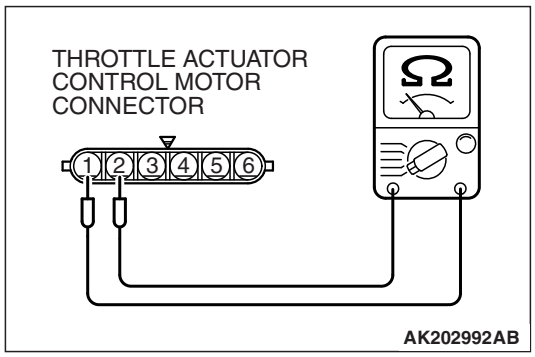
YES : Go to Step 2.

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 connector B-06.



(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 2.

Standard value: 0.3 – 80 Ω [at 20°C (68°F)]

Q: Is the measured resistance between 0.3 and 80 ohms [at 20°C (68°F)]?

YES : Go to Step 3.

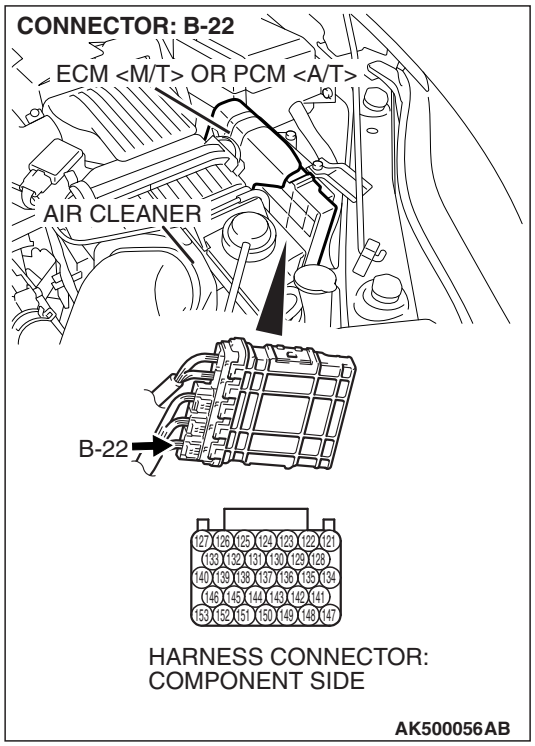
NO : Replace the throttle body assembly. Then go to Step 7.

STEP 3. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage

Q: Is the harness connector in good condition?

YES : Go to Step 4.

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

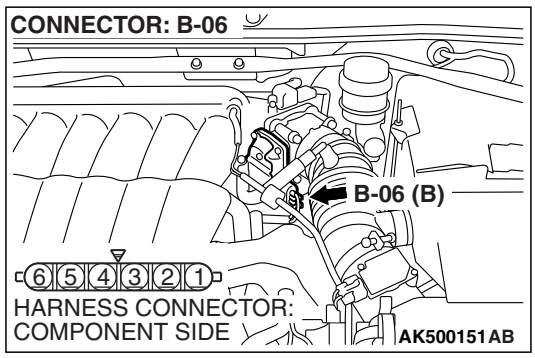


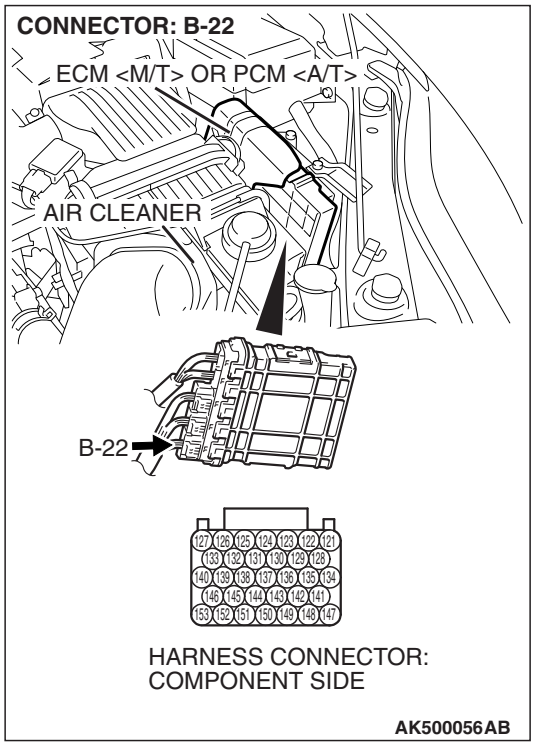
STEP 4. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 147).

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair it. Then go to Step 7.



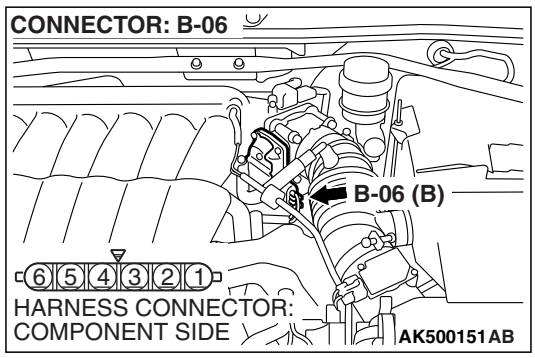


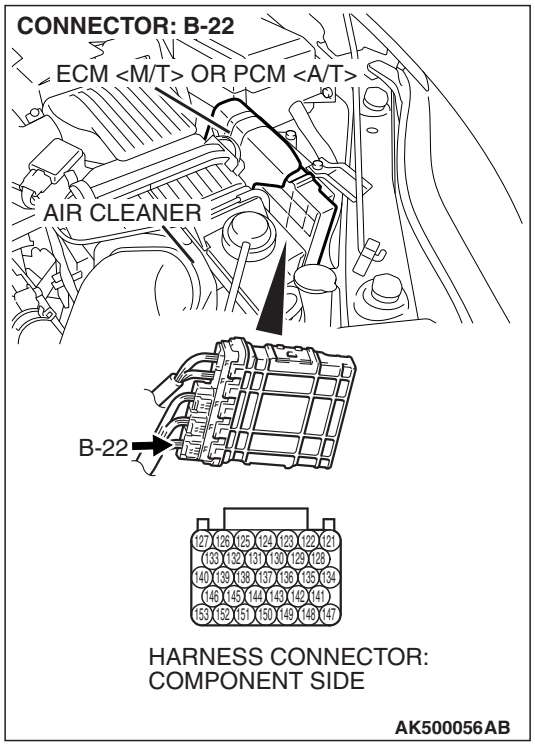
STEP 5. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 141).

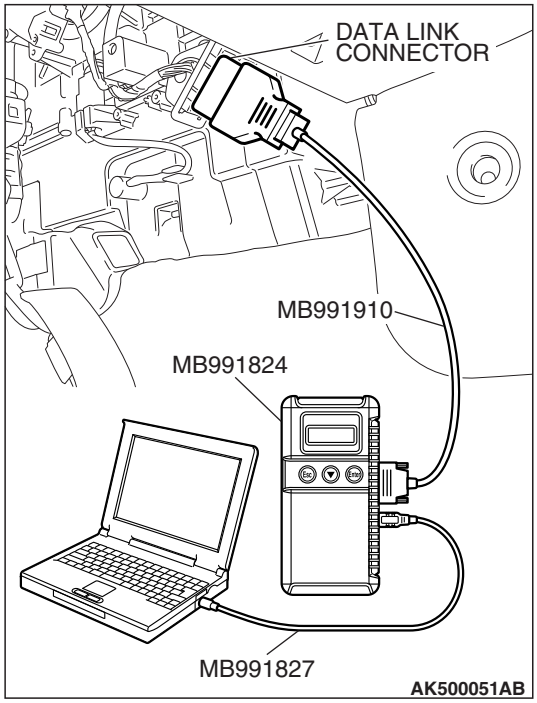
Q: Is the harness wire in good condition?

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

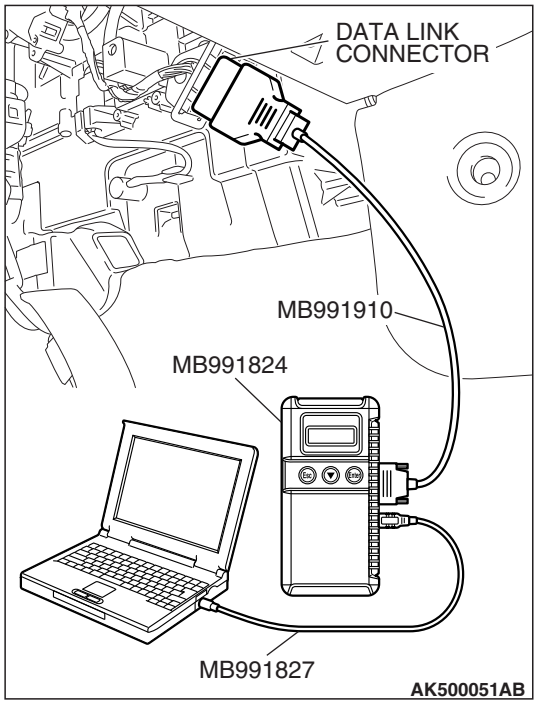
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.



STEP 7. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC P2101 set?

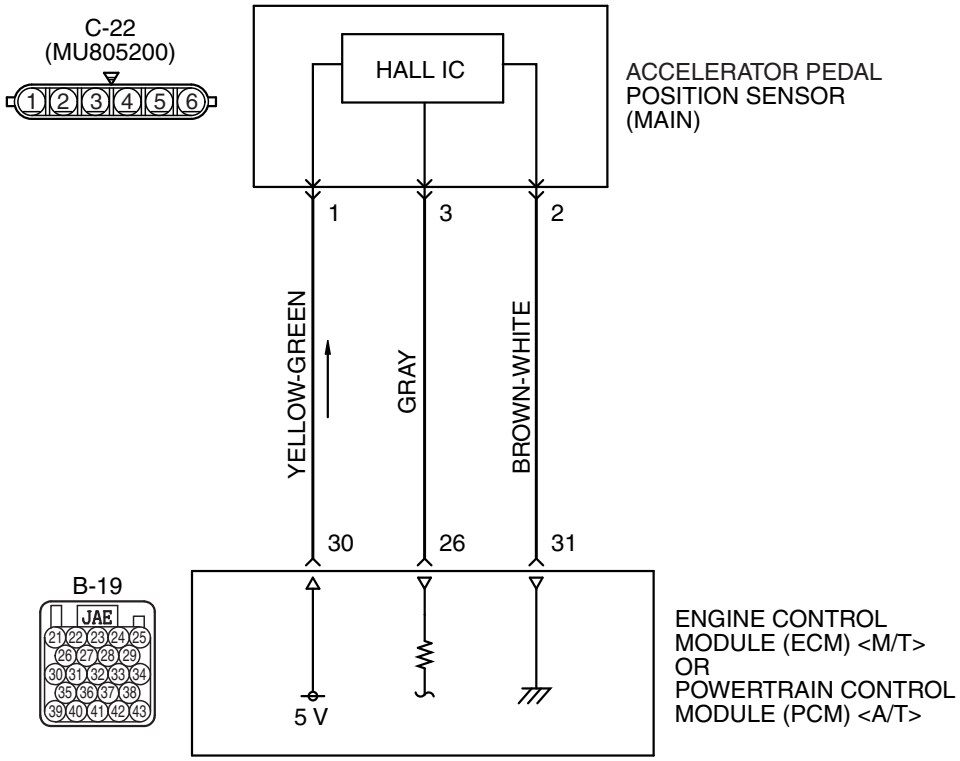
YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input

⚠ CAUTION
If DTC P2122 has been set, TCL related DTC U1120 is also set. After P2122 has been diagnosed, don't forget to erase DTC U1120.

Accelerator Pedal Position Sensor (main) Circuit



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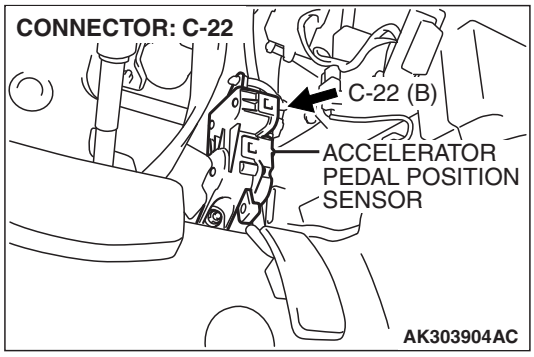
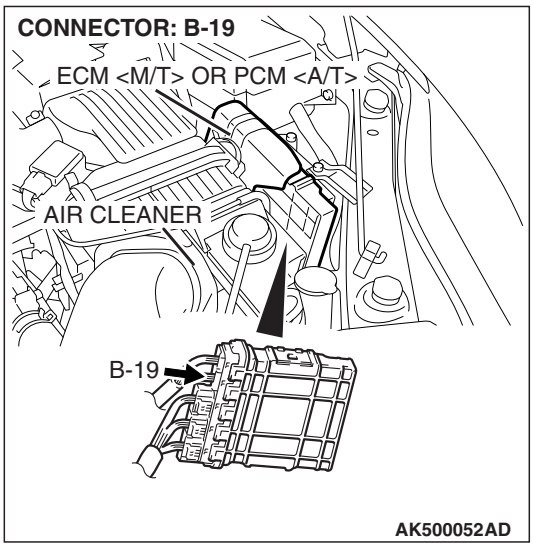




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No. 1) from the ECM <M/T> or the PCM <A/T> (terminal No. 30).
  The ground terminal (terminal No. 2) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 31).

TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM <M/T> or the PCM <A/T> 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)

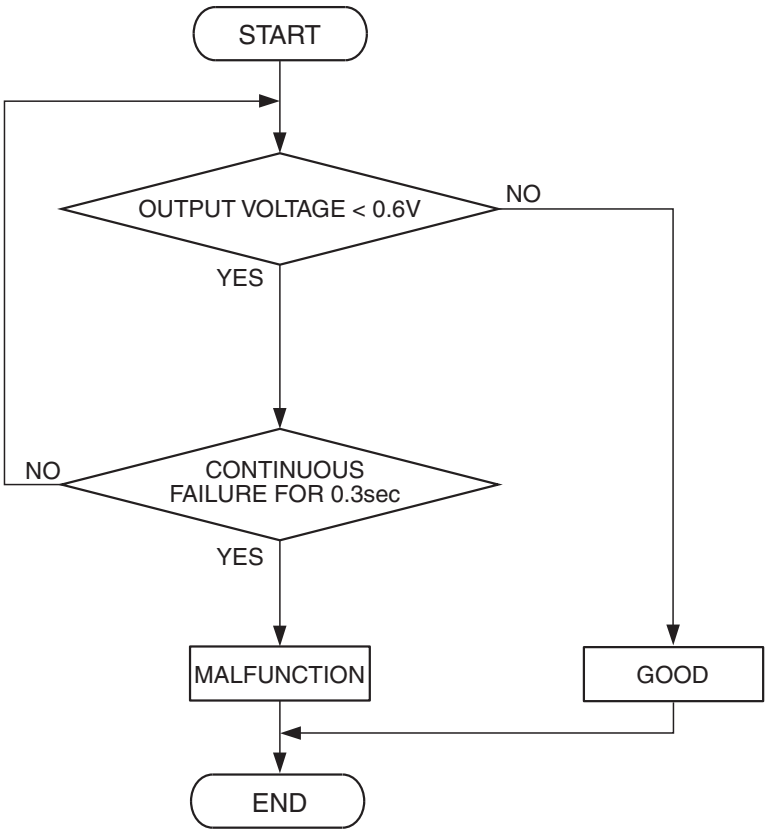
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



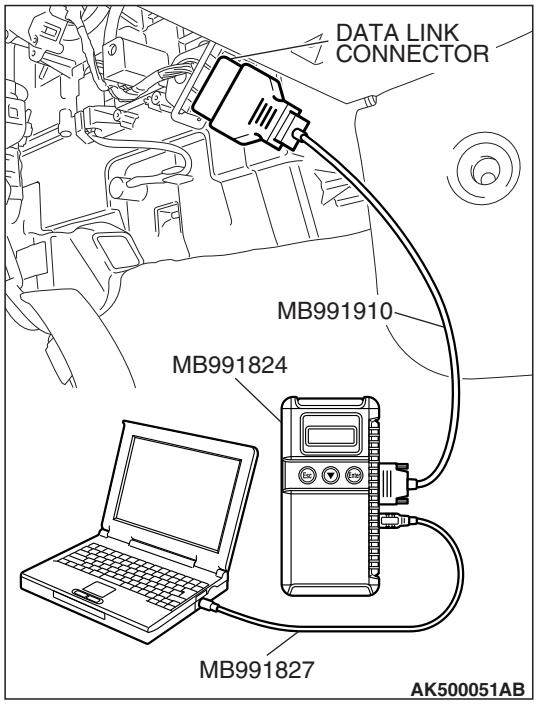
AK302413

TSB Revision

Check Condition
- Ignition switch is "ON" position.

Judgement Criterion
- Accelerator pedal position sensor (main) output voltage is 0.6 volt or less for 0.3 second.

OBD-II DRIVE CYCLE PATTERN
None.



TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Accelerator pedal position sensor failed.
- Open or shorted accelerator pedal position sensor (main) circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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

STEP 1. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).

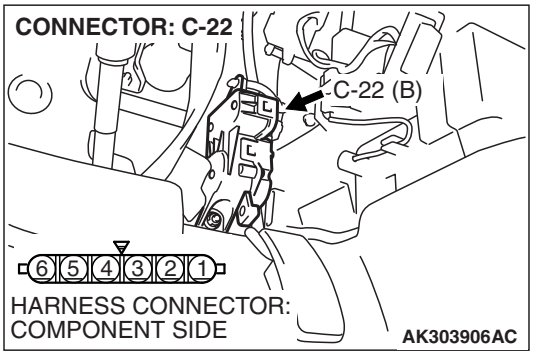
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 is between 0.8 and 1.2 volts when foot is released from accelerator pedal.
  - Output voltage is 4.0 volts or higher 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.00-14.

NO : Go to Step 2.

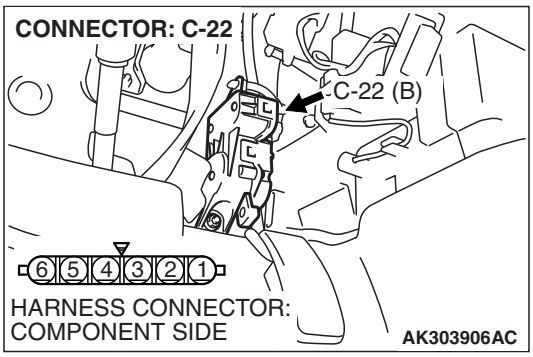


STEP 2. Check harness connector C-22 at accelerator pedal position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

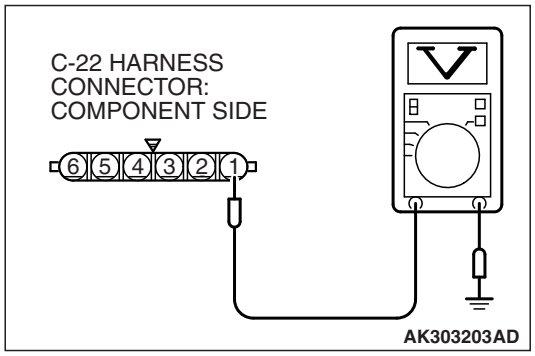
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.



STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-22.

(1) Disconnect the connector C-22 and measure at the harness side.

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



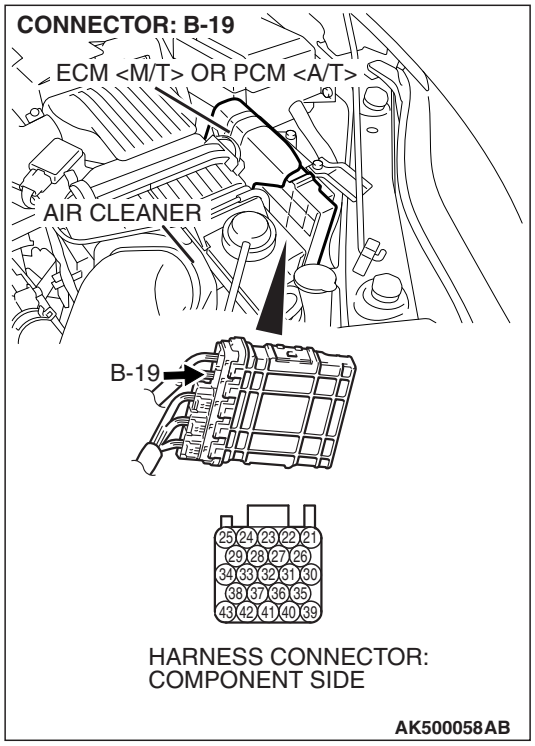
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be between 4.9 and 5.1 volts.

(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-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

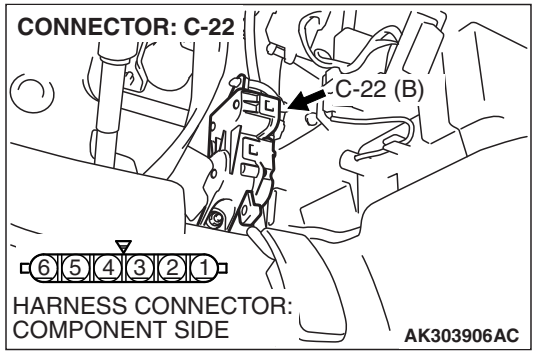
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

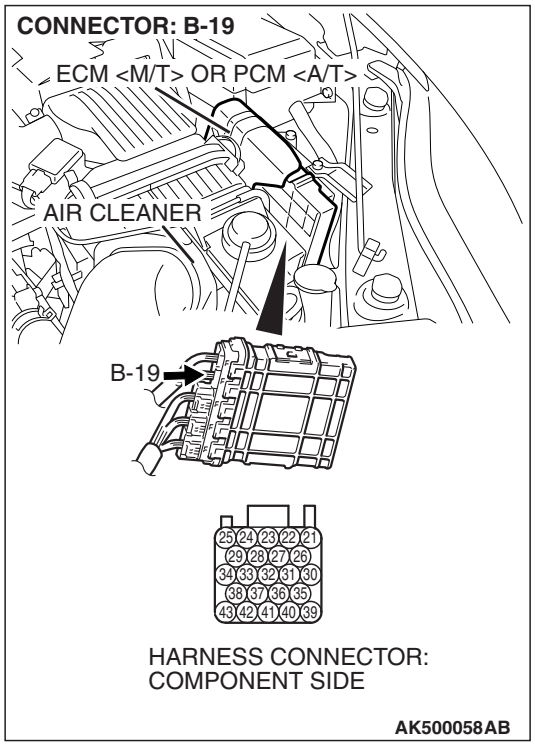
STEP 5. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-22 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 30).

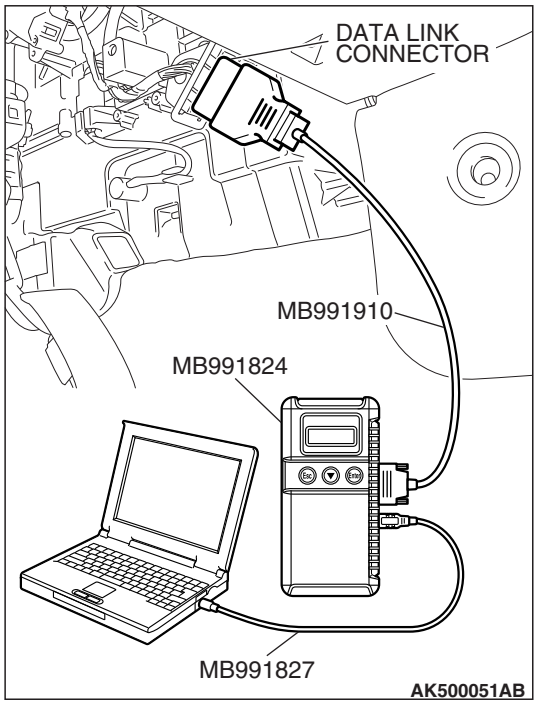
Q: Is the harness wire in good condition?

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).

⚠ 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.

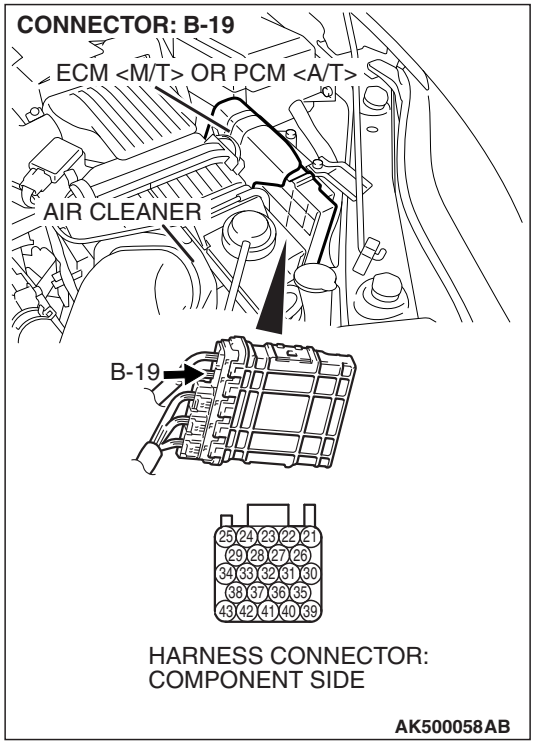
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage is between 0.8 and 1.2 volts when foot is released from accelerator pedal.
- Output voltage is 4.0 volts or higher 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.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 11.



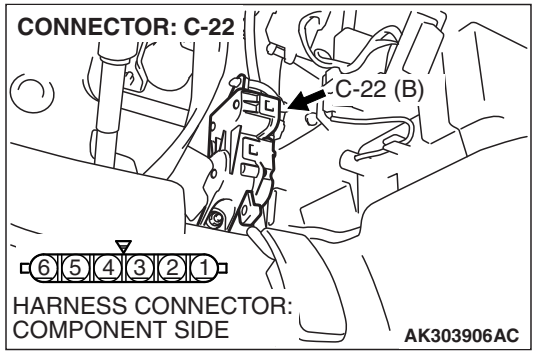
STEP 7. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

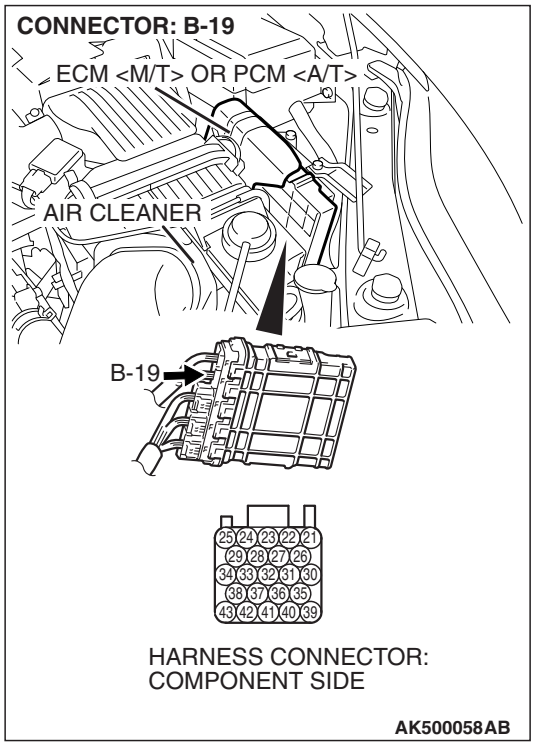
Q: Is the harness connector in good condition?

YES : Go to Step 8.

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

TSB Revision





STEP 8. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 30).

Q: Is the harness wire in good condition?

YES : Go to Step 9.

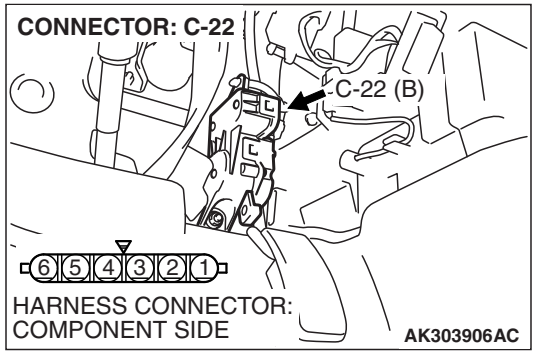
NO : Repair it. Then go to Step 11.

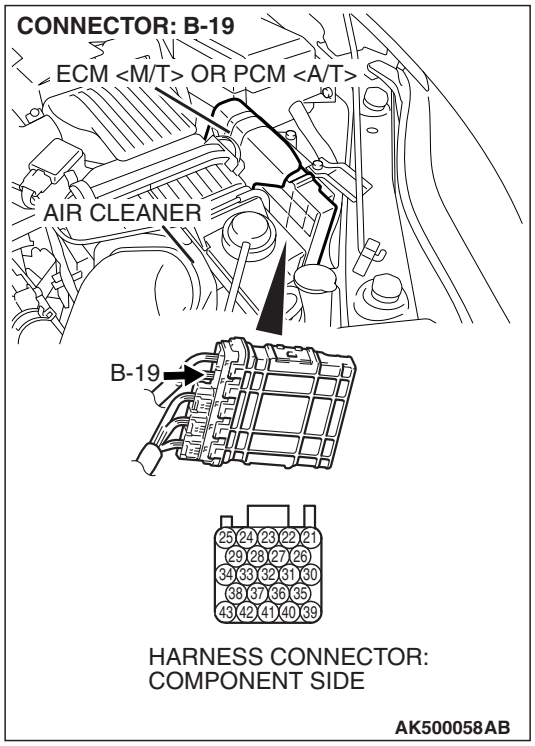
STEP 9. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 26).

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair it. Then go to Step 11.





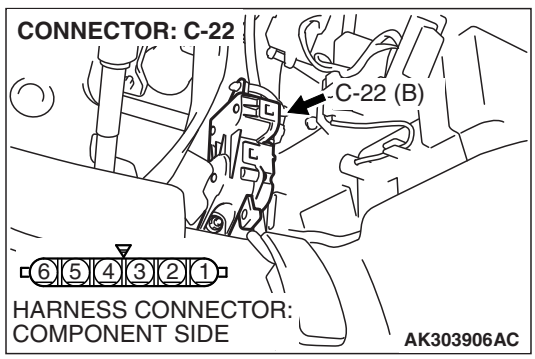
STEP 10. Replace the accelerator pedal position sensor.

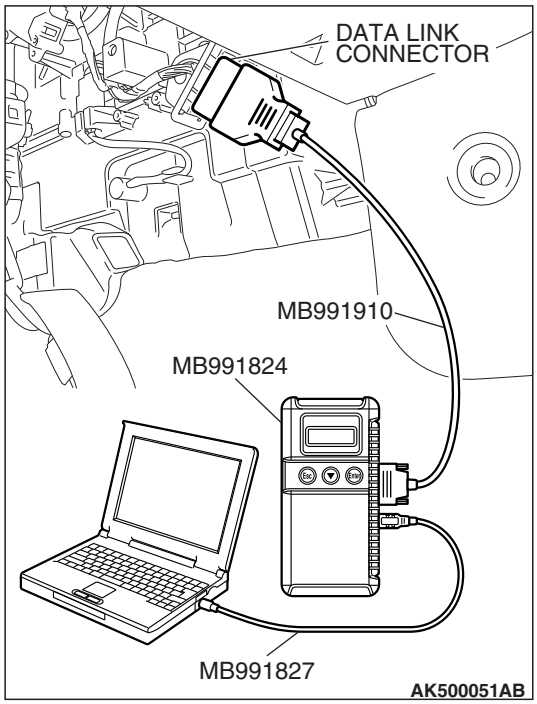
(1) Replace the accelerator pedal position sensor.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2122 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 11.

NO : The inspection is complete.





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

⚠ CAUTION

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

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

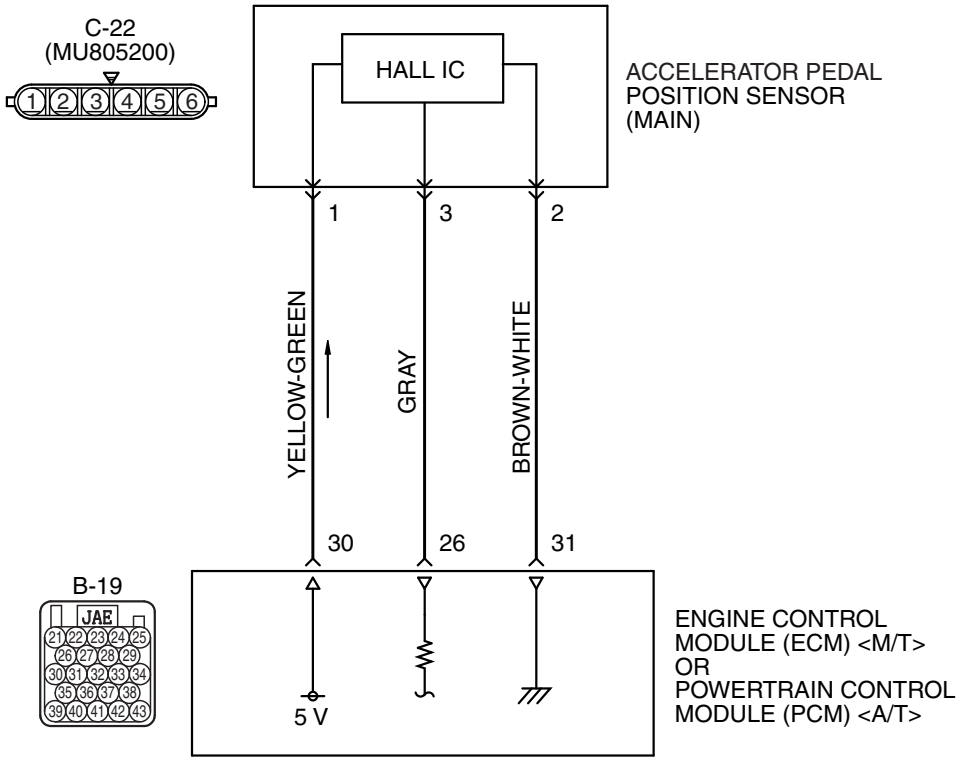
Q: Is DTC P2122 set?

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

DTC P2123: Accelerator Pedal Position Sensor (main) Circuit High Input

⚠ CAUTION
If DTC P2123 has been set, TCL related DTC U1120 is also set. After P2123 has been diagnosed, don't forget to erase DTC U1120.

Accelerator Pedal Position Sensor (main) Circuit



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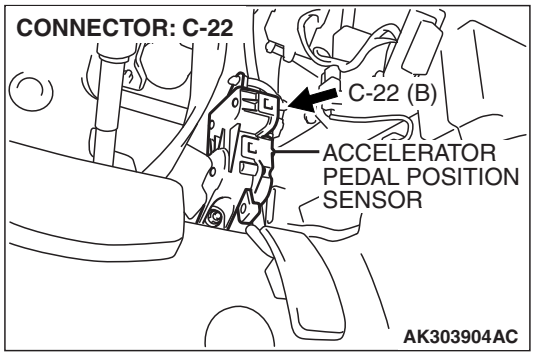
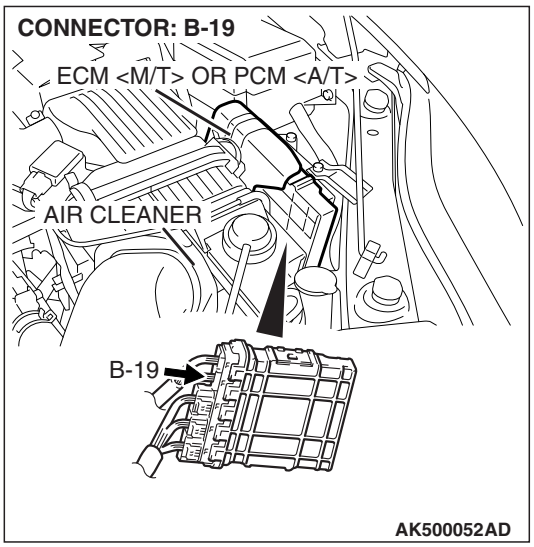




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No. 1) from the ECM <M/T> or the PCM <A/T> (terminal No. 30).
  The ground terminal (terminal No. 2) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 31).

TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM <M/T> or the PCM <A/T> 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)

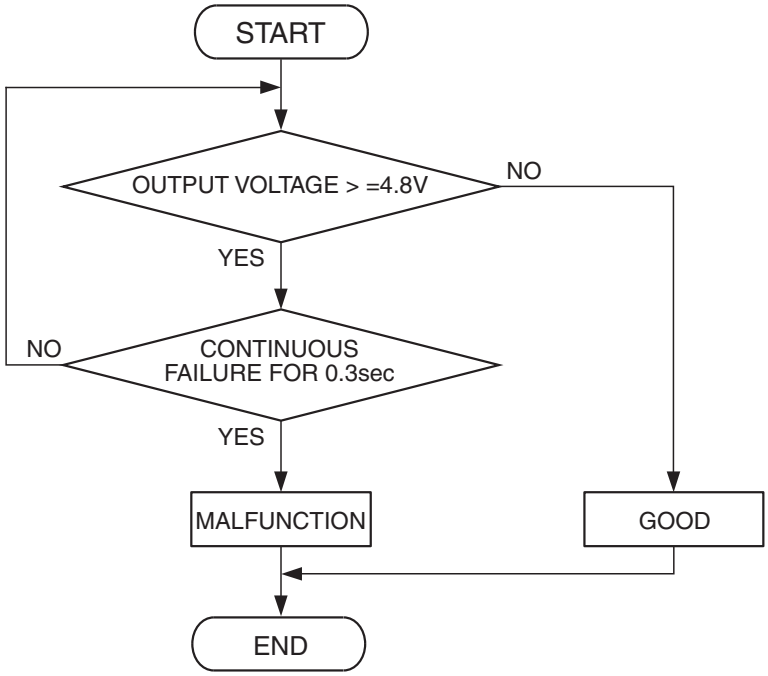
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK401528

TSB Revision

Check Condition
- Ignition switch is "ON" position.

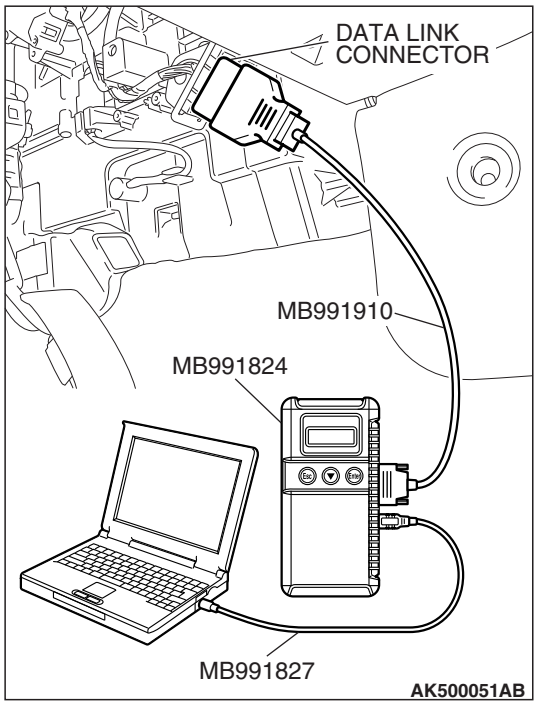
Judgement Criterion
- Accelerator pedal position sensor (main) output voltage should be 4.8 volts or higher for 0.3 second.

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. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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



STEP 1. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).

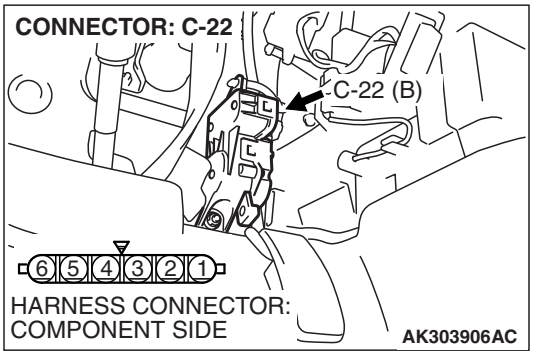
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

(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 is between 0.8 and 1.2 volts when foot is released from accelerator pedal.
  - Output voltage is 4.0 volts or higher 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.00-14.

NO : Go to Step 2.

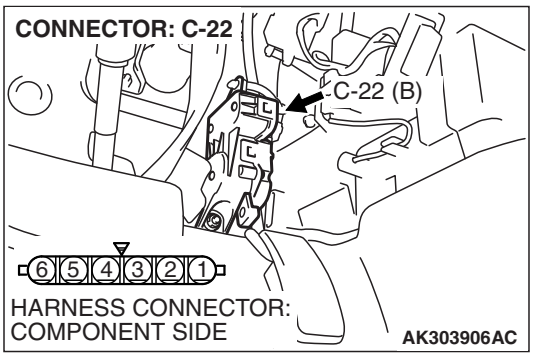


STEP 2. Check harness connector C-22 at accelerator pedal position sensor for damage.

Q: Is the harness connector in good condition?

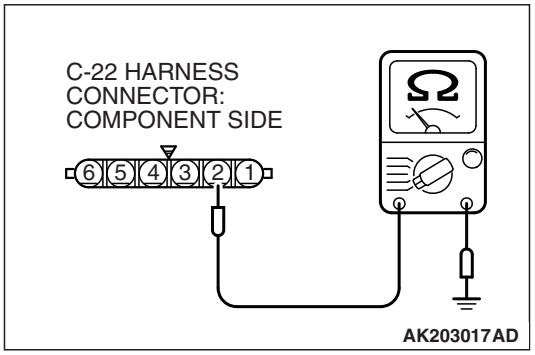
YES : Go to Step 3.

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-22.

(1) Disconnect the connector C-22 and measure at the harness side.



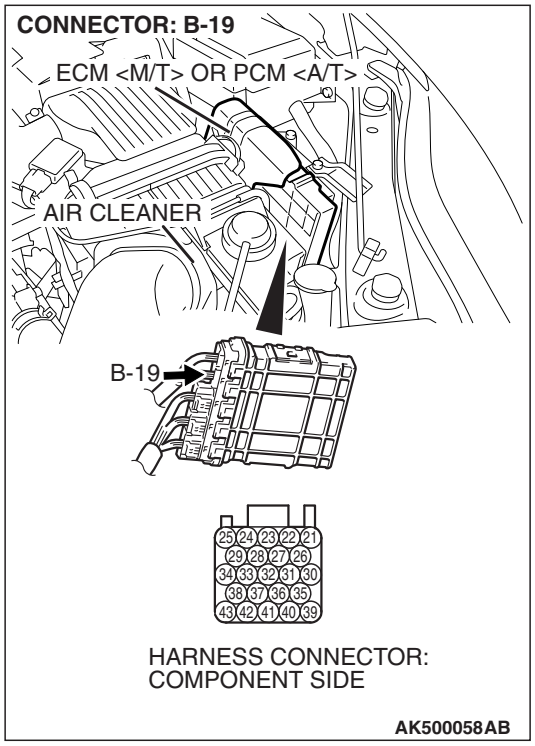
(2) Measure the continuity between terminal No. 2 and ground.

- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 6.

NO : Go to Step 4.



STEP 4. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

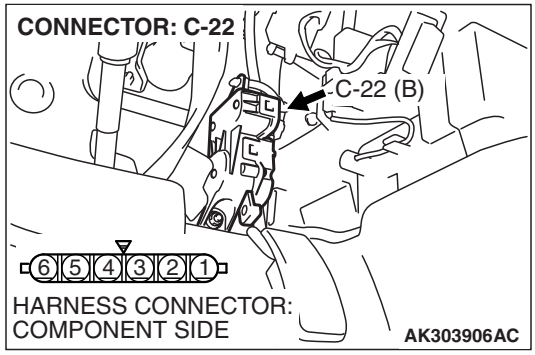
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

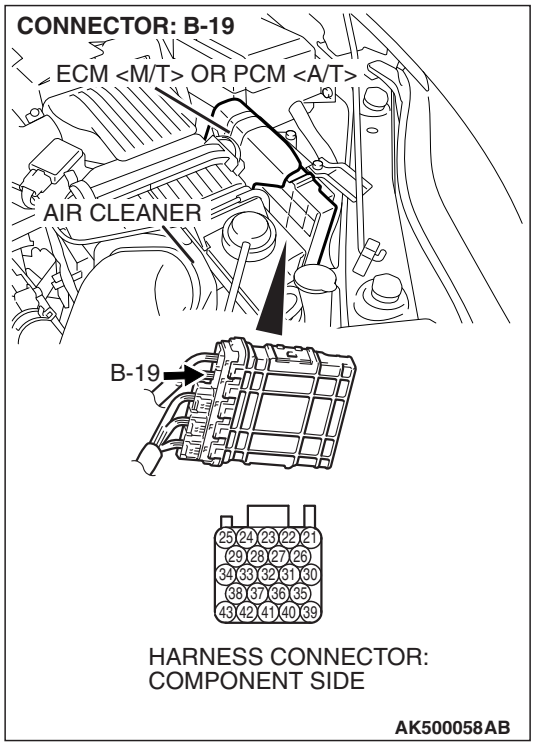
STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-22 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 31).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 8.





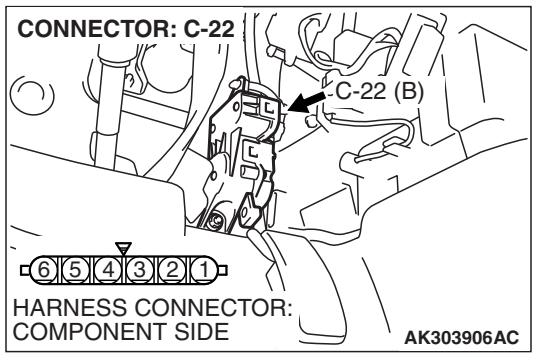
STEP 6. Replace the accelerator pedal position sensor.

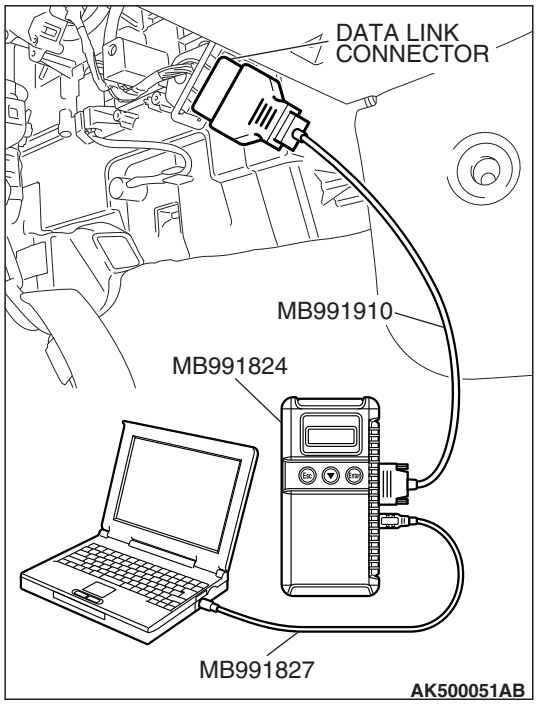
(1) Replace the accelerator pedal position sensor.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2123 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.

NO : The inspection is complete.





STEP 7. 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.

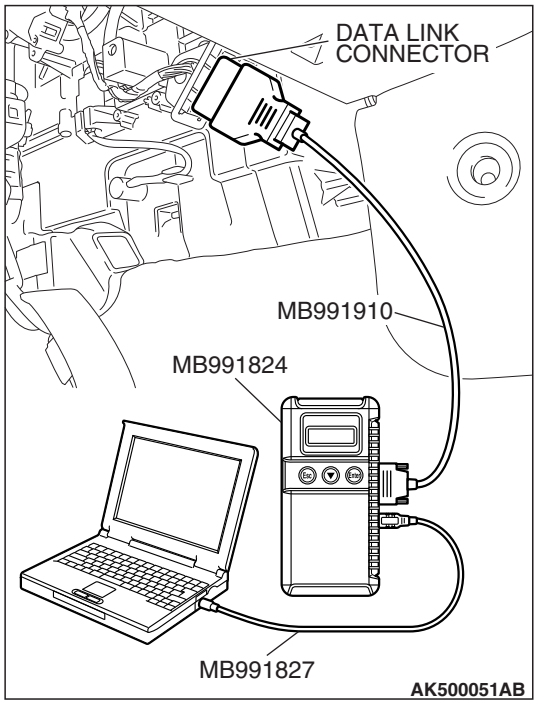
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage is between 0.8 and 1.2 volts when foot is released from accelerator pedal.
- Output voltage is 4.0 volts or higher 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.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.



STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC P2123 set?

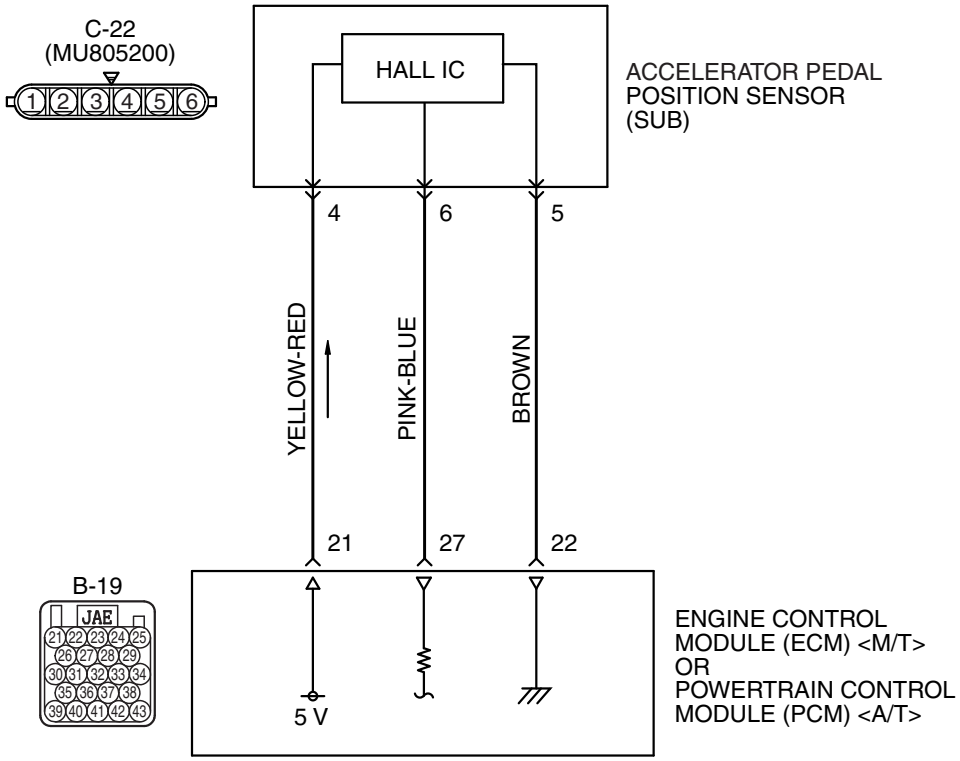
YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input

⚠ CAUTION
If DTC P2127 has been set, TCL related DTC U1120 is also set. After P2127 has been diagnosed, don't forget to erase DTC U1120.

Accelerator Pedal Position Sensor (sub) Circuit



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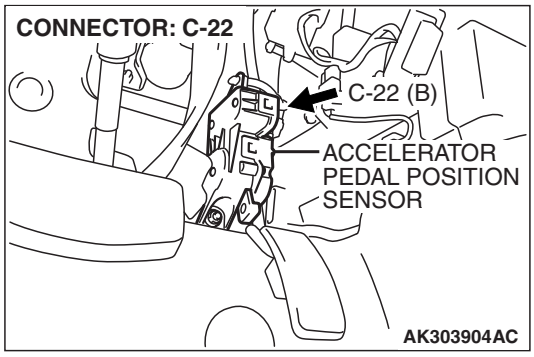
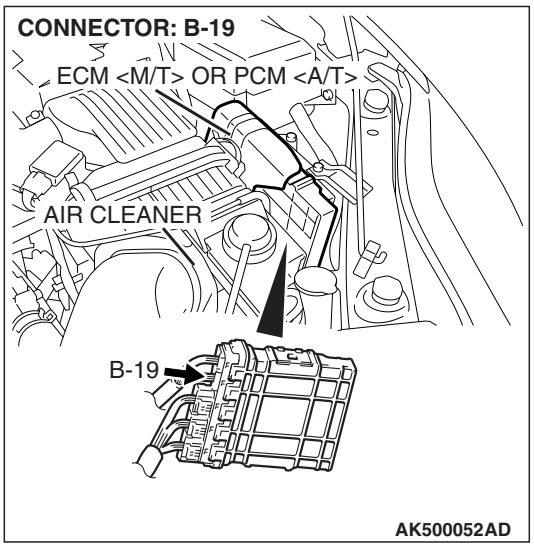




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 4) from the ECM <M/T> or the PCM <A/T> (terminal No. 21).
  The ground terminal (terminal No. 5) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 22).

TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM <M/T> or the PCM <A/T> 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)

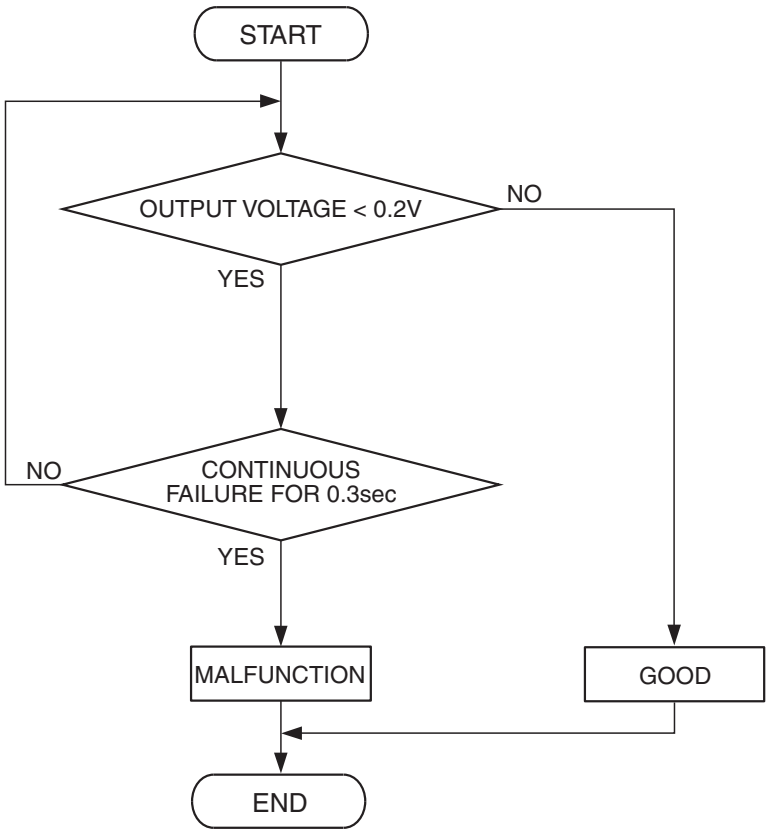
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302412

TSB Revision

Check Condition

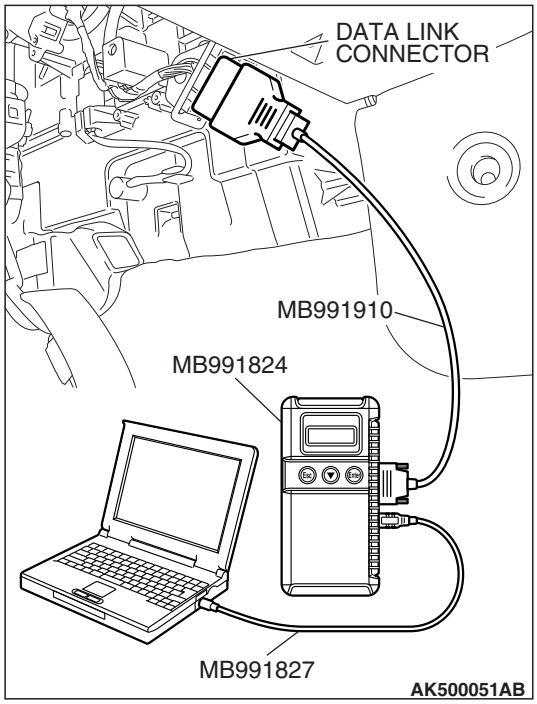
- Ignition switch is "ON" position.

Judgement Criterion

- Accelerator pedal position sensor (sub) output voltage is 0.2 volt or less for 0.3 second.

OBD-II DRIVE CYCLE PATTERN

None.



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

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

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).

⚠ CAUTION

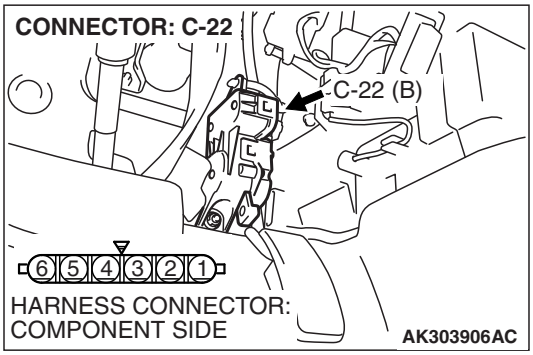
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

(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 is between 0.4 and 1.0 volts when foot is released from accelerator pedal.
  - Output voltage is 3.6 volts or higher 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.00-14.

NO : Go to Step 2.

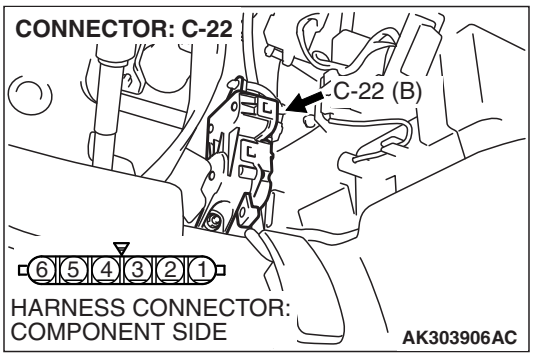


STEP 2. Check harness connector C-22 at accelerator pedal position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

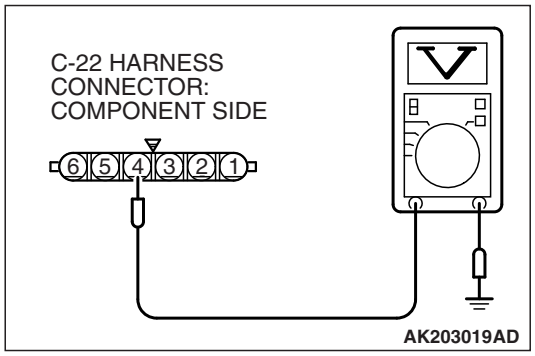
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.



STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-22.

(1) Disconnect the connector C-22 and measure at the harness side.

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



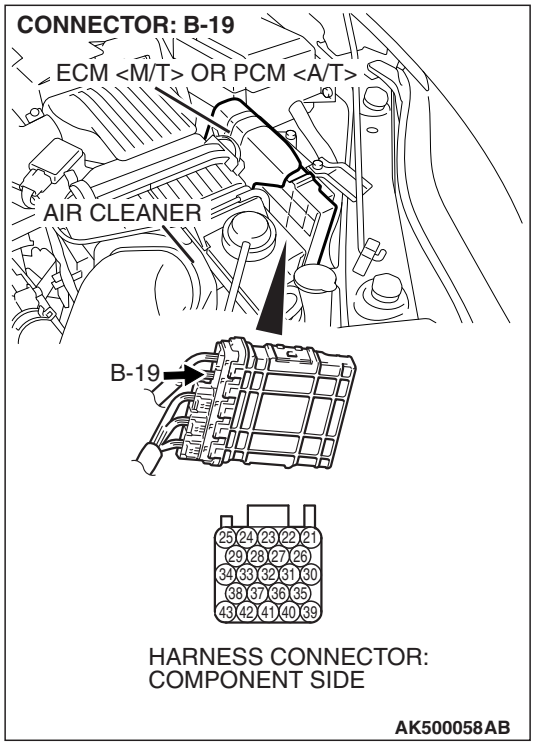
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 4.9 and 5.1 volts.

(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.

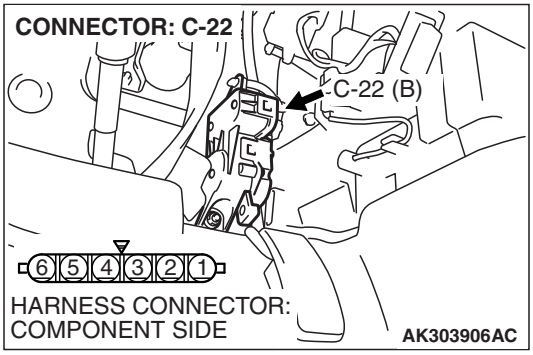


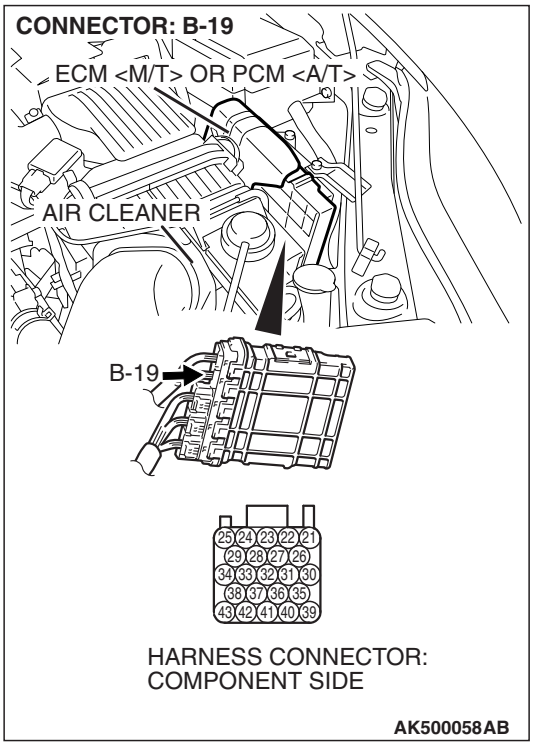
STEP 4. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

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



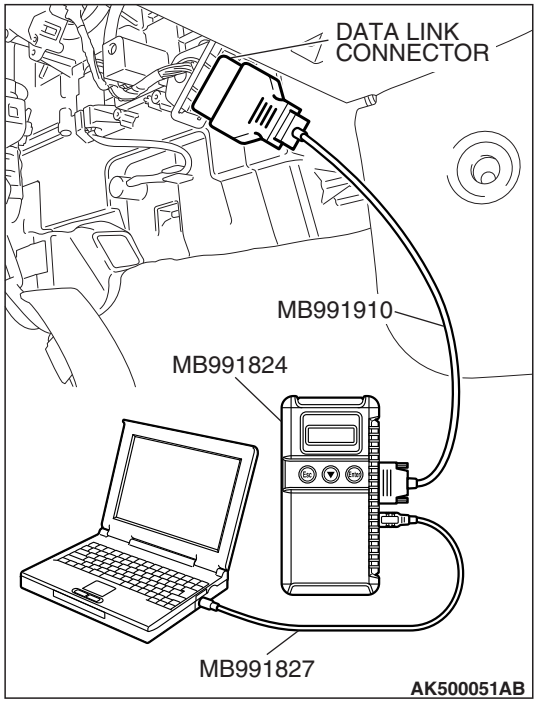


STEP 5. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-22 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 21).

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).

⚠ 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.

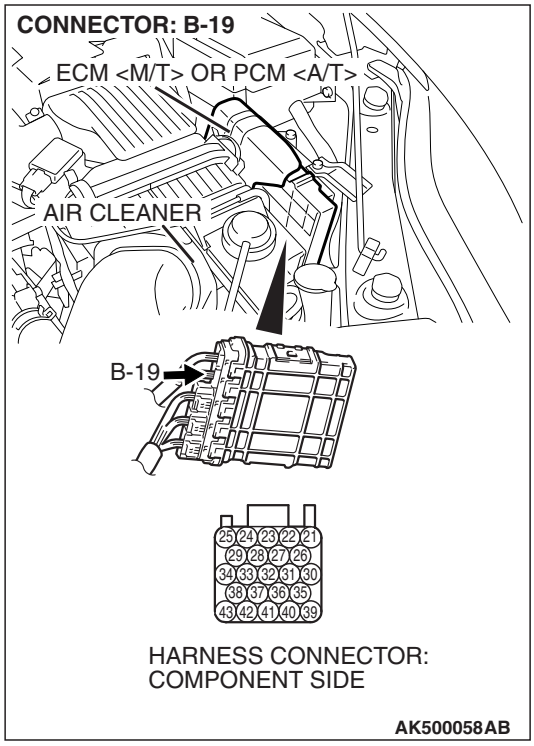
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage is between 0.4 and 1.0 volts when foot is released from accelerator pedal.
- Output voltage is 3.6 volts or higher 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.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 11.

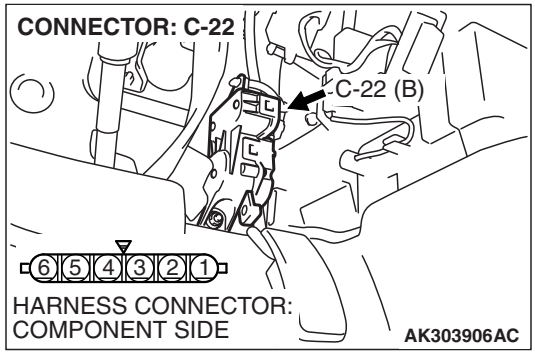


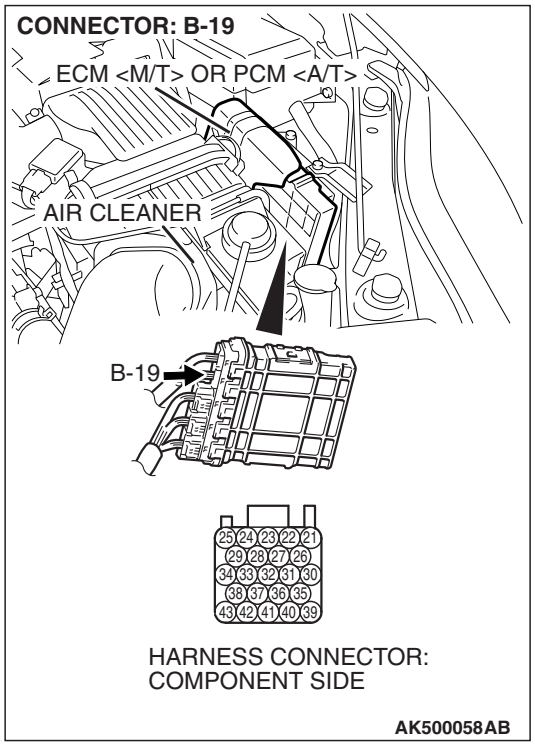
STEP 7. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

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





STEP 8. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 21).

Q: Is the harness wire in good condition?

YES : Go to Step 9.

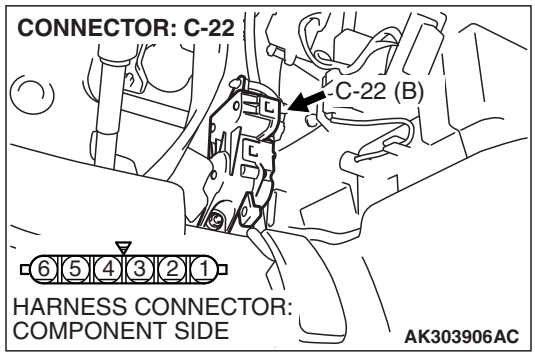
NO : Repair it. Then go to Step 11.

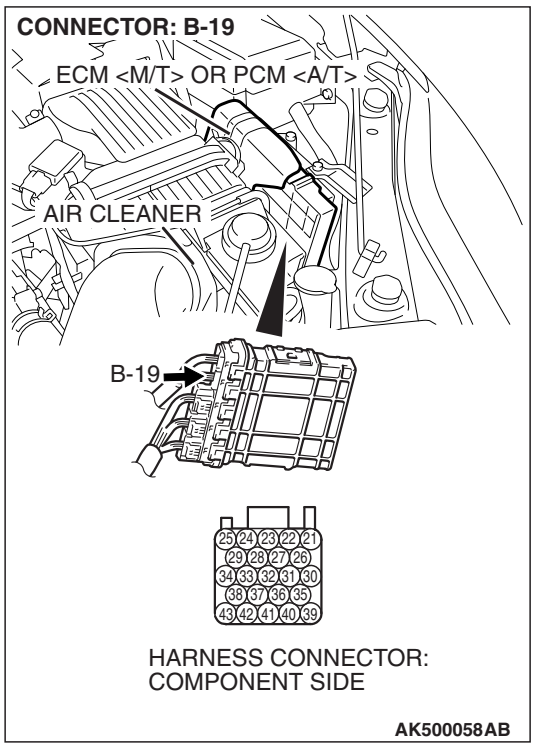
STEP 9. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 6) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 27)

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair it. Then go to Step 11.





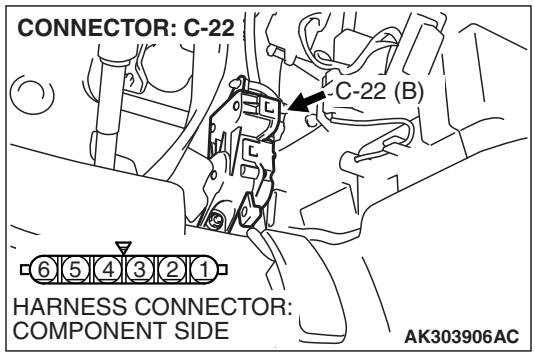
STEP 10. Replace the accelerator pedal position sensor.

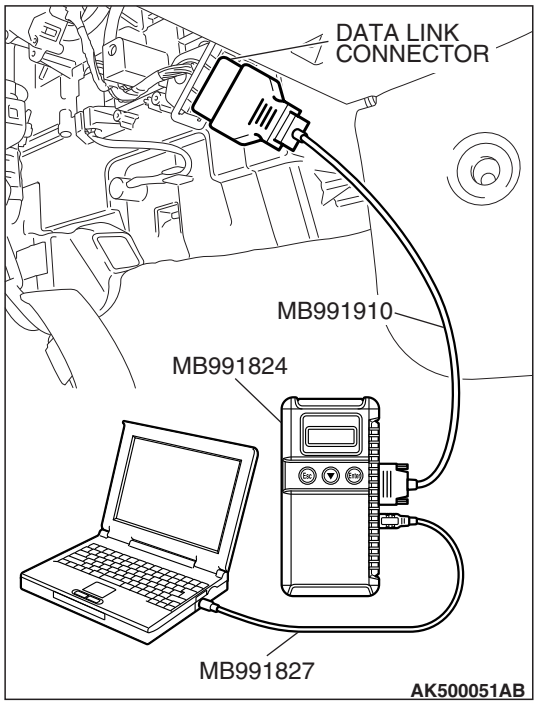
(1) Replace the accelerator pedal position sensor.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2127 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 11.

NO : The inspection is complete.





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

⚠ CAUTION

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

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

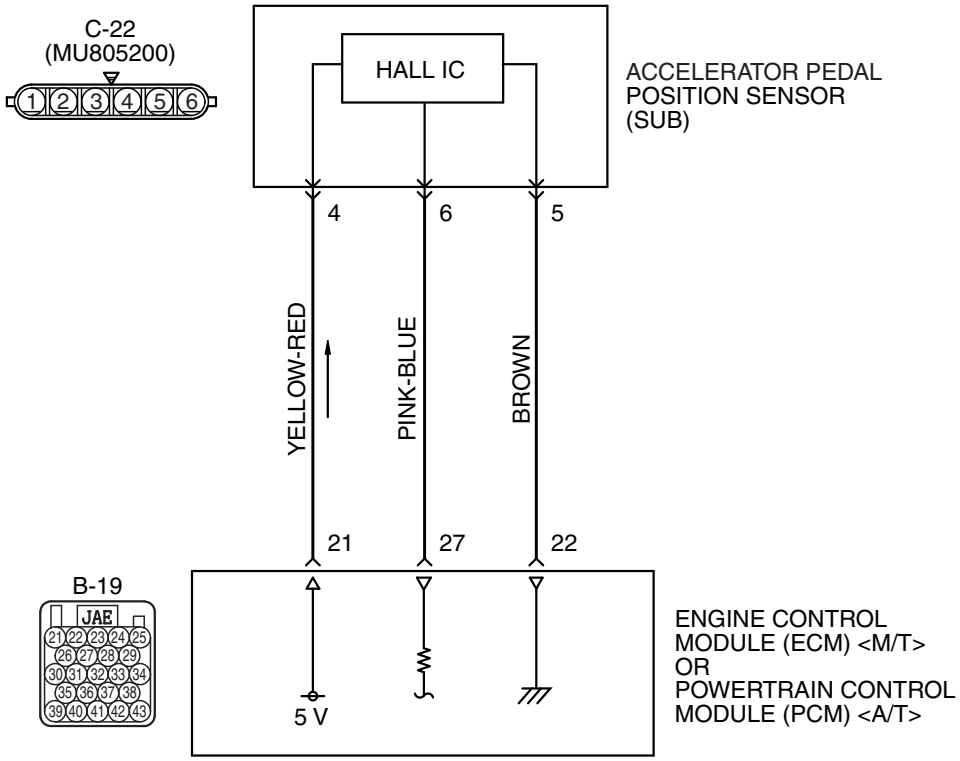
Q: Is DTC P2127 set?

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

DTC P2128: Accelerator Pedal Position Sensor (Sub) Circuit High Input

⚠ CAUTION
If DTC P2128 has been set, TCL related DTC U1120 is also set. After P2128 has been diagnosed, don't forget to erase DTC U1120.

Accelerator Pedal Position Sensor (sub) Circuit



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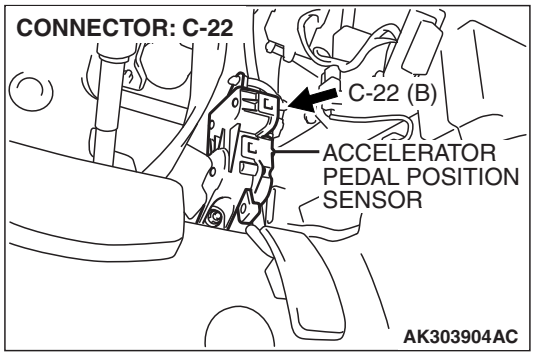
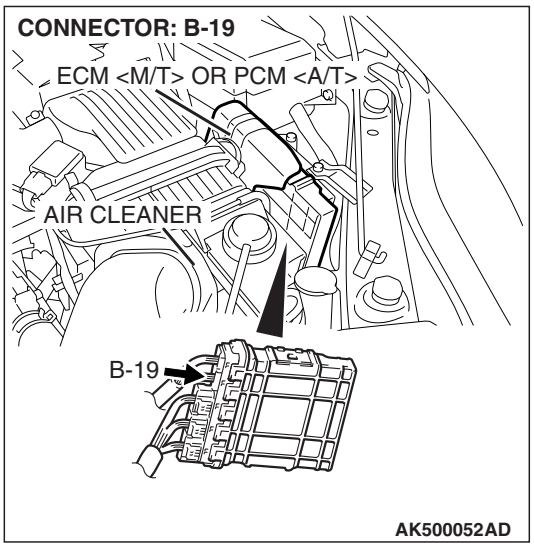




TSB Revision

CIRCUIT OPERATION

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 4) from the ECM <M/T> or the PCM <A/T> (terminal No. 21).
  The ground terminal (terminal No. 5) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 22).

TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM <M/T> or the PCM <A/T> 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)

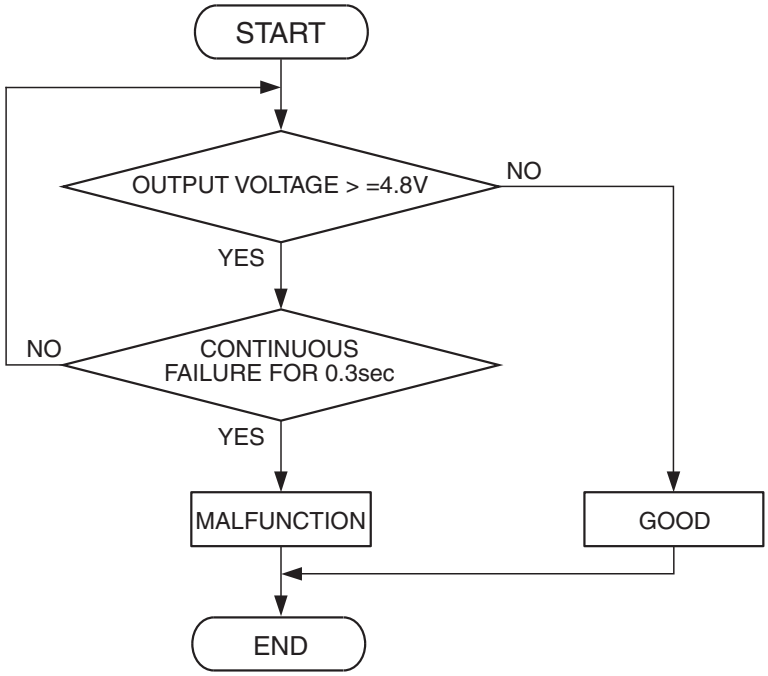
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK401528

TSB Revision

Check Condition
- Ignition switch is "ON" position.

Judgement Criterion
- Accelerator pedal position sensor (sub) output voltage is 4.8 volts or higher for 0.3 second.

OBD-II DRIVE CYCLE PATTERN
None.

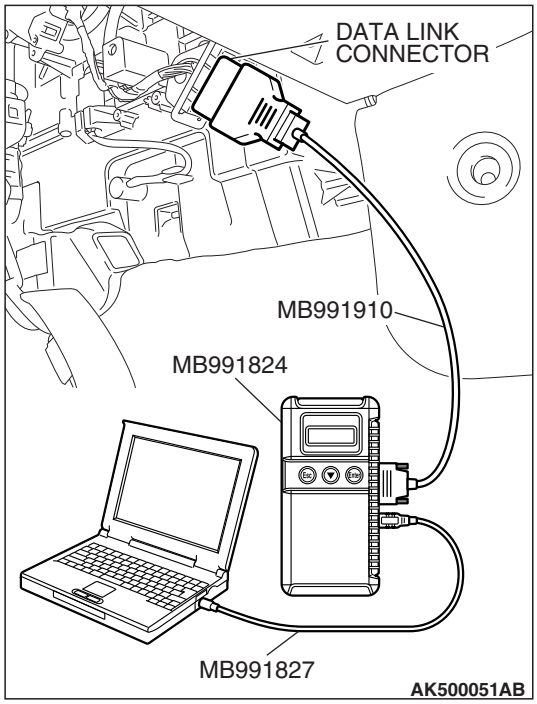
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Accelerator pedal position sensor failed.
- Open accelerator pedal position sensor (sub) circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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

STEP 1. Using scan tool MB991958, check data list item 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.

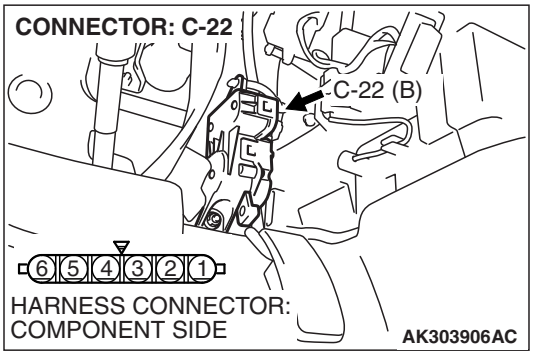


(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage is between 0.4 and 1.0 volts when foot is released from accelerator pedal.
  - Output voltage is 3.6 volts or higher 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.00-14.

NO : Go to Step 2.

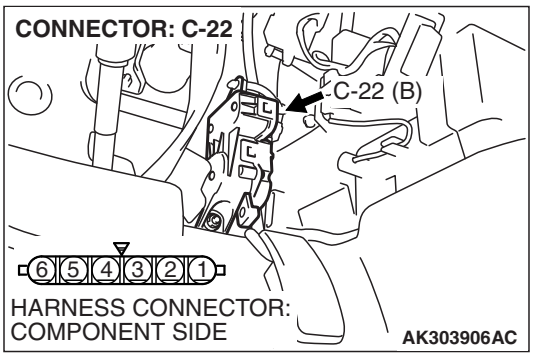


STEP 2. Check harness connector C-22 at accelerator pedal position sensor for damage.

Q: Is the harness connector in good condition?

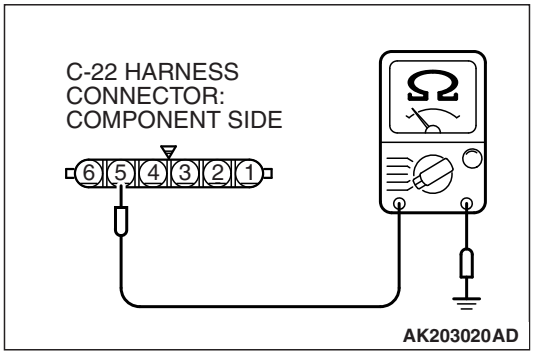
YES : Go to Step 3.

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-22.

(1) Disconnect the connector C-22 and measure at the harness side.

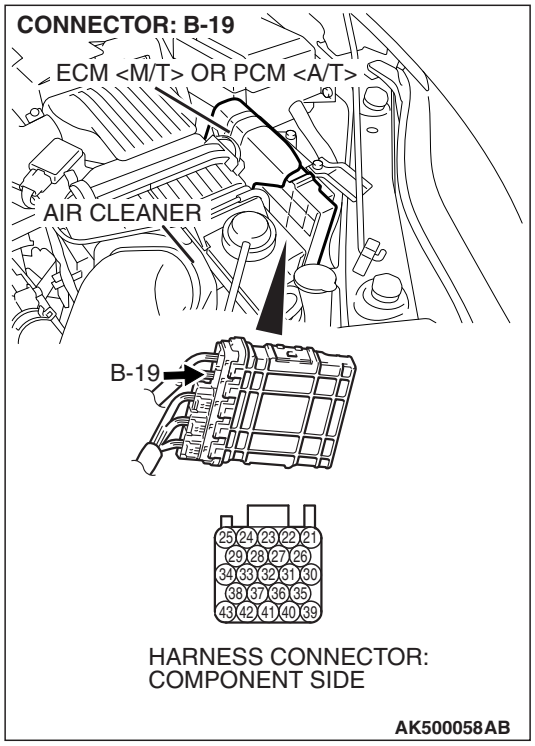


(2) Measure the continuity between terminal No. 5 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 6.

NO : Go to Step 4.



STEP 4. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

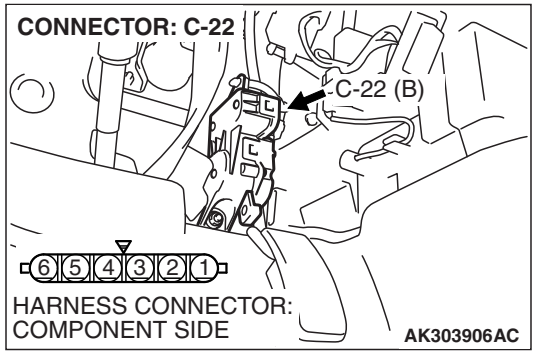
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

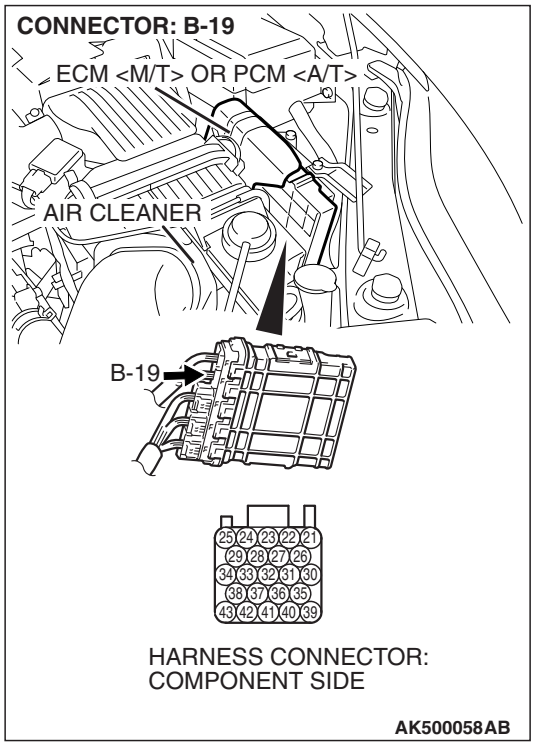
STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-22 (terminal No. 5) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 22).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 8.





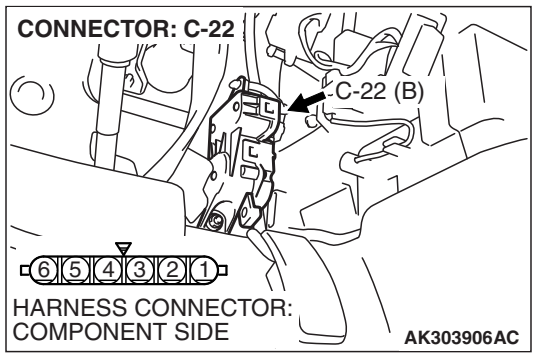
STEP 6. Replace the accelerator pedal position sensor.

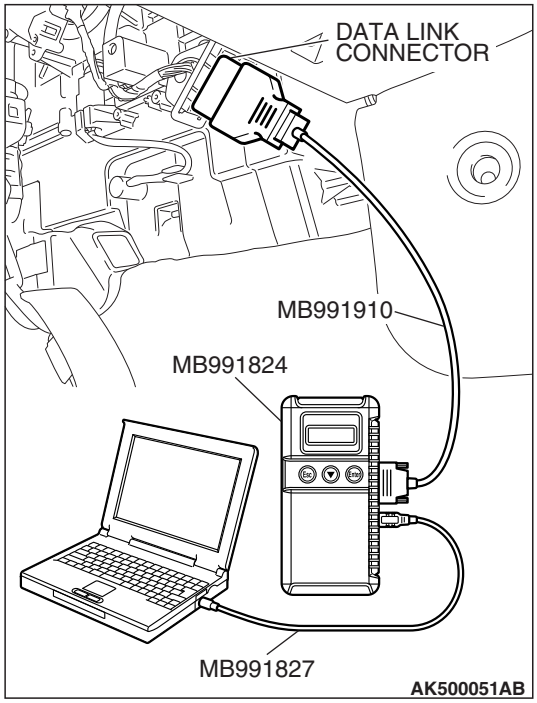
(1) Replace the accelerator pedal position sensor.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2128 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.

NO : The inspection is complete.





STEP 7. 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.

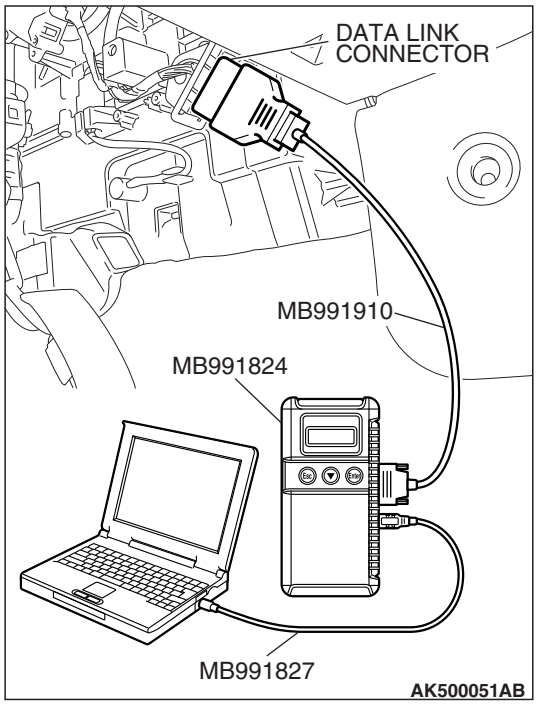
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage is between 0.4 and 1.0 volts when foot is released from accelerator pedal.
- Output voltage is 3.6 volts or higher 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.00-14.

NO : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 8.



STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC P2128 set?

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

DTC P2135: Throttle Position Sensor (Main and Sub) Range/Performance Problem

⚠ CAUTION
If DTC P2135 has been set, TCL related DTC U1120 is also set. After P2135 has been diagnosed, don't forget to erase DTC U1120.

THROTTLE POSITION SENSOR (MAIN AND SUB) RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P0122 – Throttle Position Sensor (Main) Circuit P.13B-271.
- Refer to DTC P0222 – Throttle Position Sensor (Sub) Circuit P.13B-567.

CIRCUIT OPERATION

- Refer to DTC P0122 – Throttle Position Sensor (Main) Circuit P.13B-271.
- Refer to DTC P0222 – Throttle Position Sensor (Sub) Circuit P.13B-567.

TECHNICAL DESCRIPTION

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

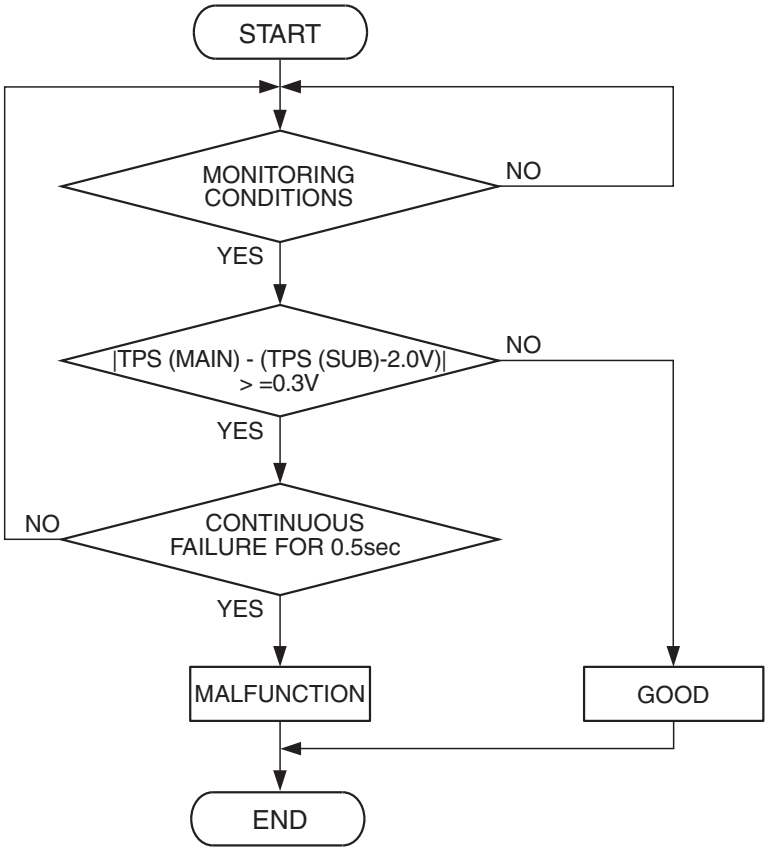
- Not applicable

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor

DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

Logic Flow Chart



AK302391

Check Conditions

- Ignition switch is "ON" position.
- Throttle position sensor (main) output voltage is between 0.35 and 2.5 volts.
- Throttle position sensor (sub) output voltage is between 2.25 and 4.8 volts.

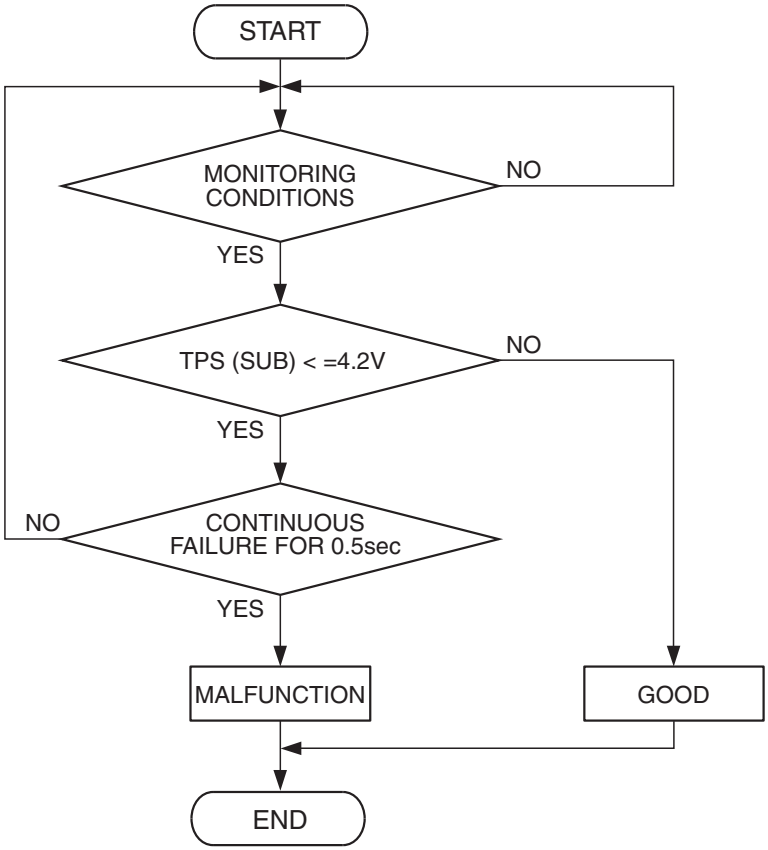
Judgement Criterion

- Voltage obtained with the formula given below is 0.3 volt or higher for 0.5 second: throttle position sensor (main) output voltage – [throttle position sensor (sub) output voltage – 2 volts]

TSB Revision

DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

Logic Flow Chart



AK302392

Check Conditions
- Ignition switch is "ON" position.
- Throttle position sensor (main) output voltage is between 2.5 and 4.8 volts.
- Throttle position sensor (sub) output voltage is higher than 2.25 volts.

Judgement Criterion
- Throttle position sensor (sub) output voltage is 4.2 volts or lower.

OBD-II DRIVE CYCLE PATTERN

None.

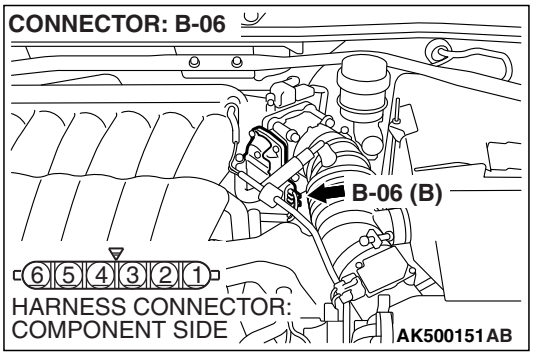
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

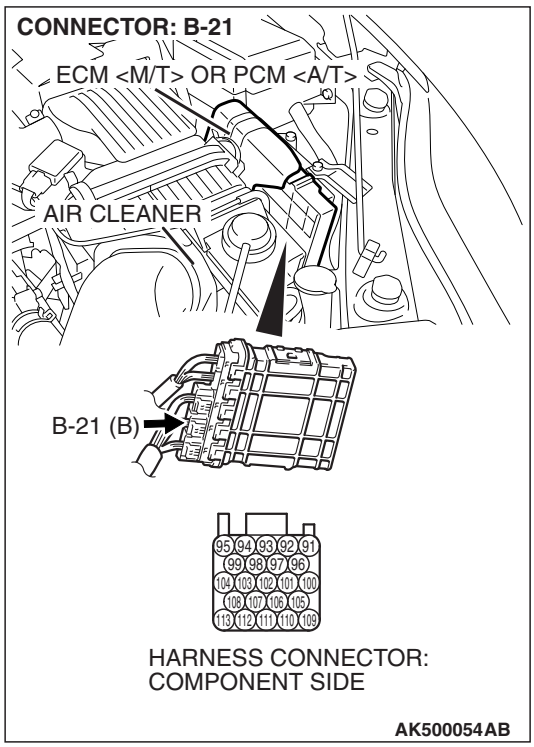
- Throttle position sensor failed.
- Shorted throttle position sensor circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

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

TSB Revision



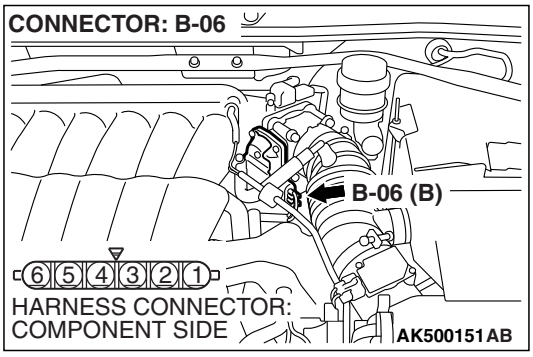


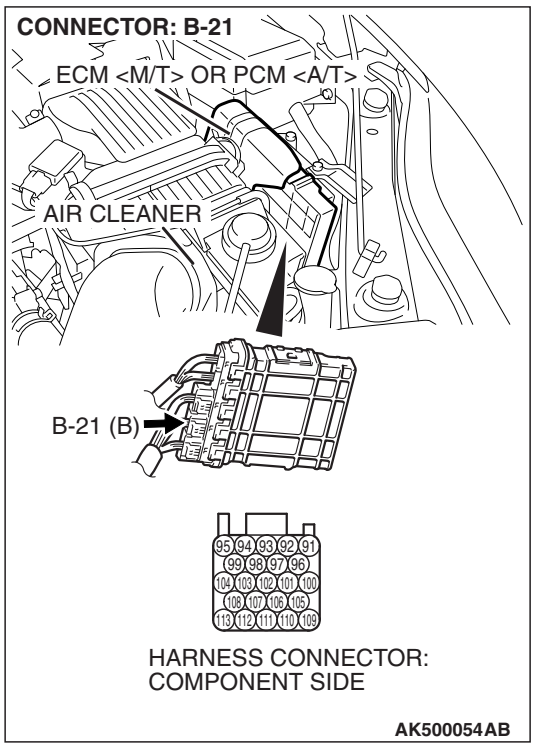
STEP 1. Check harness connector B-06 at throttle position sensor and harness connector B-21 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2.

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





STEP 2. Check for short circuit to ground between throttle position sensor connector B-06 (terminal No. 6) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 98).

Q: Is the harness wire in good condition?

YES : Go to Step 3.

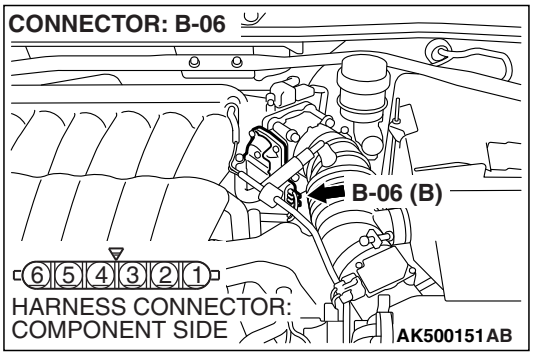
NO : Repair it. Then go to Step 5.

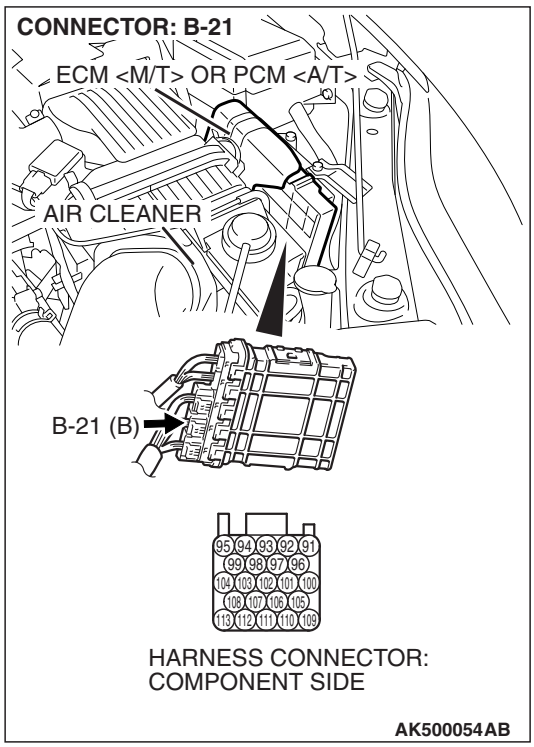
STEP 3. Check for short circuit to ground between throttle position sensor connector B-06 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 99).

Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair it. Then go to Step 5.





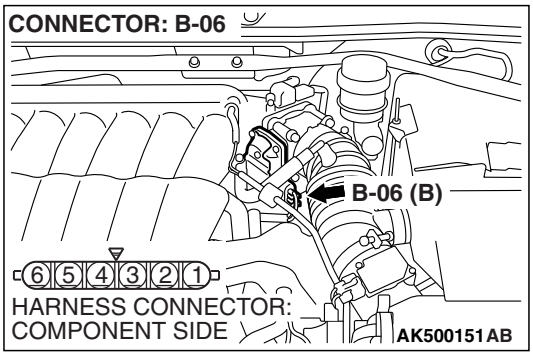
STEP 4. Replace the throttle body assembly.

(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) Turn the ignition switch to the "LOCK" (OFF) position.
(6) Check the DTC.

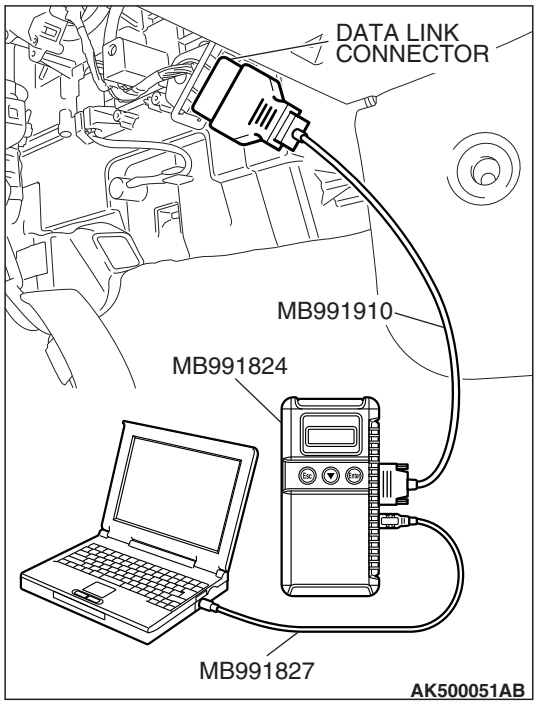
Q: Is DTC P2135 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 5.

NO : The inspection is complete.



TSB Revision



STEP 5. 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) Depress the accelerator pedal fully for a few seconds.
(5) Turn the ignition switch to the "LOCK" (OFF) position.
(6) Check the DTC.

Q: Is DTC P2135 set?

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

DTC P2138: Accelerator Pedal Position Sensor (main and sub) Circuit Range/Performance Problem

⚠ CAUTION
If DTC P2138 has been set, TCL related DTC U1120 is also set. After P2138 has been diagnosed, don't forget to erase DTC U1120.

ACCELERATOR PEDAL POSITION SENSOR (MAIN AND SUB) RANGE/PERFORMANCE CIRCUIT

- Refer to DTC P2122 – Accelerator Pedal Position Sensor (Main) Circuit P.13B-966.
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (Sub) Circuit P.13B-983.

CIRCUIT OPERATION

- Refer to DTC P2122 – Accelerator Pedal Position Sensor (Main) Circuit P.13B-966.
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (Sub) Circuit P.13B-983.

TECHNICAL DESCRIPTION

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

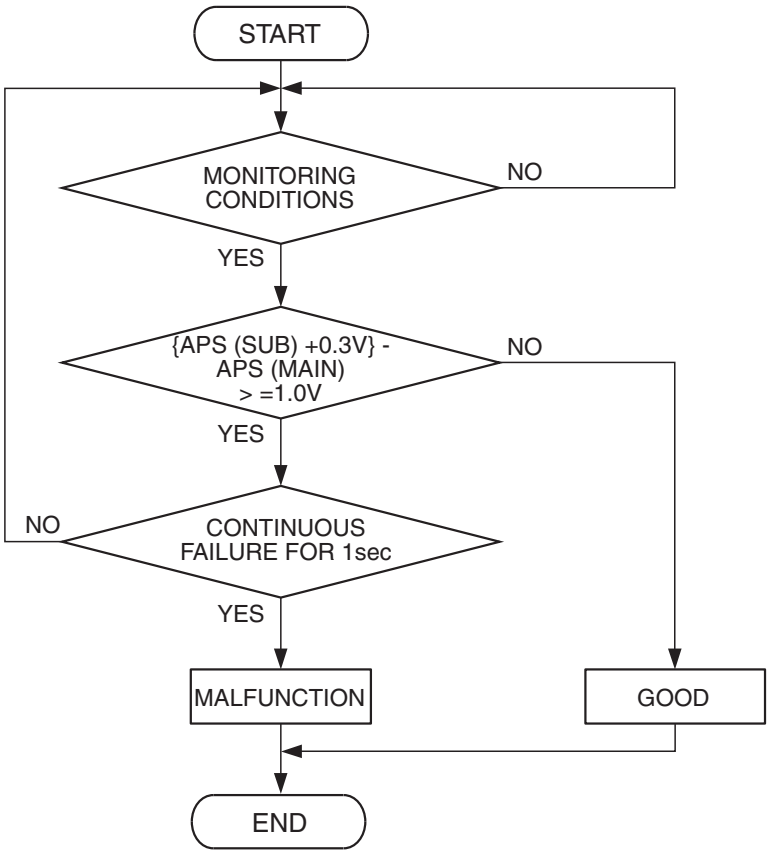
Sensor (The sensor below is determined to be normal)

- Not applicable

TSB Revision

DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

Logic Flow Chart



AK303910

Check Conditions

- Ignition switch is "ON" position.
- Accelerator pedal position sensor (main) output voltage is between 0.6 and 4.8 volts.
- Accelerator pedal position sensor (sub) output voltage is between 0.2 and 4.8 volts.
- Change of accelerator pedal position sensor (sub) output voltage per 25 milliseconds is lower than 0.06 volt.

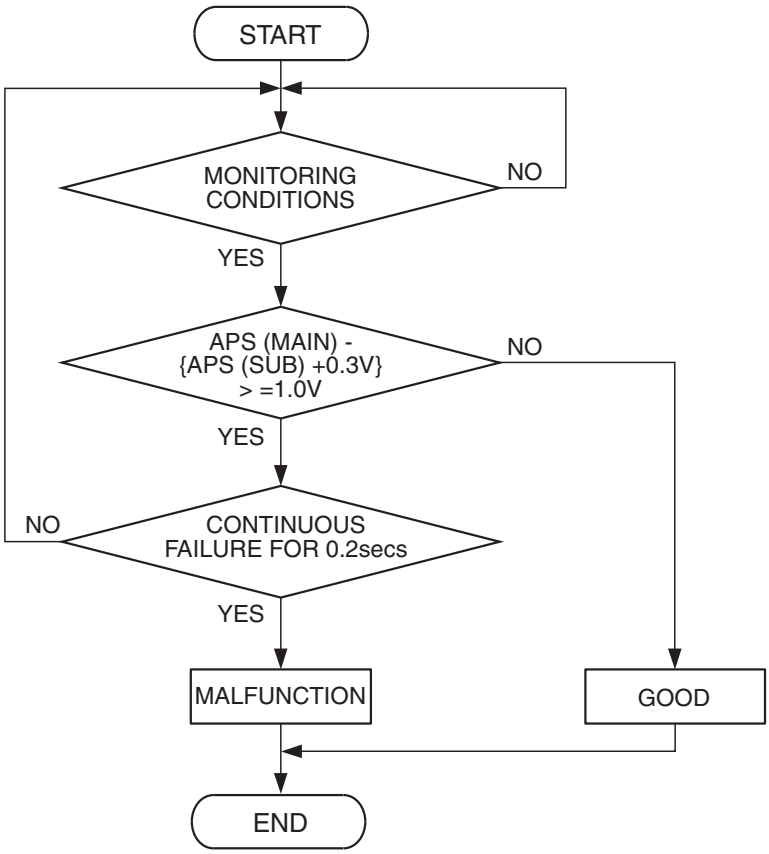
Judgement Criterion

- Voltage obtained with the formula given below is 1.0 volt or higher for 1 second: [accelerator pedal position sensor (sub) output voltage +0.3 volt] – accelerator pedal position sensor (main) output voltage.

TSB Revision

DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

Logic Flow Chart



AK303911

Check Conditions

- Ignition switch is "ON" position.
- Accelerator pedal position sensor (main) output voltage is between 0.6 and 4.8 volts.
- Accelerator pedal position sensor (sub) output voltage is between 0.2 and 4.8 volts.
- Change of accelerator pedal position sensor (sub) output voltage per 25 milliseconds is lower than 0.06 volt.
- Battery voltage is higher than 6.3 volts.

Judgement Criterion

- Voltage obtained with the formula given below is 1.0 volt or higher for 0.2 second: accelerator pedal position sensor (main) output voltage – [accelerator pedal position sensor (sub) output voltage +0.3 volt].

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. <M/T>
- PCM failed. <A/T>

TSB Revision

DIAGNOSIS

Required Special Tools:

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

STEP 1. Check whether the battery runs out or not.

- Check whether the user has had the experience of running out of the battery or not.

Q: Have you ever had the experience of running out of the battery before?

YES : The possible cause of the outputted diagnosis code may be due to the battery drop. Delete the diagnosis code and check on the situation for a while.

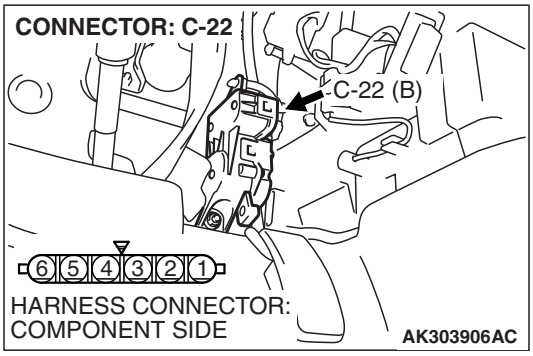
NO : Go to Step 2.

STEP 2. Check harness connector C-22 at accelerator pedal position sensor for damage.

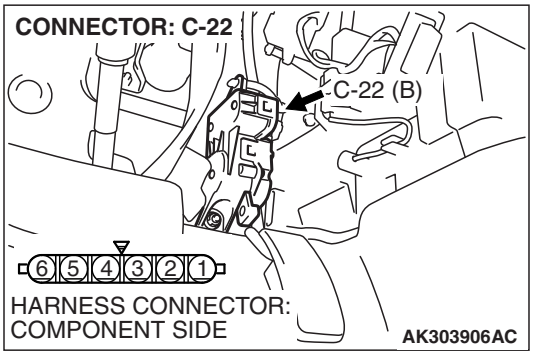
Q: Is the harness connector in good condition?

YES : Go to Step 3.

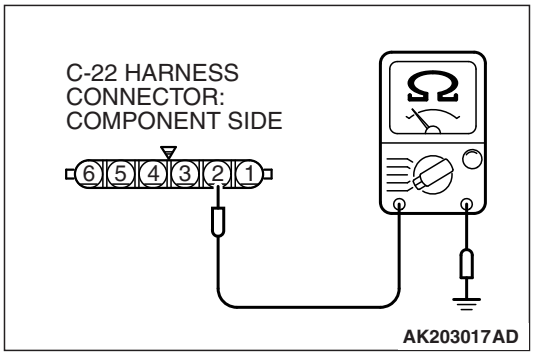
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.



STEP 3. Check the continuity at accelerator pedal position sensor harness side connector C-22.



(1) Disconnect the connector C-22 and measure at the harness side.

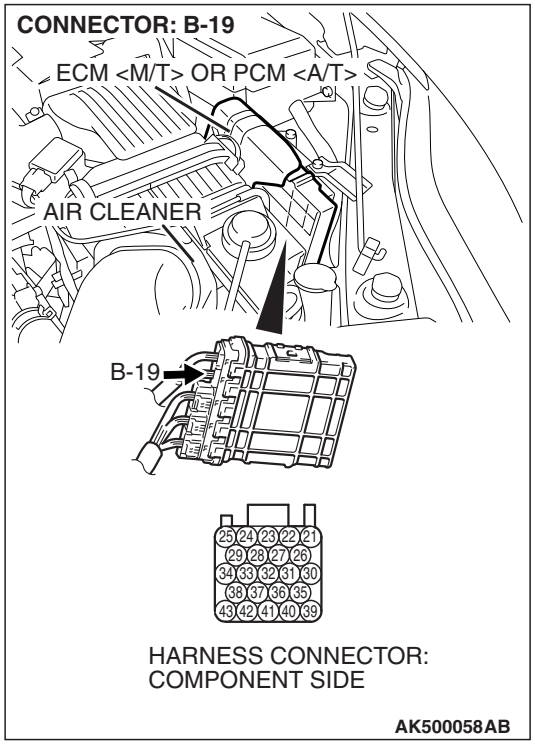


(2) Measure the continuity between terminal No. 2 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

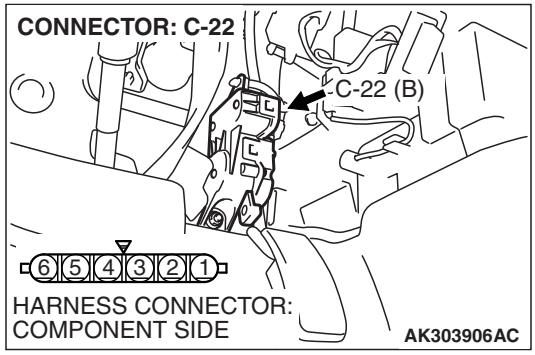
YES : Go to Step 7.
NO : Go to Step 4.

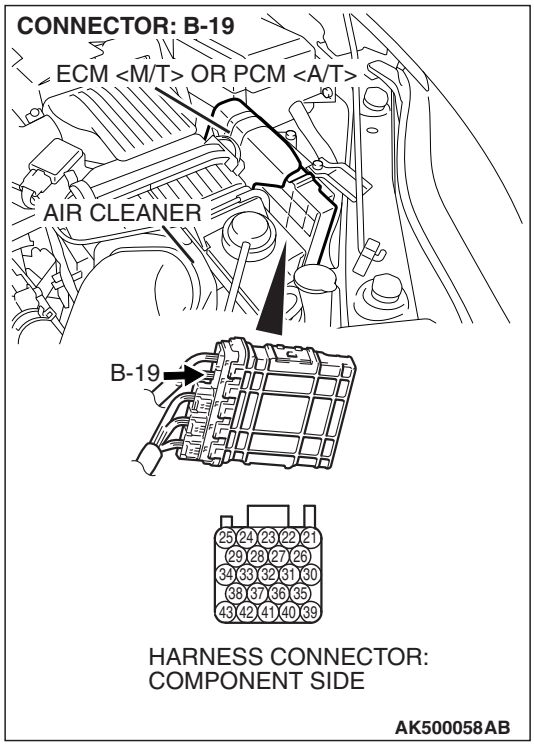
STEP 4. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.



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

YES : Go to Step 5.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.





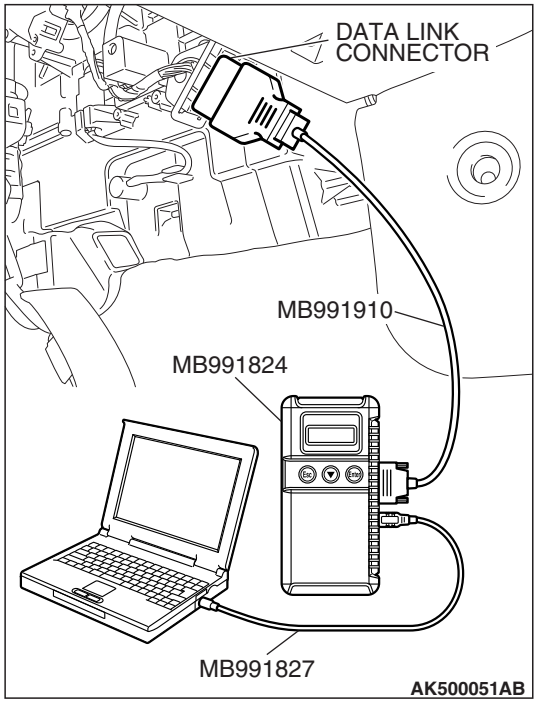
STEP 5. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 31).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 17.

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.

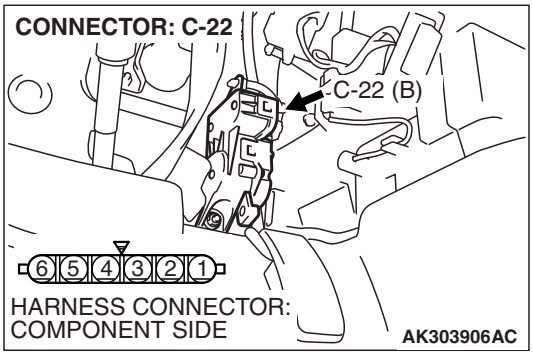
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is DTC P2138 set?

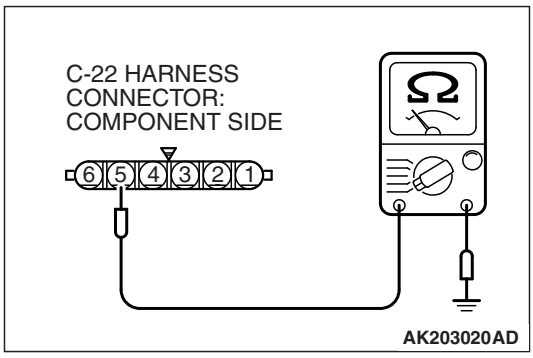
YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

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.00-14.

STEP 7. Check the continuity at accelerator pedal position sensor harness side connector C-22.



(1) Disconnect the connector C-22 and measure at the harness side.

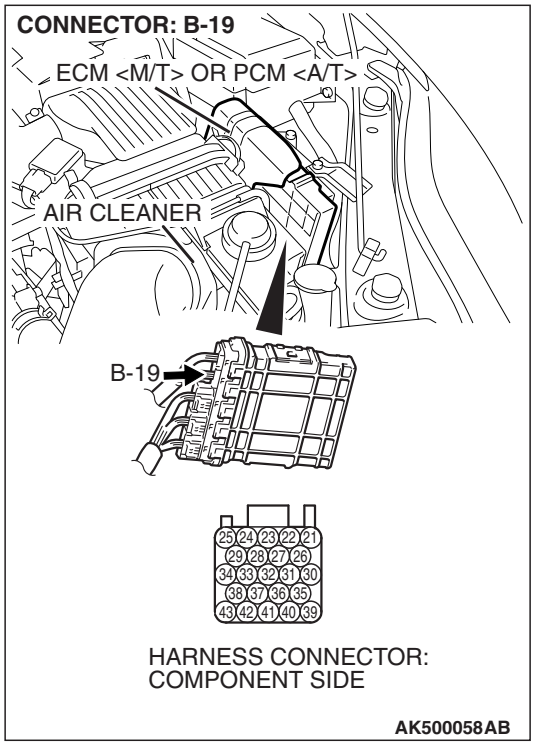


(2) Measure the continuity between terminal No. 5 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 11.

NO : Go to Step 8.

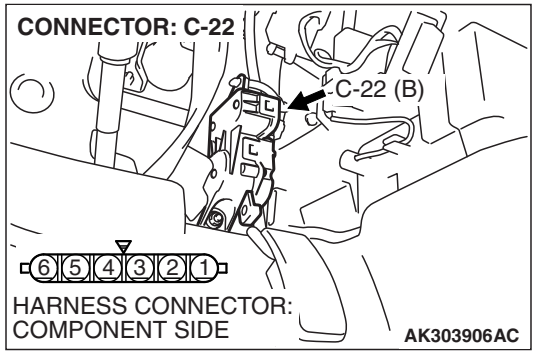


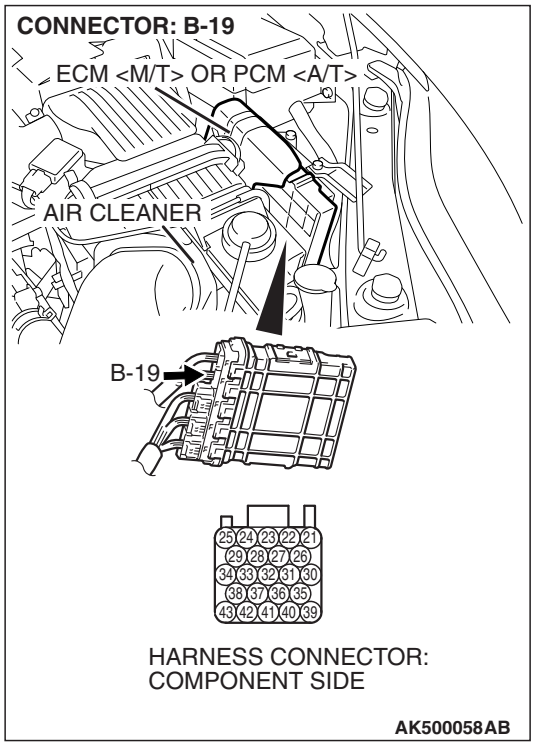
STEP 8. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.



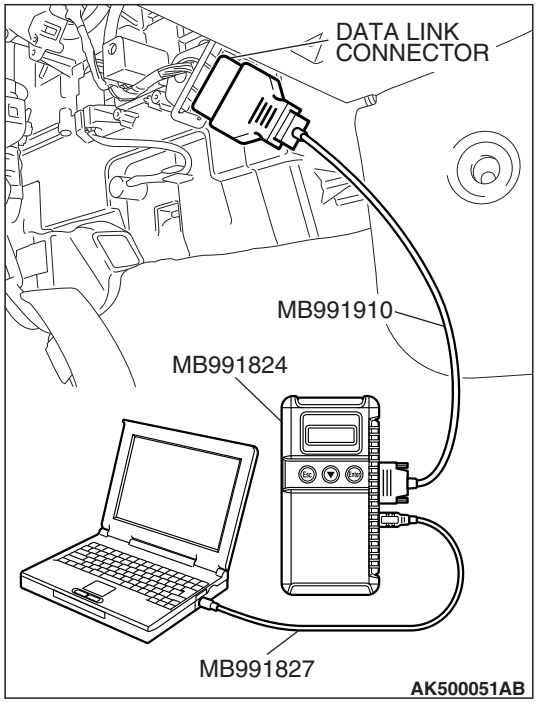


STEP 9. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 5) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 22).

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).

⚠ CAUTION

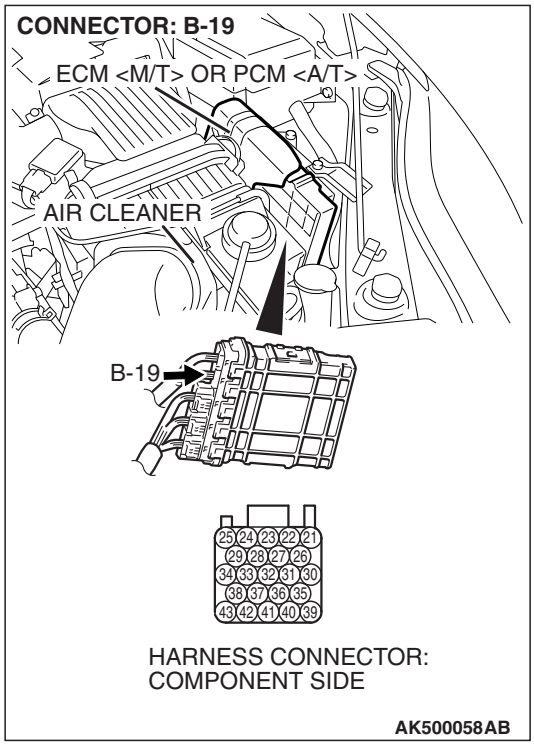
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

(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 P2138 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. 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.00-14.

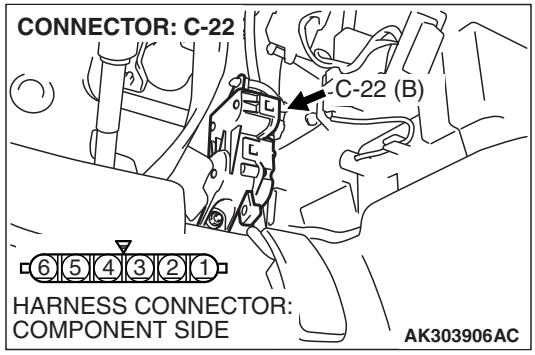


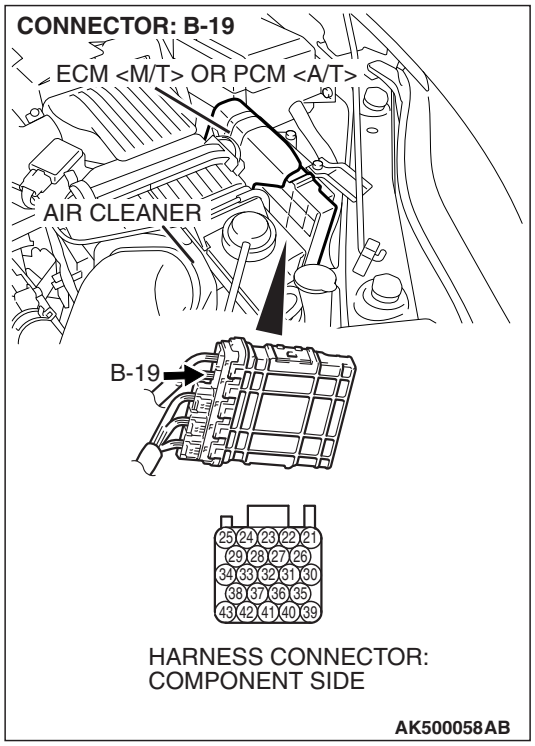
STEP 11. Check harness connector B-19 at ECM <M/T> or PCM <A/T> for damage.

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.



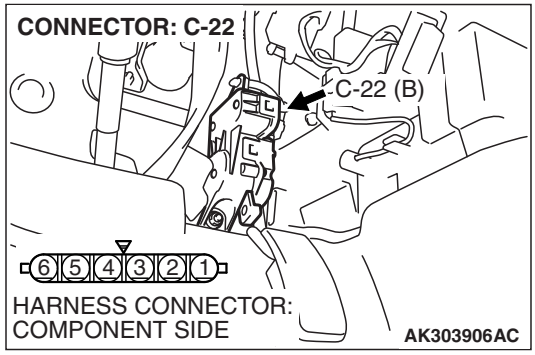


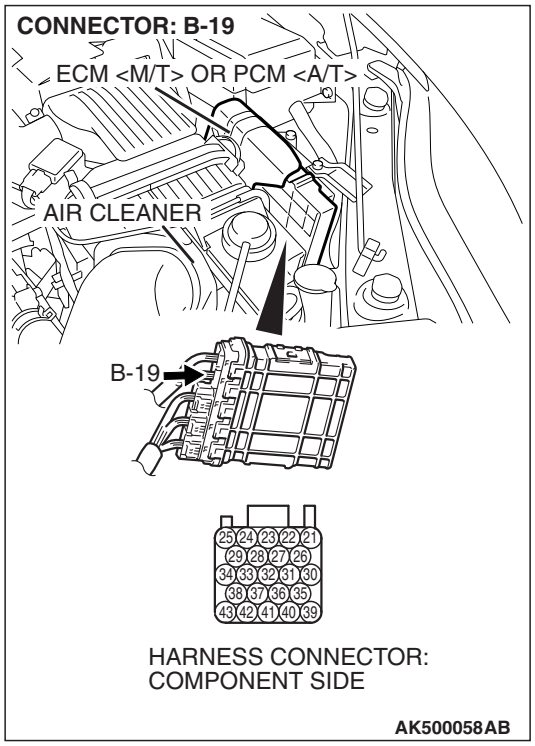
STEP 12. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 30).

Q: Is the harness wire in good condition?

YES : Go to Step 13.

NO : Repair it. Then go to Step 17.



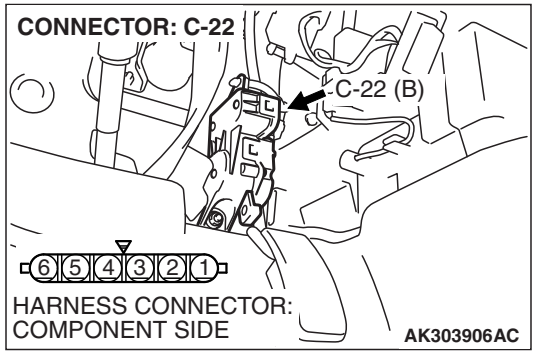


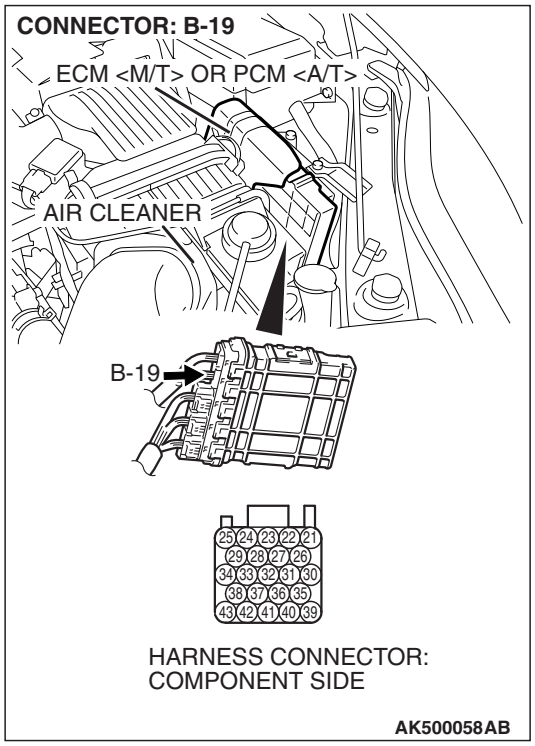
STEP 13. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 21).

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-22 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 26).

Q: Is the harness wire in good condition?

YES : Go to Step 15.

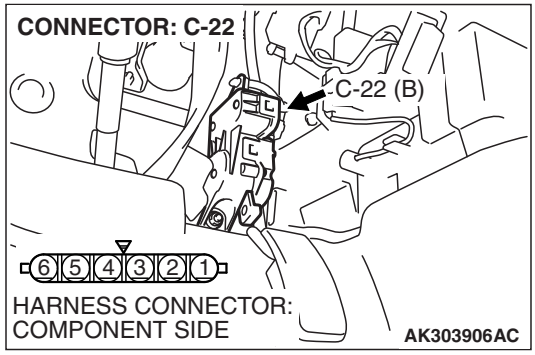
NO : Repair it. Then go to Step 17.

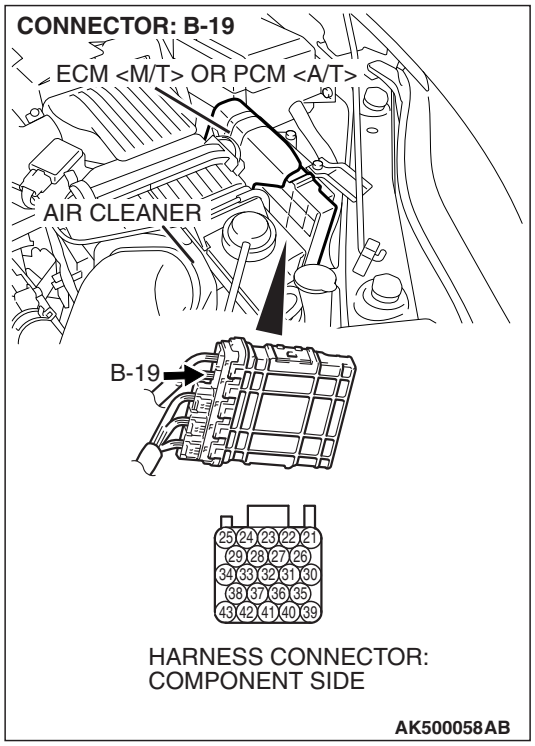
STEP 15. Check for harness damage between accelerator pedal position sensor connector C-22 (terminal No. 6) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 27).

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair it. Then go to Step 17.





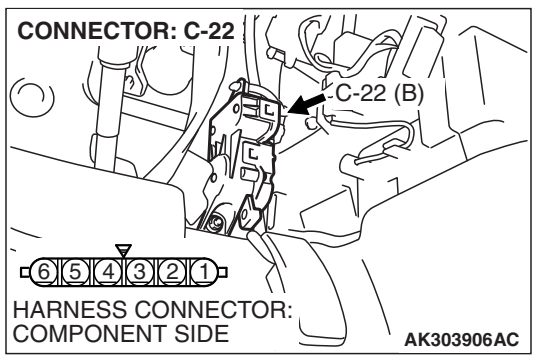
STEP 16. Replace the accelerator pedal position sensor.

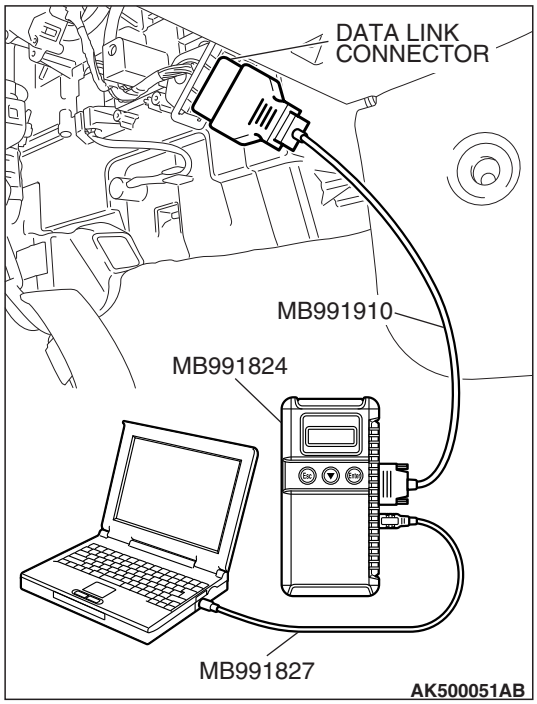
(1) Replace the accelerator pedal position sensor.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P2138 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 17.

NO : The inspection is complete.





STEP 17. 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 P2138 set?

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

DTC P2195: Heated Oxygen Sensor Inactive (bank 1, sensor 1)

⚠ CAUTION
If DTC P2195 has been set, TCL related DTC U1120 is also set. After P2195 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The ECM <M/T> or the PCM <A/T> effects air/fuel ratio feedback control in accordance with the signals from the right bank heater oxygen sensor (front).
- If the right bank heated oxygen sensor (front) has deteriorated, corrections will be made by the right bank heated oxygen sensor (rear).
- DTC P2195 becomes stored in memory if a failure is detected in the right bank heated oxygen sensor (front).

DESCRIPTIONS OF MONITOR METHODS

Right bank 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)

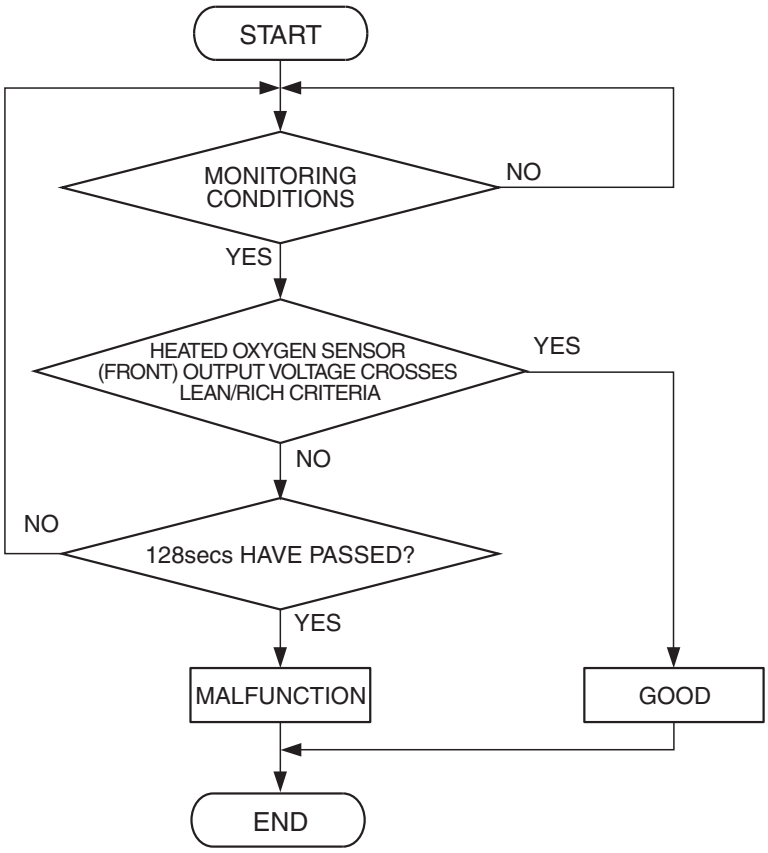
- Heated oxygen sensor (front) monitor
- Misfire monitor

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- 128 seconds or more have passed since the engine starting sequence was completed.
- Engine coolant temperature is 7°C (45°F) or more.
- Under the closed loop air/fuel ratio control.
- Intake air temperature is more than −10°C (14°F)

Judgment Criterion

- Right bank 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-6.

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

- Right bank heated oxygen sensor (front) deteriorated.
- ECM failed. <M/T>
- PCM failed. <A/T>

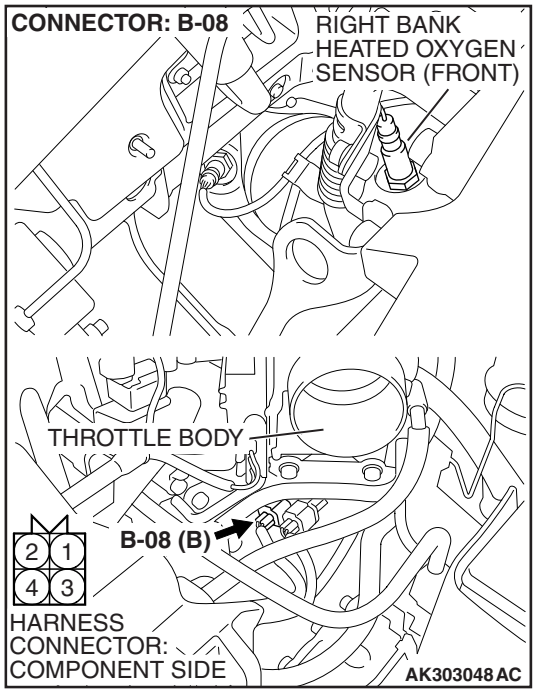
DIAGNOSIS

Required Special Tools:

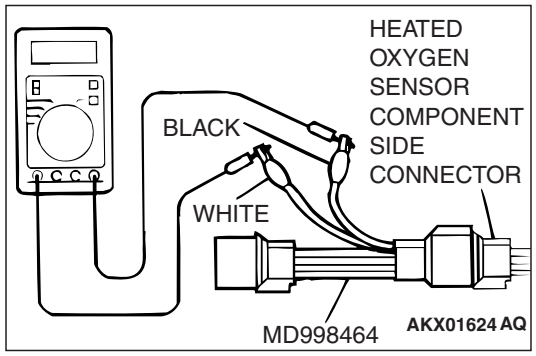
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MD998464: Test Harness

TSB Revision

STEP 1. Check the right bank heated oxygen sensor (front).



(1) Disconnect the right bank heated oxygen sensor (front) connector B-08 and connect test harness special tool, MD998464, to the connector on the right bank 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 2,500 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 right bank 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 through 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 voltage between 0.6 and 1.0 volt?

YES : Go to Step 2.
NO : Replace the right bank heated oxygen sensor (front). Then go to Step 3.

STEP 2. 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-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P2195 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 3. 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-6.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P2195 set?

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

DTC P2197: Heated Oxygen Sensor Inactive (bank 2, sensor 1)

⚠ CAUTION
If DTC P2197 has been set, TCL related DTC U1120 is also set. After P2197 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The ECM <M/T> or the PCM <A/T> effects air/fuel ratio feedback control in accordance with the signals from the left bank heater oxygen sensor (front).
- If the left bank heated oxygen sensor (front) has deteriorated, corrections will be made by the left bank heated oxygen sensor (rear).
- DTC P2197 becomes stored in memory if a failure is detected in the left bank heated oxygen sensor (front).

DESCRIPTIONS OF MONITOR METHODS

Left bank 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)

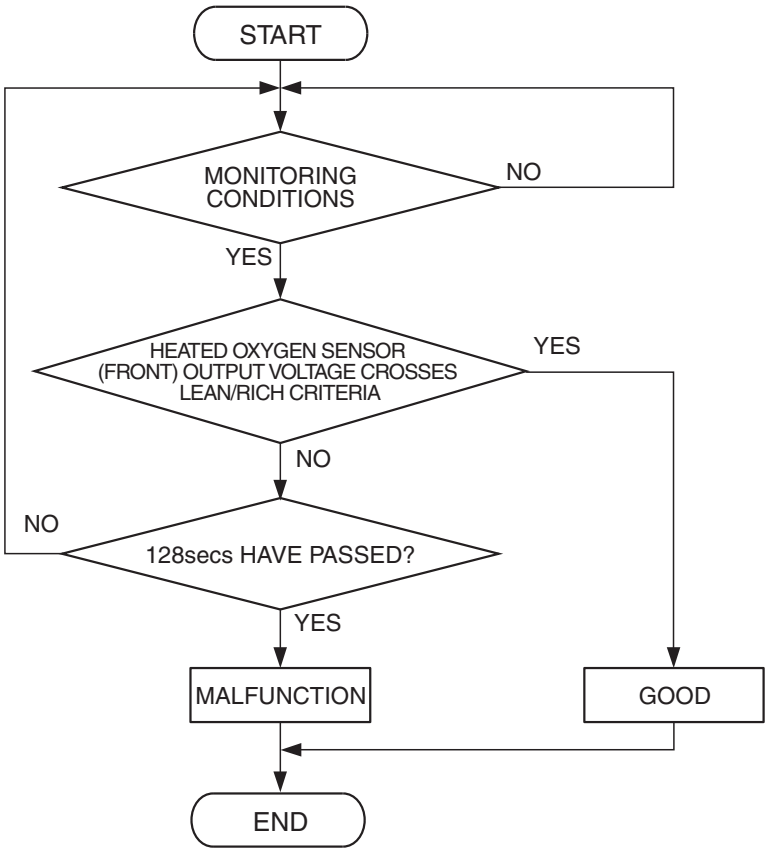
- Heated oxygen sensor (front) monitor
- Misfire monitor

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- 128 seconds or more have passed since the engine starting sequence was completed.
- Engine coolant temperature is 7°C (45°F) or more.
- Under the closed loop air/fuel ratio control.
- Intake air temperature is more than −10°C (14°F)

Judgment Criterion

- Left bank 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-6.

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

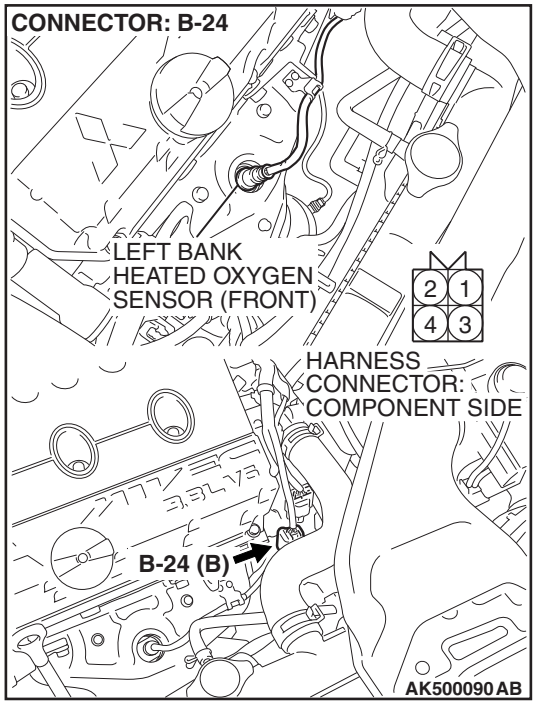
- Left bank heated oxygen sensor (front) deteriorated.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

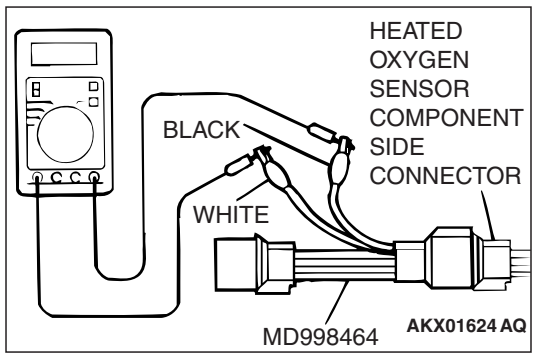
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MD998464: Test Harness

TSB Revision



STEP 1. Check the left bank heated oxygen sensor (front).

(1) Disconnect the left bank heated oxygen sensor (front) connector B-24 and connect test harness special tool, MD998464, to the connector on the left bank 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 2,500 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 left bank 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 through 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 voltage between 0.6 and 1.0 volt?

YES : Go to Step 2.
NO : Replace the left bank heated oxygen sensor (front). Then go to Step 3.

STEP 2. 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-6.

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

Q: Is DTC P2197 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 3.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 3. 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-6.

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

Q: Is DTC P2197 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P2228: Barometric Pressure Circuit Low Input

⚠ CAUTION

If DTC P2228 has been set, TCL related DTC U1120 is also set. After P2228 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM <M/T> or the PCM <A/T> 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)

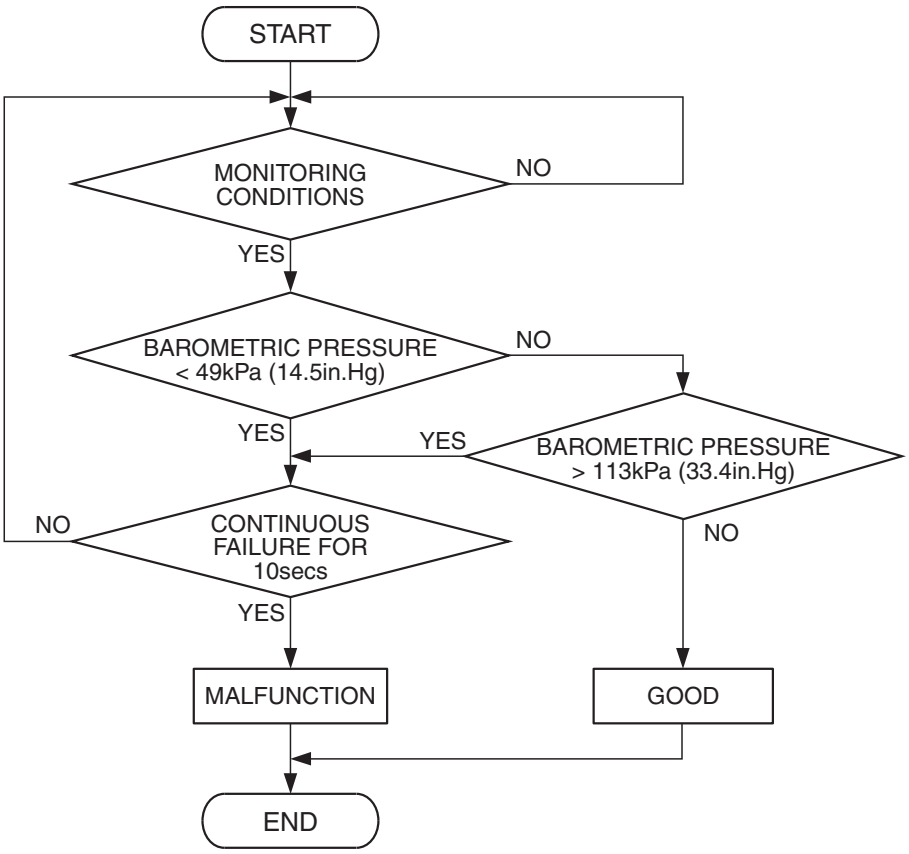
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- 2 seconds or more have passed since the engine starting sequence was completed.
- Battery positive voltage is higher than 8 volts.

Judgement Criterion

- Barometric pressure sensor output signal has continued to be 49 kPa (14.5 in.Hg) or lower (approximately 15,000 feet above sea level) for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

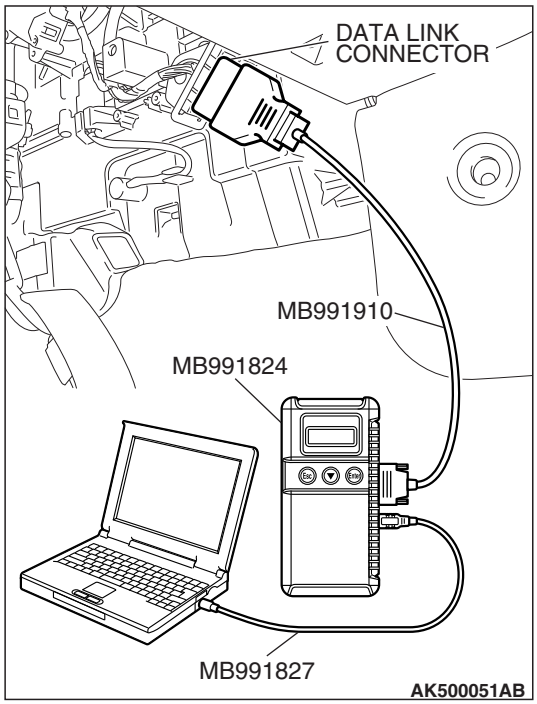
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

TSB Revision



STEP 1. 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-6.
(4) Check the diagnosis trouble code (DTC).

Q: Is DTC P02228 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

DTC P2229: Barometric Pressure Circuit High Input

⚠ CAUTION
If DTC P2229 has been set, TCL related DTC U1120 is also set. After P2229 has been diagnosed, don't forget to erase DTC U1120.

TECHNICAL DESCRIPTION

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM <M/T> or the PCM <A/T> 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

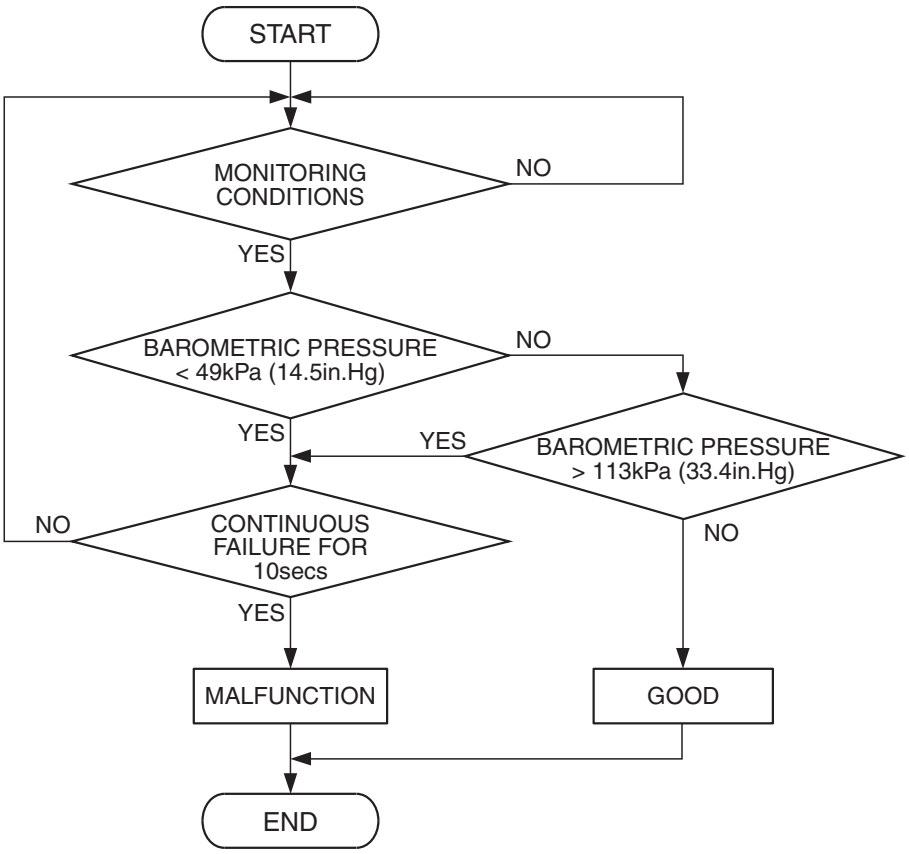
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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



AK401684

Check Conditions

- 2 seconds or more have passed since the engine starting sequence was completed.
- Battery positive voltage is higher than 8 volts.

Judgement Criterion

- Barometric pressure sensor output signal has continued to be 113 kPa (33.4 in.Hg) or higher (approximately 4,000 ft below sea level) for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.

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

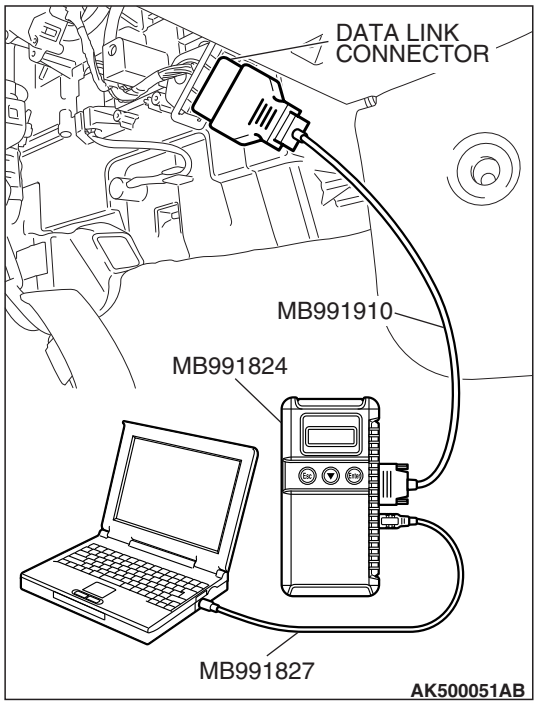
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

TSB Revision



STEP 1. 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.

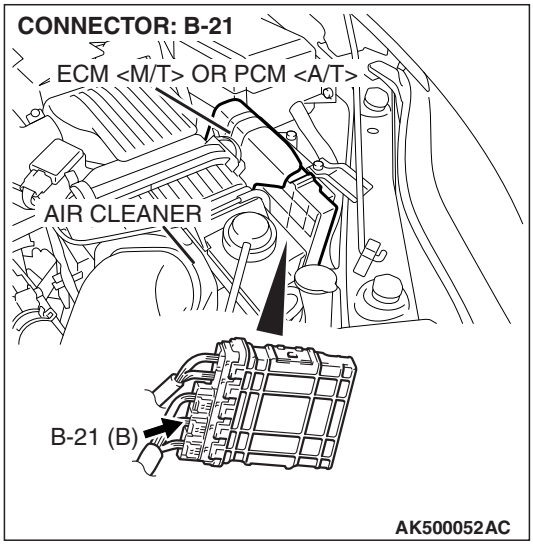
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 23 P.13B-6.
(4) Check the diagnosis trouble code (DTC).

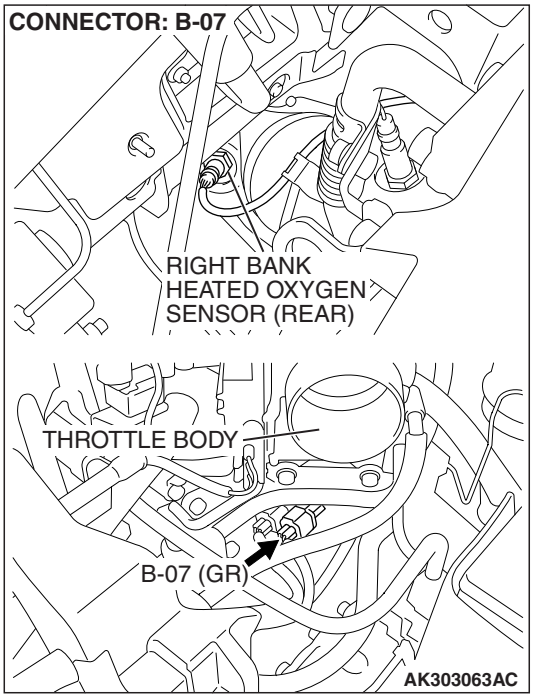
Q: Is DTC P02229 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

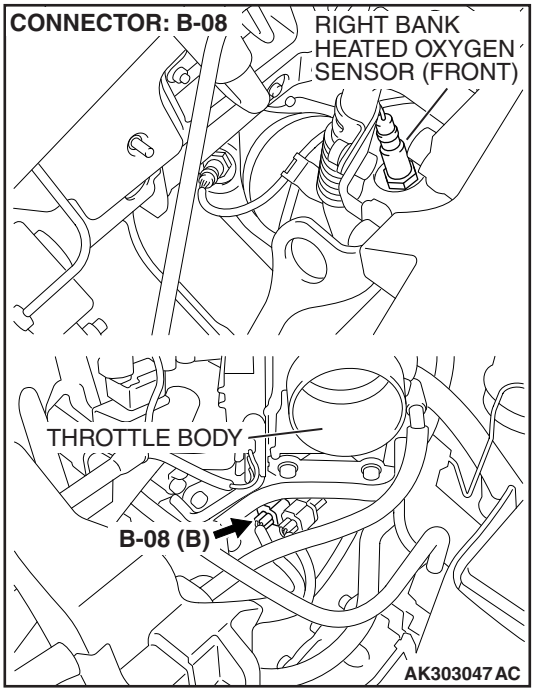
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

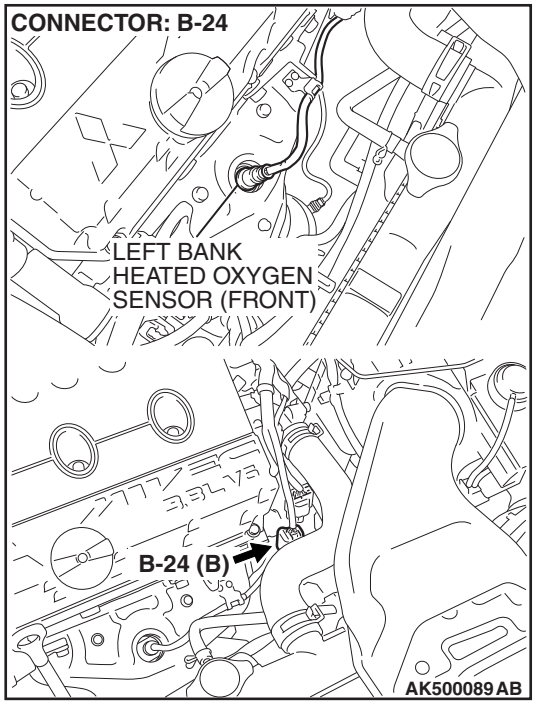
DTC P2252: Heated Oxygen Sensor Offset Circuit Low Voltage

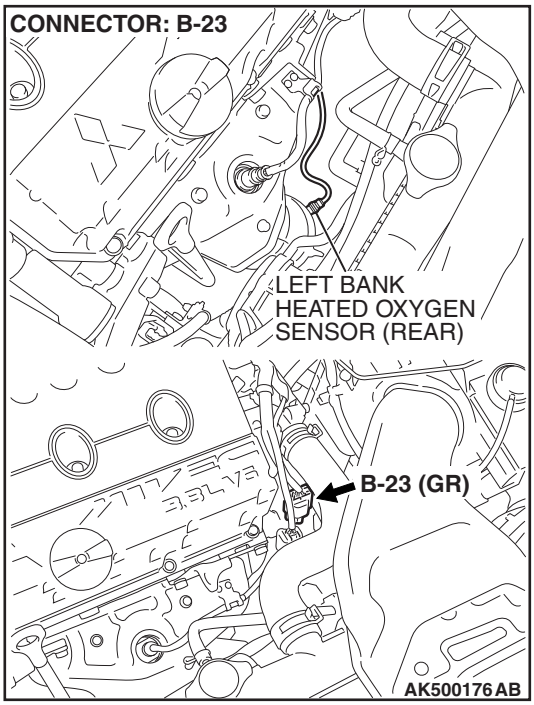




TSB Revision







HEATED OXYGEN SENSOR OFFSET CIRCUIT LOW VOLTAGE CIRCUIT

Refer to DTC P0131 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 1) P.13B-305.
Refer to DTC P0137 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 2) P.13B-343.
Refer to DTC P0151 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) P.13B-373.
Refer to DTC P0157 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 2) P.13B-410.

CIRCUIT OPERATION

Refer to DTC P0131 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 1) P.13B-305.
Refer to DTC P0137 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 2) P.13B-343.
Refer to DTC P0151 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) P.13B-373.
Refer to DTC P0157 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 2) P.13B-410.

TSB Revision

TECHNICAL DESCRIPTION

- The ECM <M/T> or the PCM <A/T> applies an offset voltage of 0.5 volt to the heated oxygen sensor.
- The ECM <M/T> or the PCM <A/T> checks for heated oxygen sensor offset voltage.

DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is under specified range.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

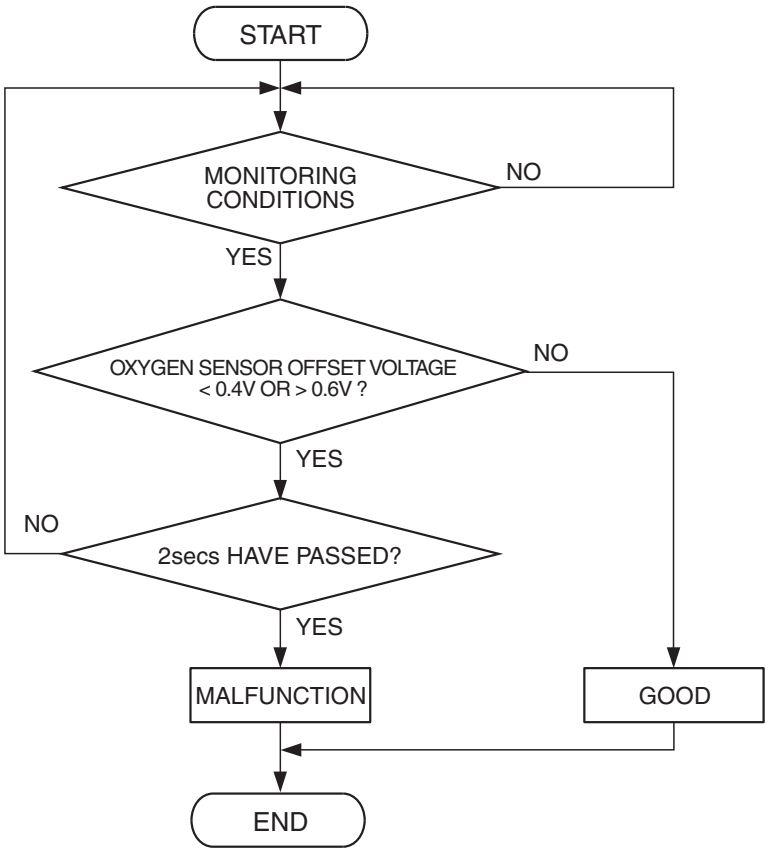
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITION

Logic Flow Chart



AK802510

Check Condition

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

Judgement Criterion

- Heated oxygen sensor offset voltage is lower than 0.4 volt for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 22 P.13B-6.

TSB Revision

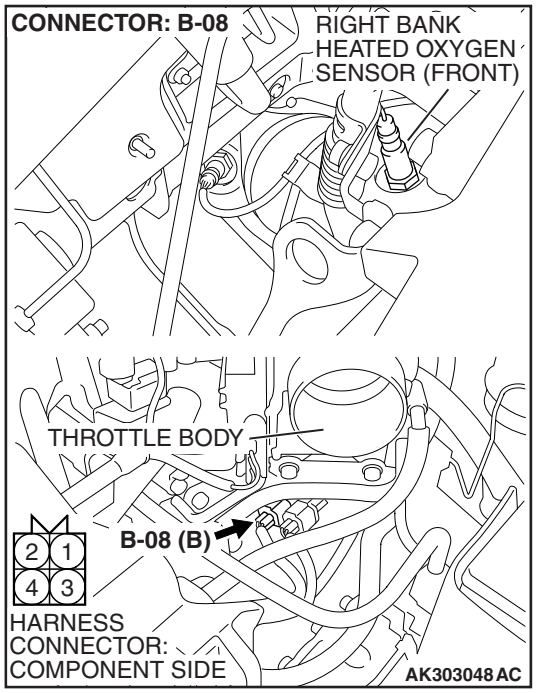
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Right bank heated oxygen sensor (front) failed.
- Right bank heated oxygen sensor (rear) failed.
- Left bank heated oxygen sensor (front) failed.
- Left bank heated oxygen sensor (rear) failed.
- Shorted right bank heated oxygen sensor (front) circuit or connector damage.
- Shorted right bank heated oxygen sensor (rear) circuit or connector damage.
- Shorted left bank heated oxygen sensor (front) circuit or connector damage.
- Shorted left bank heated oxygen sensor (rear) circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

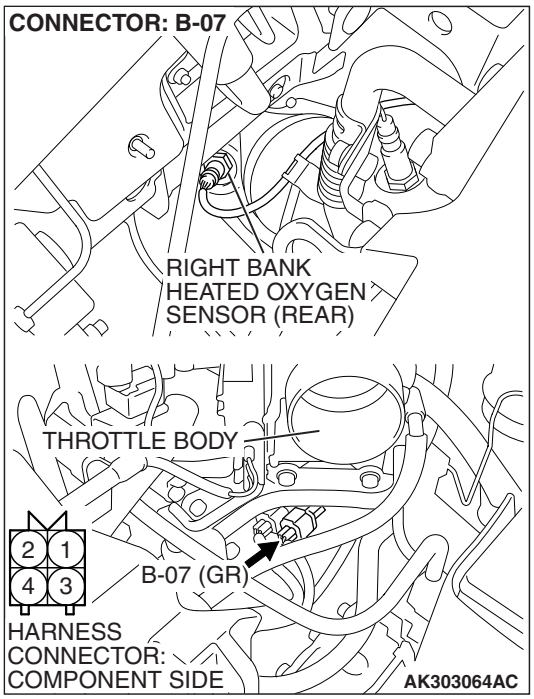


STEP 1. Check harness connector B-08 at right bank heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2 .

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

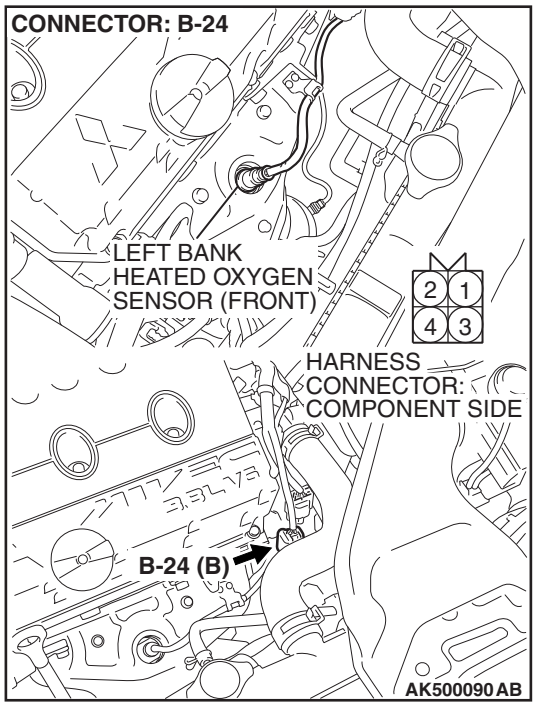


STEP 2. Check harness connector B-07 at right bank heated oxygen sensor (rear) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3 .

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

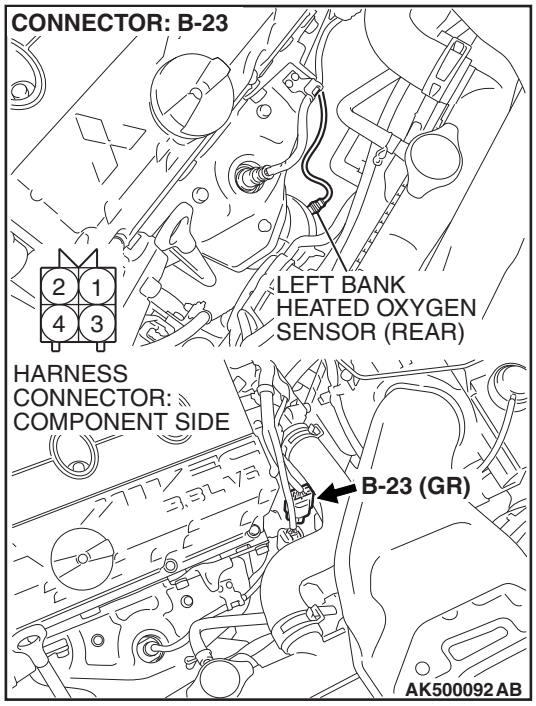


STEP 3. Check harness connector B-24 at left bank heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4 .

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



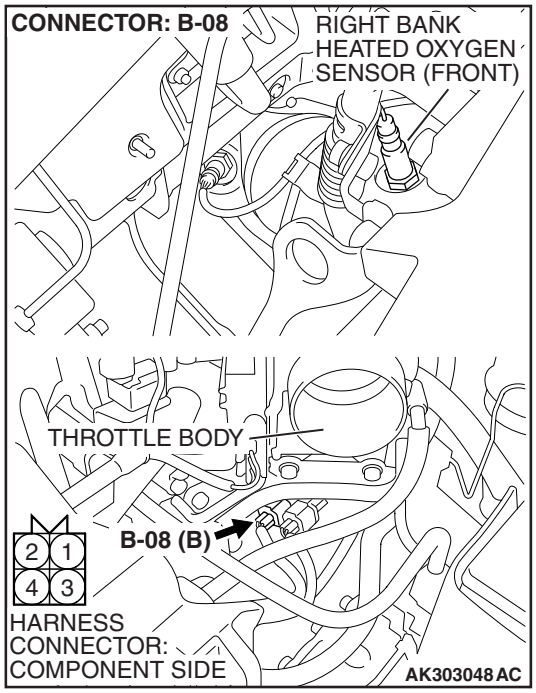
STEP 4. Check harness connector B-23 at left bank heated oxygen sensor (rear) for damage.

Q: Is the harness connector in good condition?

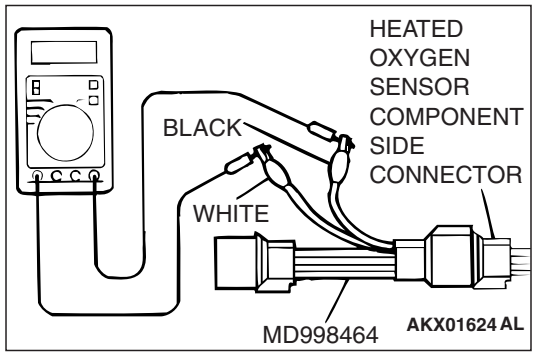
YES : Go to Step 5 .

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

STEP 5. Check the right bank heated oxygen sensor (front).



(1) Disconnect the right bank heated oxygen sensor (front) connector B-08 and connect test harness special tool MD998464 to the connector on the right bank 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 right bank heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

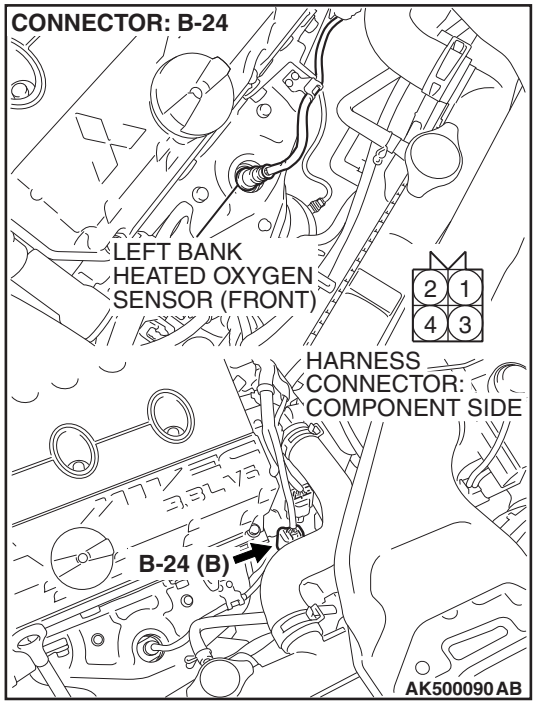
⚠ CAUTION

- **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.

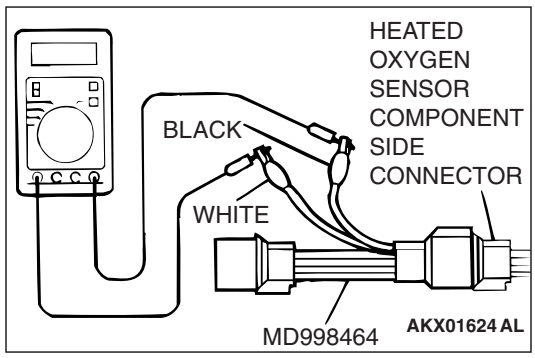
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 6 .
NO : Replace the right bank heated oxygen sensor (front). Then go to Step 22 .



STEP 6. Check the left bank heated oxygen sensor (front).

(1) Disconnect the left bank heated oxygen sensor (front) connector B-24 and connect test harness special tool MD998464 to the connector on the left bank 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 left bank heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

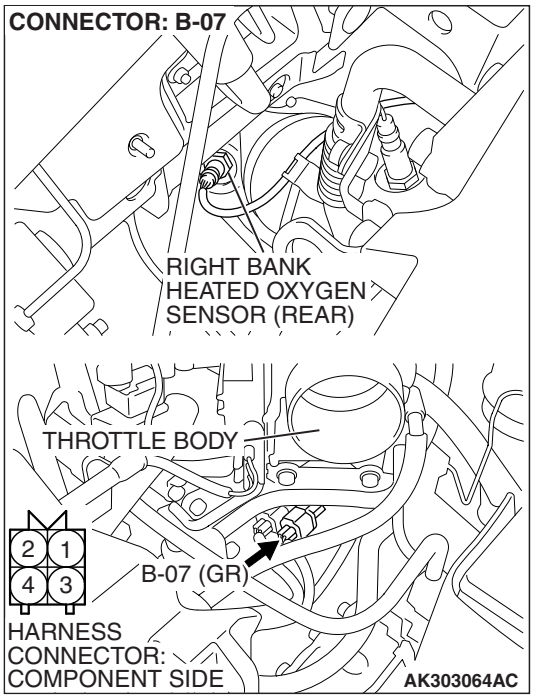
⚠ CAUTION

- **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.

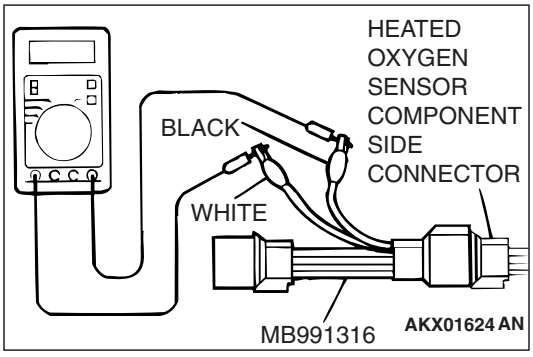
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 7 .
NO : Replace the left bank heated oxygen sensor (front). Then go to Step 22 .



STEP 7. Check the right bank heated oxygen sensor (rear).

(1) Disconnect the right bank heated oxygen sensor (rear) connector B-07 and connect test harness special tool MB991316 to the connector on the right bank heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



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

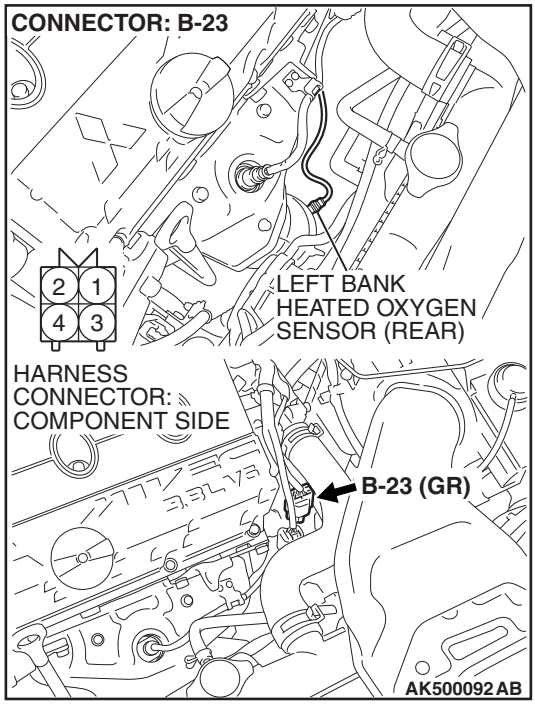
Standard value: 0.6 – 1.0 V

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

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

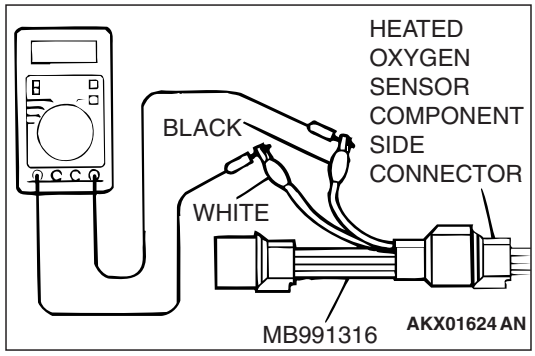
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 8 .
NO : Replace the right bank heated oxygen sensor (rear). Then go to Step 22 .



STEP 8. Check the left bank heated oxygen sensor (rear).

(1) Disconnect the left bank heated oxygen sensor (rear) connector B-23 and connect test harness special tool MB991316 to the connector on the left bank heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



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

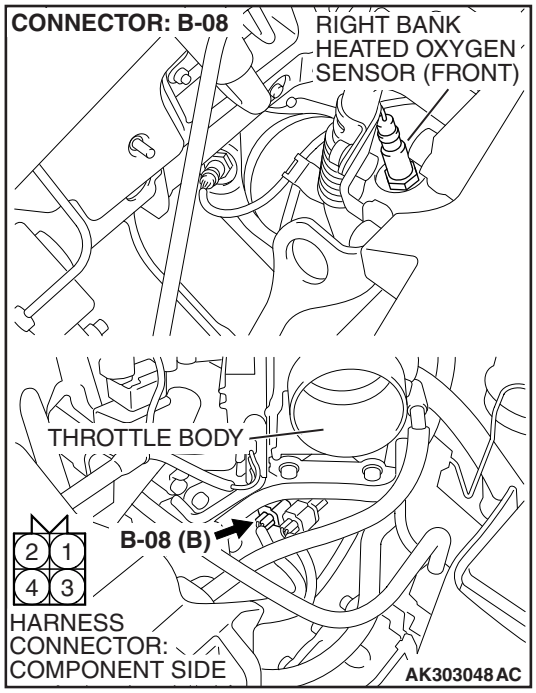
Standard value: 0.6 – 1.0 V

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

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

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

YES : Go to Step 9 .
NO : Replace the left bank heated oxygen sensor (rear). Then go to Step 22 .



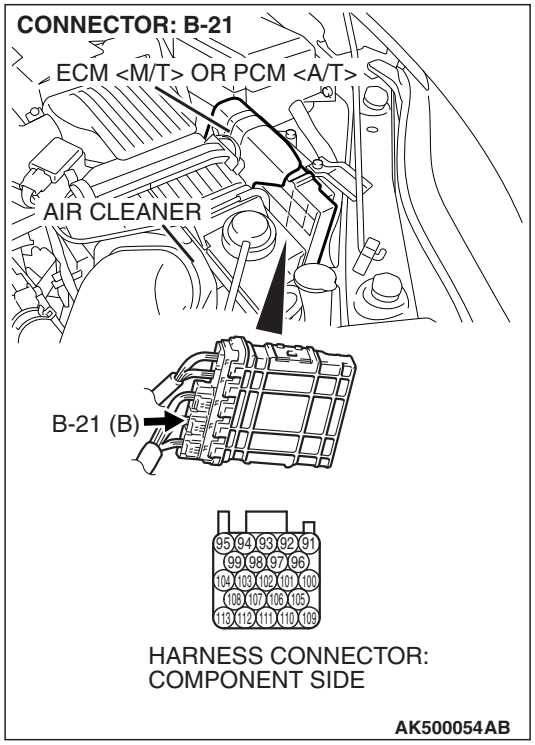
STEP 9. Measure the sensor offset voltage at right bank heated oxygen sensor (front) harness side connector B-08.

(1) Disconnect the connector B-08 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

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



STEP 10. Check harness connector B-21 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

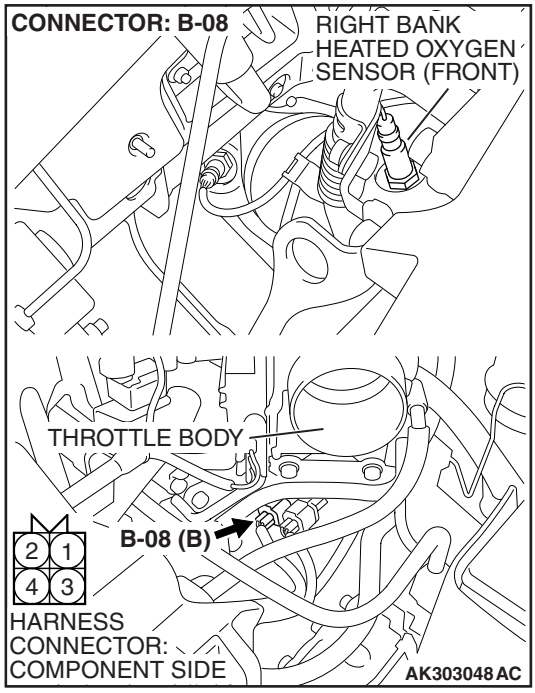
YES : Go to Step 11 .
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22 .

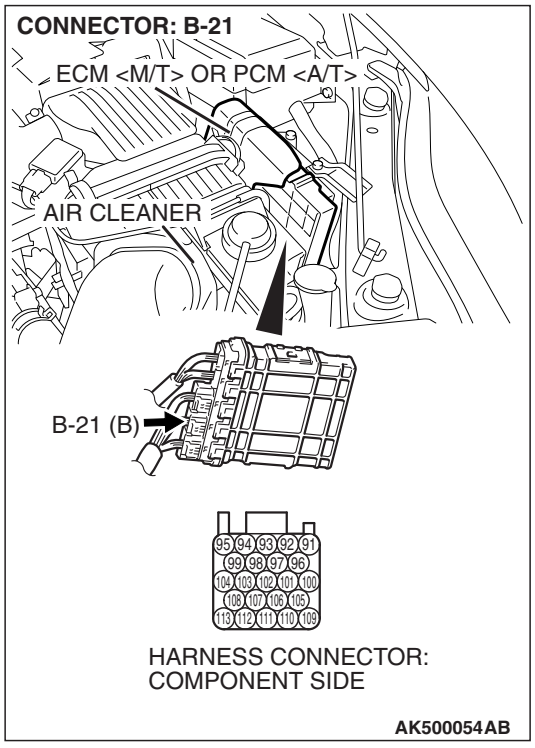
STEP 11. Check for short circuit to ground between right bank heated oxygen sensor (front) connector B-08 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 92).

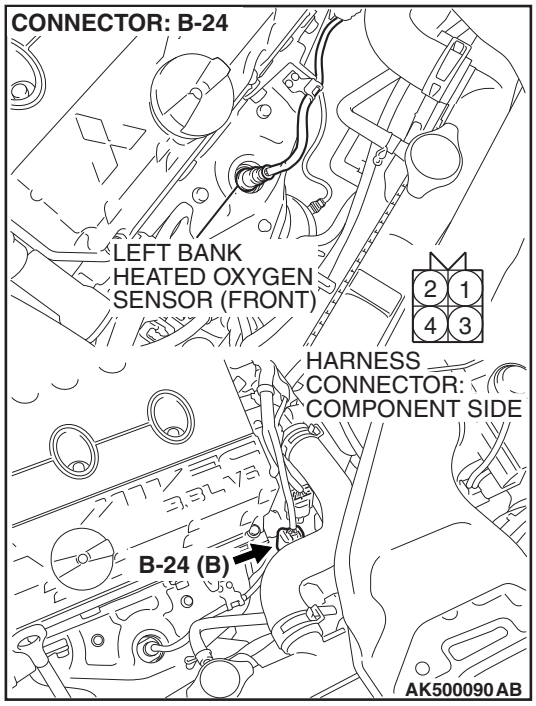
Q: Is the harness wire in good condition?

YES : Go to Step 21 .

NO : Repair it. Then go to Step 22 .







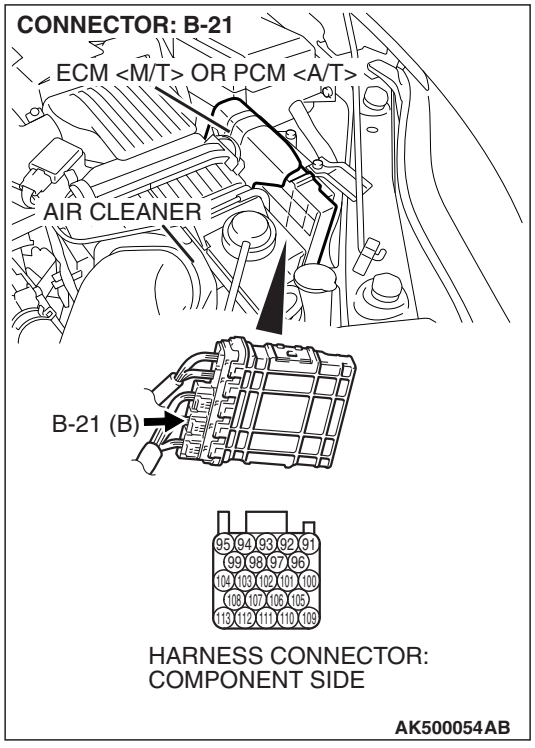
STEP 12. Measure the sensor offset voltage at left bank heated oxygen sensor (front) harness side connector B-24.

(1) Disconnect the connector B-24 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

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



STEP 13. Check harness connector B-21 at ECM<M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

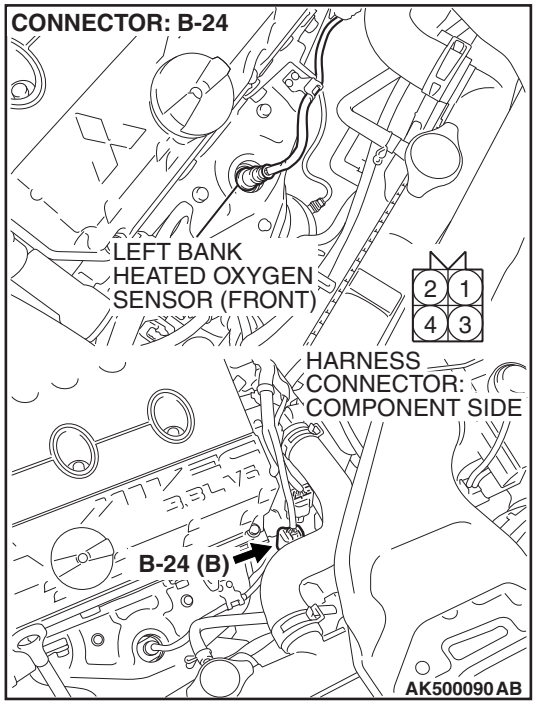
YES : Go to Step 14 .
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22 .

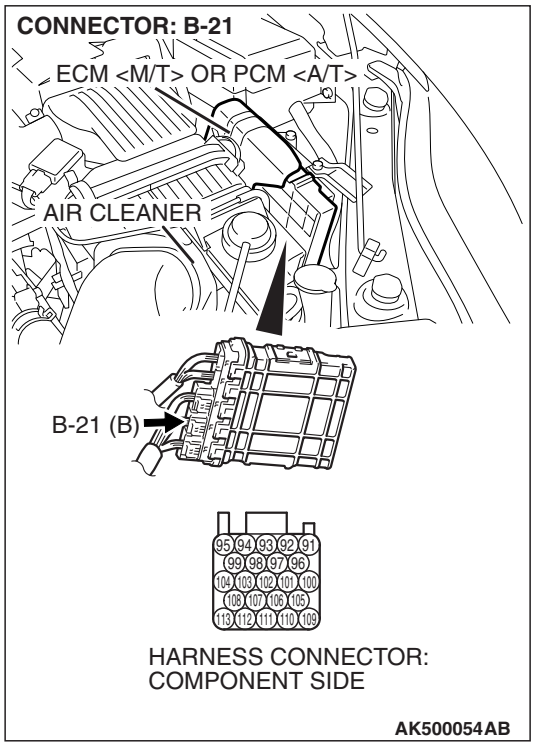
STEP 14. Check for short circuit to ground between left bank heated oxygen sensor (front) connector B-24 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 91).

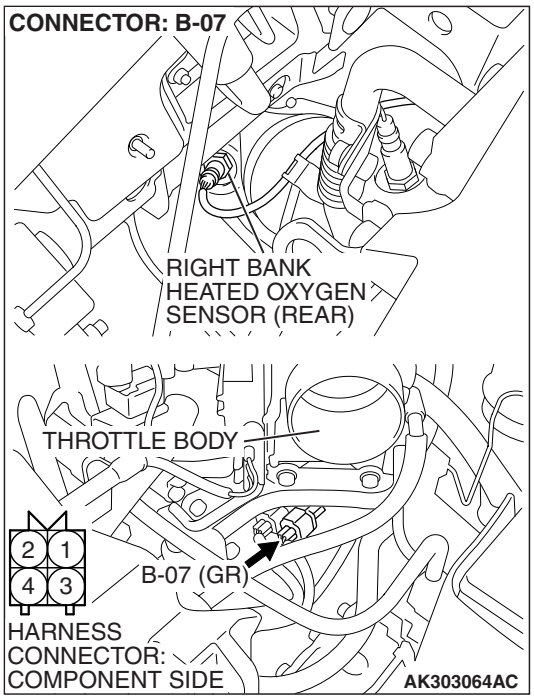
Q: Is the harness wire in good condition?

YES : Go to Step 21 .

NO : Repair it. Then go to Step 22 .







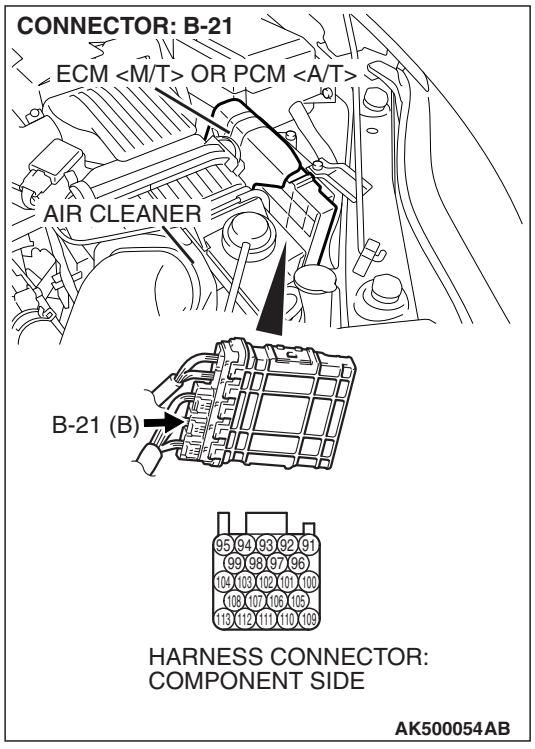
STEP 15. Measure the sensor offset voltage at right bank heated oxygen sensor (rear) harness side connector B-07.

(1) Disconnect the connector B-07 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

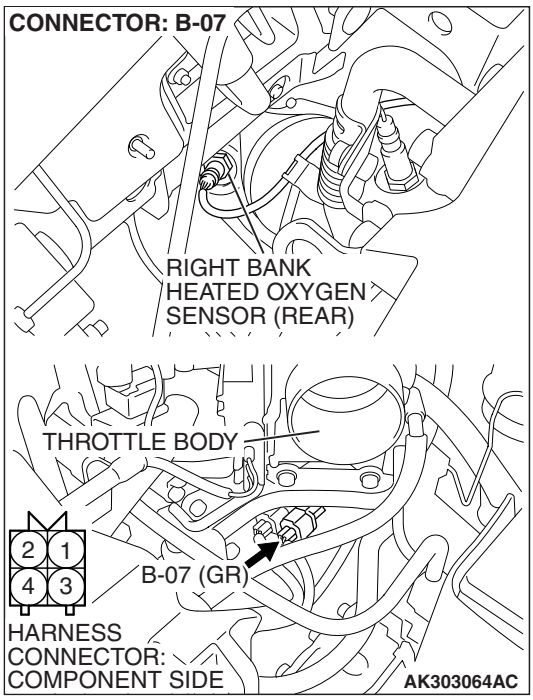
YES : Go to Step 18 .
NO : Go to Step 16 .

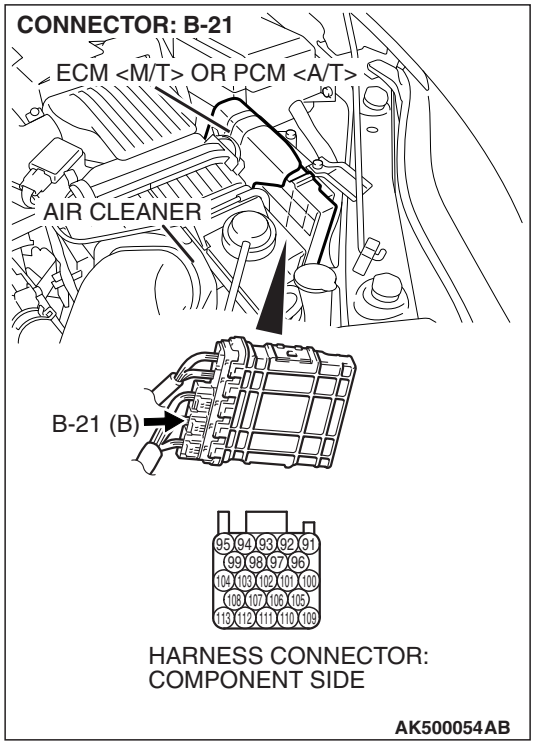


STEP 16. Check harness connector B-21 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17 .
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22 .



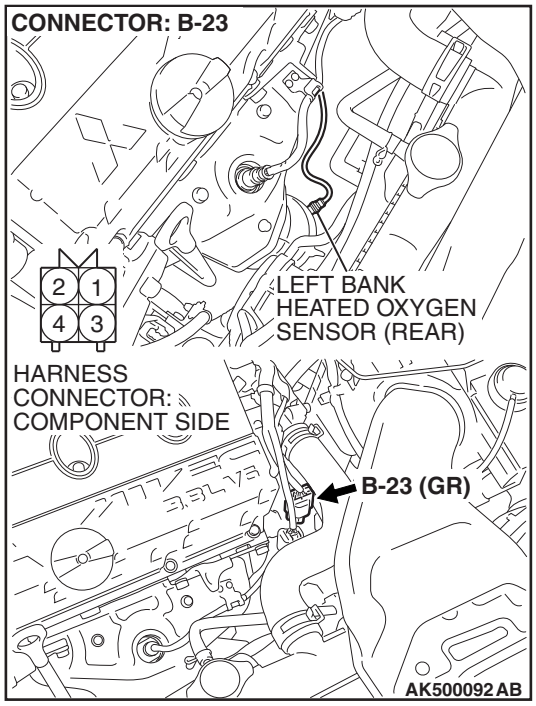


STEP 17. Check for short circuit to ground between right bank heated oxygen sensor (rear) connector B-07 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 97).

Q: Is the harness wire in good condition?

YES : Go to Step 21 .

NO : Repair it. Then go to Step 22 .



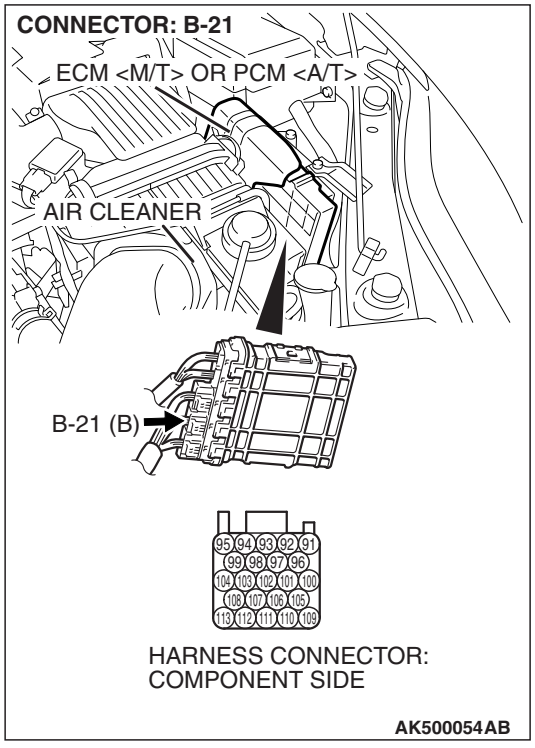
STEP 18. Measure the sensor offset voltage at left bank heated oxygen sensor (rear) harness side connector B-23.

(1) Disconnect the connector B-23 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

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



STEP 19. Check harness connector B-21 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

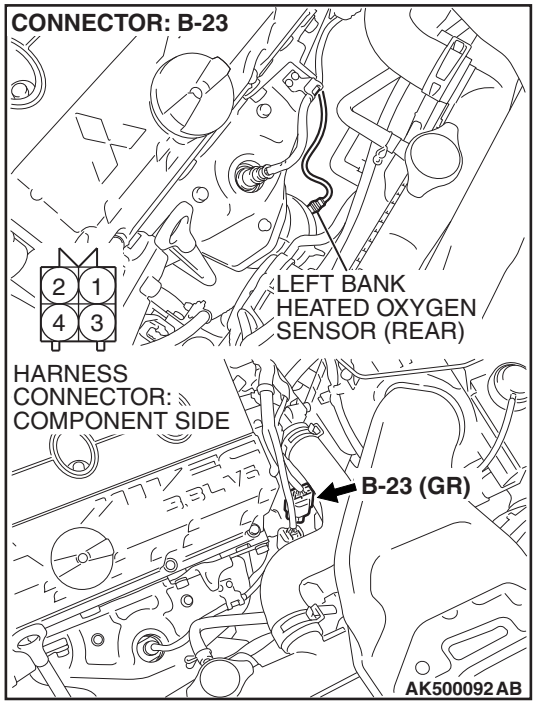
YES : Go to Step 20 .
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22 .

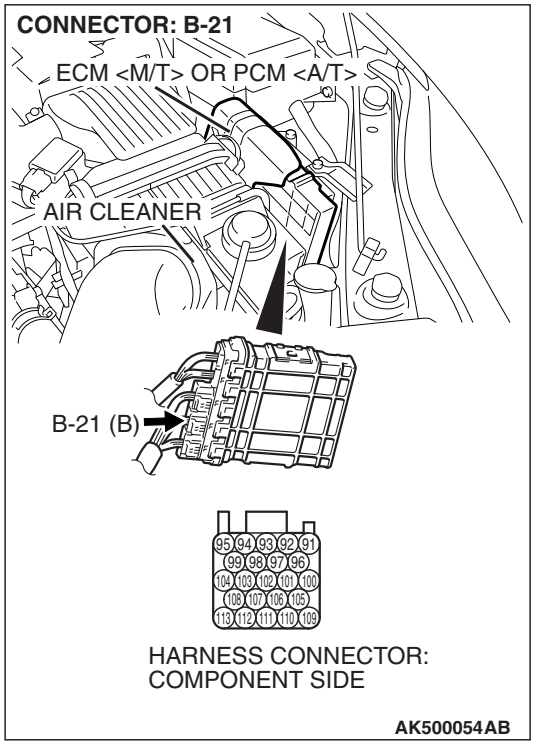
STEP 20. Check for short circuit to ground between left bank heated oxygen sensor (rear) connector B-23 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 96).

Q: Is the harness wire in good condition?

YES : Go to Step 21 .

NO : Repair it. Then go to Step 22 .





STEP 21. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function - OBD-II Drive Cycle Pattern 22 P.13B-6.

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

Q: Is DTC P2252 set?

YES : Replace the ECM <M/T> or the PCM <A/T> (Refer to, Removal and Installation P.13B-1291). Then go to Step 22 .

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 22. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 22 P.13B-6.

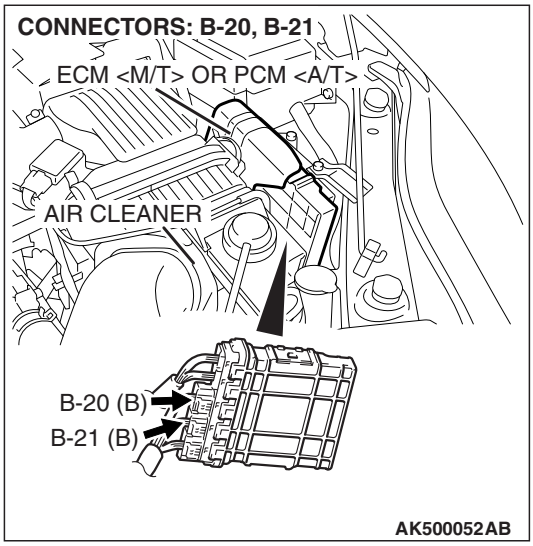
(2) Check the diagnostic trouble code (DTC).

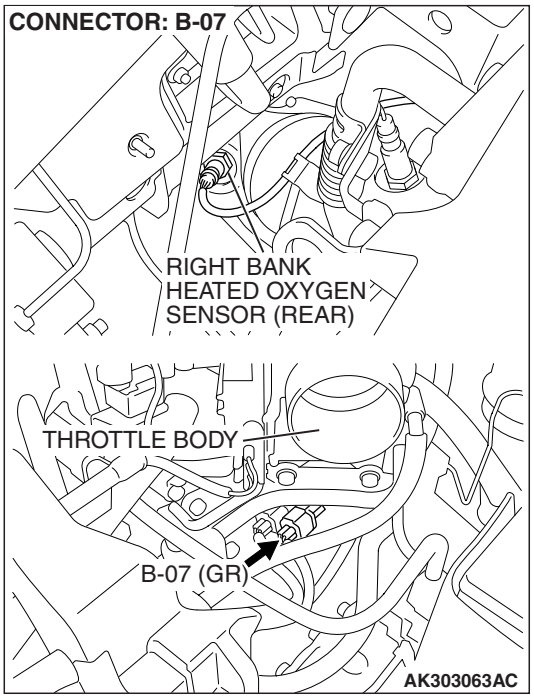
Q: Is DTC P2252 set?

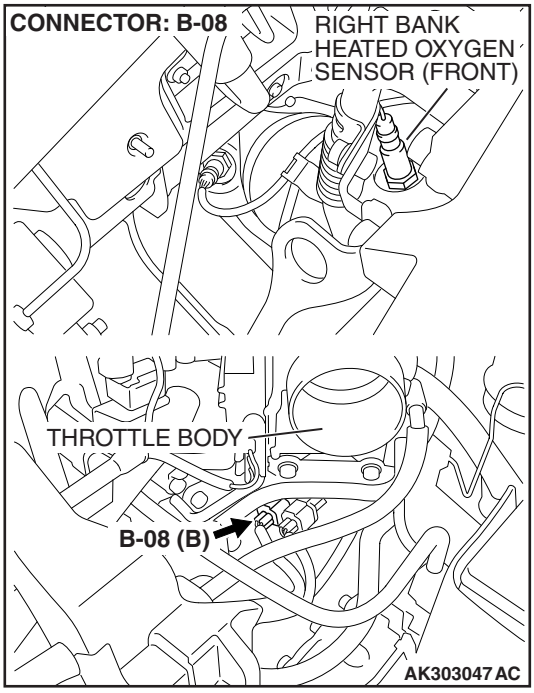
YES : Retry the troubleshooting.

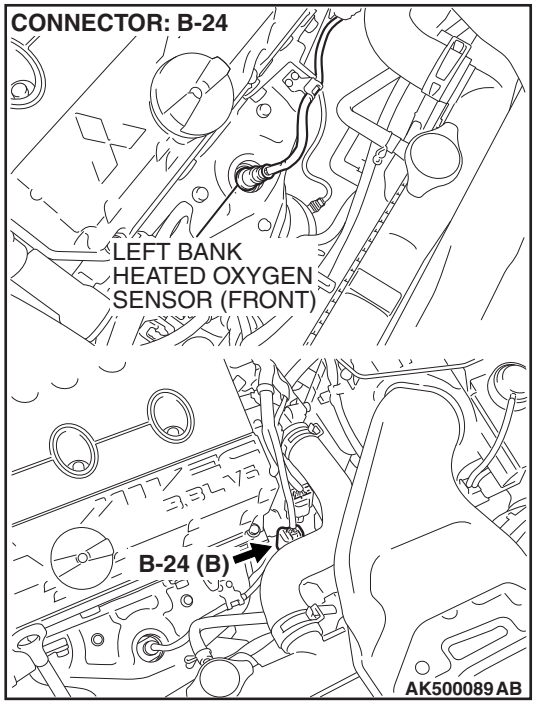
NO : The inspection is complete.

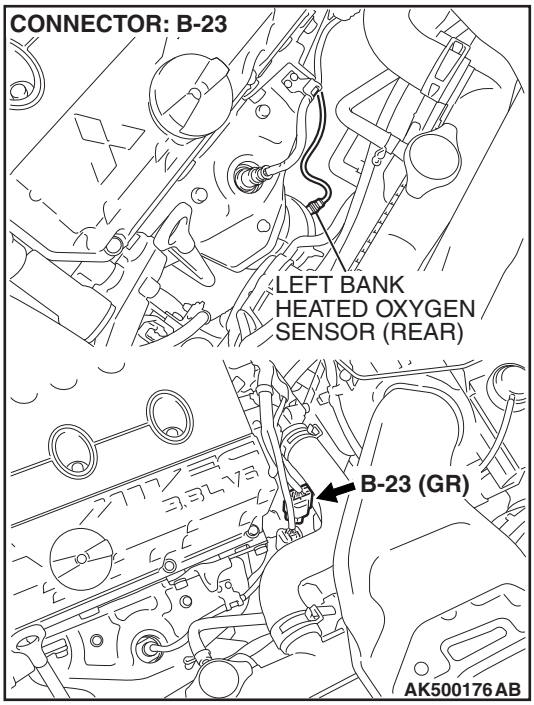
DTC P2253: Heated Oxygen Sensor Offset Circuit High Voltage











HEATED OXYGEN SENSOR OFFSET CIRCUIT LOW VOLTAGE CIRCUIT

Refer to DTC P0131 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 1) P.13B-305.
Refer to DTC P0137 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 2) P.13B-343.
Refer to DTC P0151 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) P.13B-373.
Refer to DTC P0157 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 2) P.13B-410.

CIRCUIT OPERATION

Refer to DTC P0131 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 1) P.13B-305.
Refer to DTC P0137 – Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 2) P.13B-343.
Refer to DTC P0151 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) P.13B-373.
Refer to DTC P0157 – Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 2) P.13B-410.

TSB Revision

TECHNICAL DESCRIPTION

- The ECM <M/T> or the PCM <A/T> applies an offset voltage of 0.5 volt to the heated oxygen sensor.
- The ECM <M/T> or the PCM <A/T> check for heated oxygen sensor offset voltage.

DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is under specified range.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

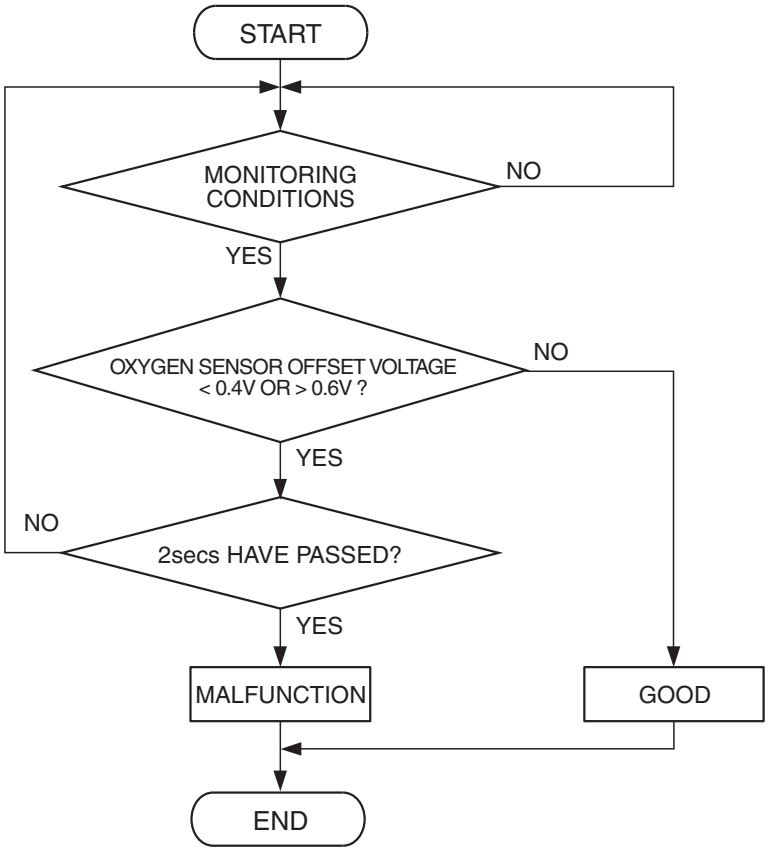
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK802510

Check Condition

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

Judgement Criterion

- Heated oxygen sensor offset voltage is higher than 0.6 volt for 2 seconds.

TSB Revision

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 22 P.13B-6.

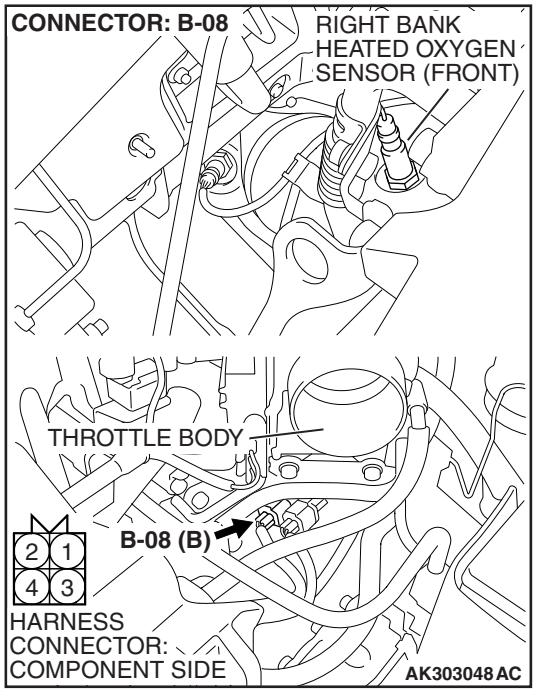
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Right bank heated oxygen sensor (front) failed.
- Right bank heated oxygen sensor (rear) failed.
- Left bank heated oxygen sensor (front) failed.
- Left bank heated oxygen sensor (rear) failed.
- Shorted right bank heated oxygen sensor (front) circuit or connector damage.
- Shorted right bank heated oxygen sensor (rear) circuit or connector damage.
- Shorted left bank heated oxygen sensor (front) circuit or connector damage.
- Shorted left bank heated oxygen sensor (rear) circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991316: Test Harness
- MD998464: Test Harness
- MB991923: Power Plant ECU Check Harness

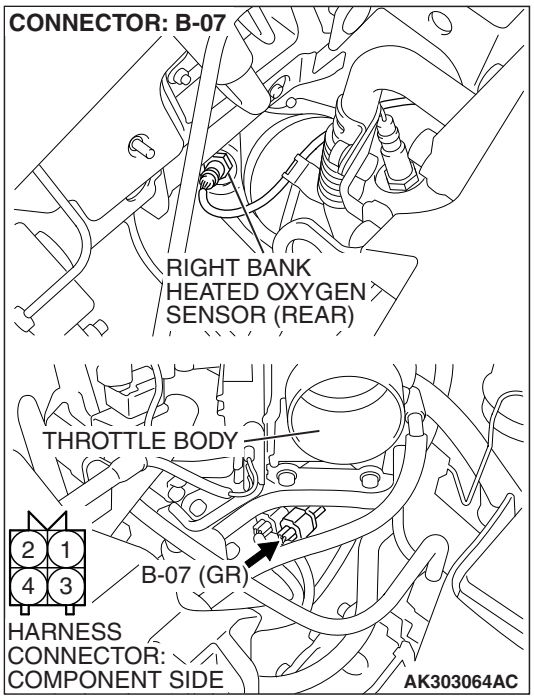


STEP 1. Check harness connector B-08 at right bank heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2 .

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

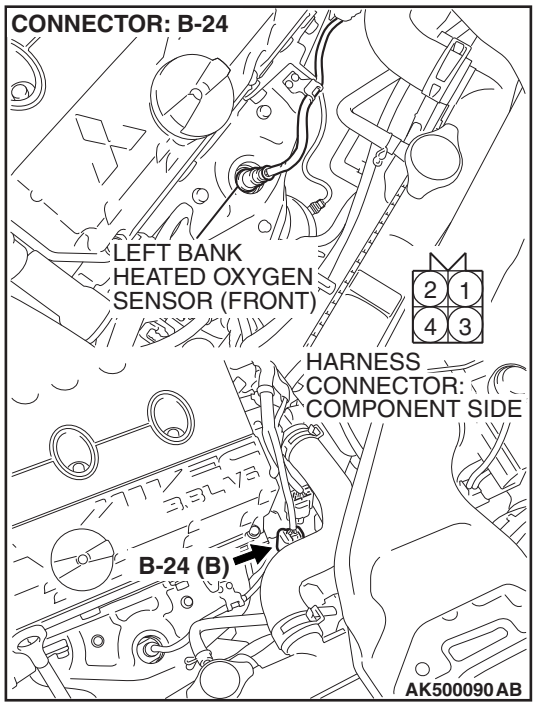


STEP 2. Check harness connector B-07 at right bank heated oxygen sensor (rear) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3 .

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

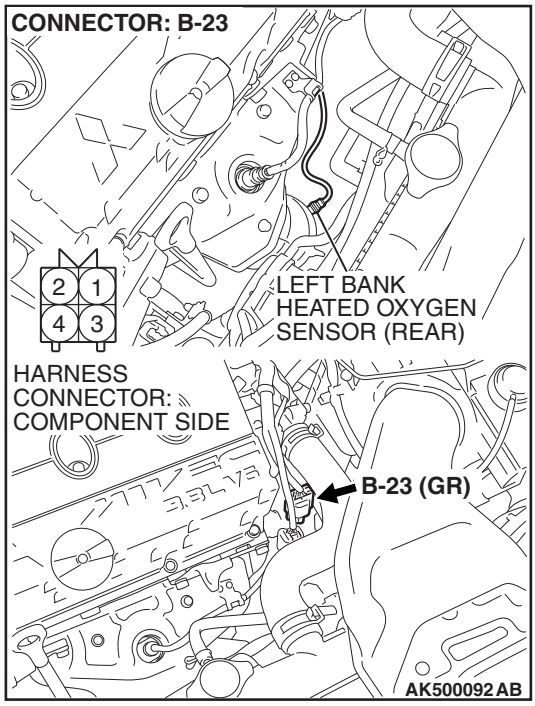


STEP 3. Check harness connector B-24 at left bank heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4 .

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



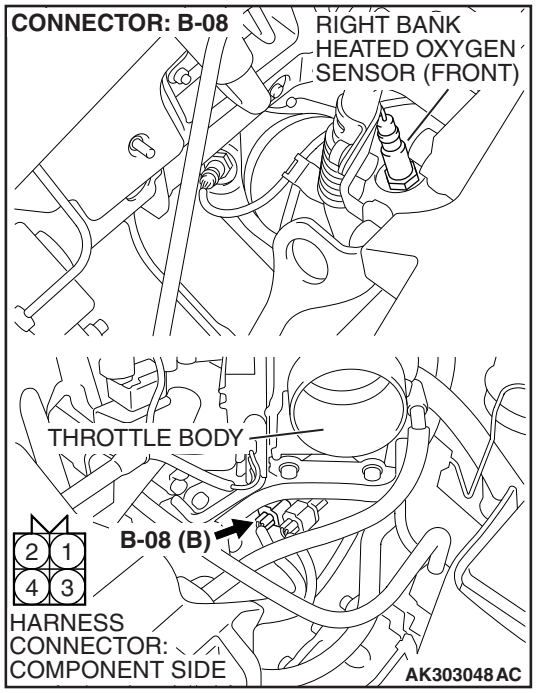
STEP 4. Check harness connector B-23 at left bank heated oxygen sensor (rear) for damage.

Q: Is the harness connector in good condition?

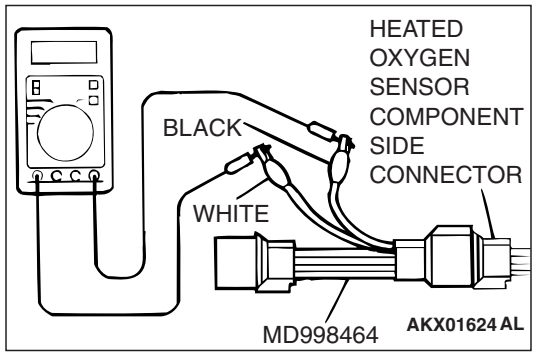
YES : Go to Step 5 .

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

STEP 5. Check the right bank heated oxygen sensor (front).



(1) Disconnect the right bank heated oxygen sensor (front) connector B-08 and connect test harness special tool MD998464 to the connector on the right bank 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 right bank heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

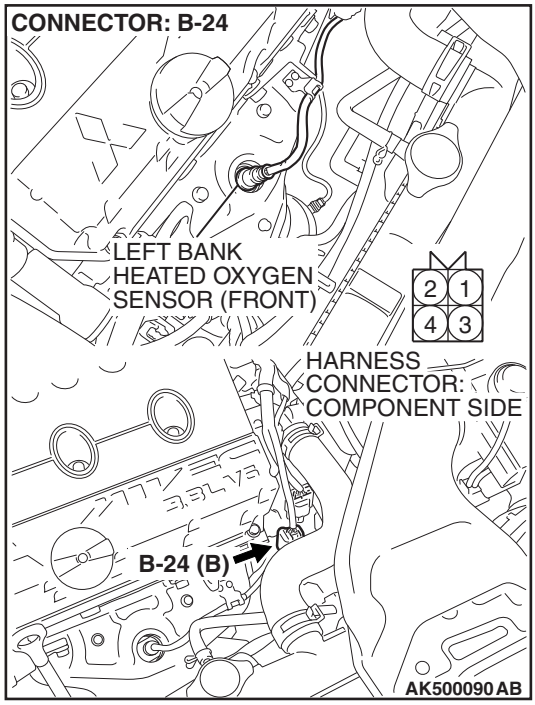
⚠ CAUTION

- **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.

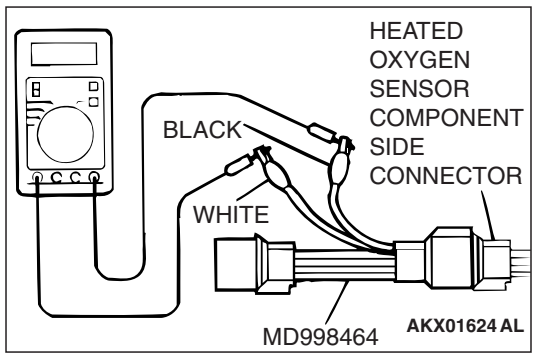
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 6 .
NO : Replace the right bank heated oxygen sensor (front). Then go to Step 23 .



STEP 6. Check the left bank heated oxygen sensor (front).

(1) Disconnect the left bank heated oxygen sensor (front) connector B-24 and connect test harness special tool MD998464 to the connector on the left bank 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 left bank heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

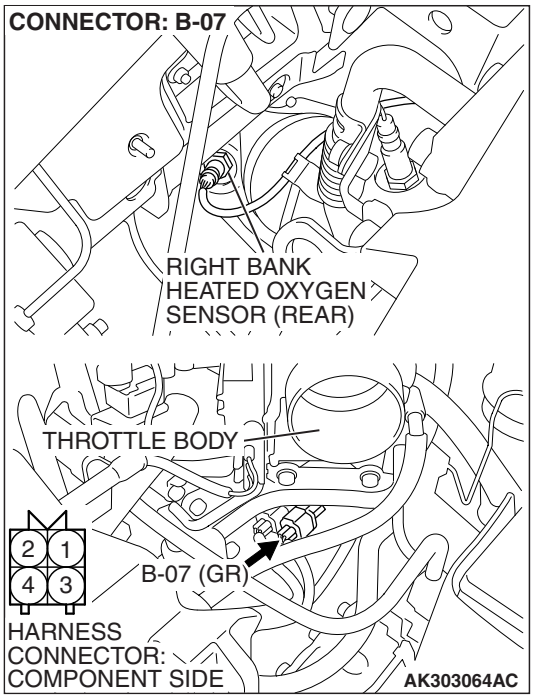
⚠ CAUTION

- **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.

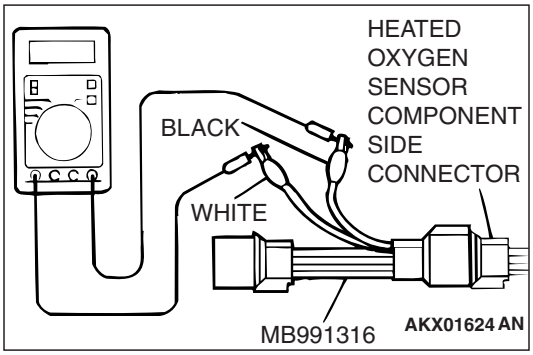
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 7 .
NO : Replace the left bank heated oxygen sensor (front). Then go to Step 23 .



STEP 7. Check the right bank heated oxygen sensor (rear).

(1) Disconnect the right bank heated oxygen sensor (rear) connector B-07 and connect test harness special tool MB991316 to the connector on the right bank heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



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

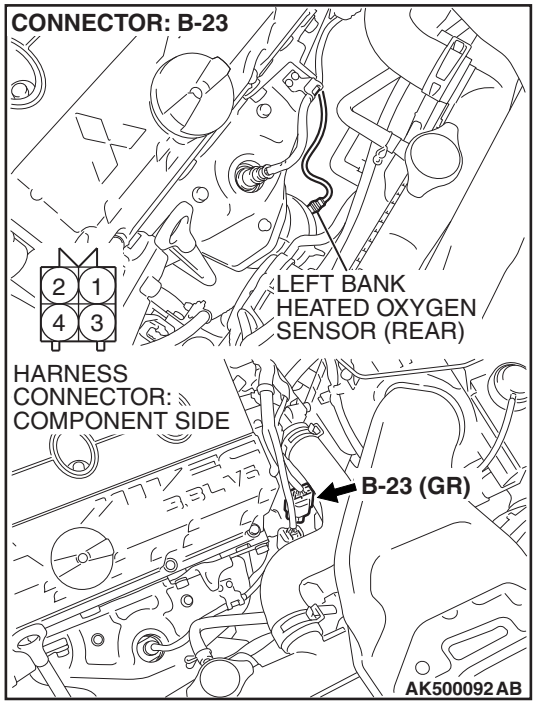
Standard value: 0.6 – 1.0 V

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

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

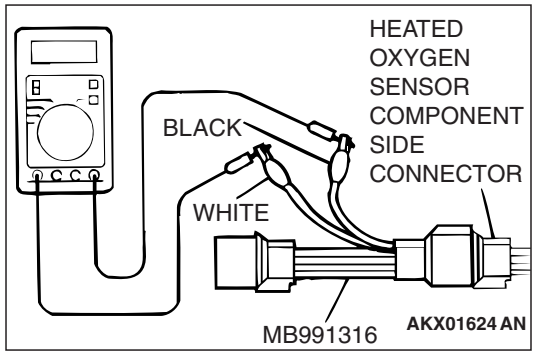
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 8 .
NO : Replace the right bank heated oxygen sensor (rear). Then go to Step 23 .



STEP 8. Check the left bank heated oxygen sensor (rear).

(1) Disconnect the left bank heated oxygen sensor (rear) connector B-23 and connect test harness special tool MB991316 to the connector on the left bank heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



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

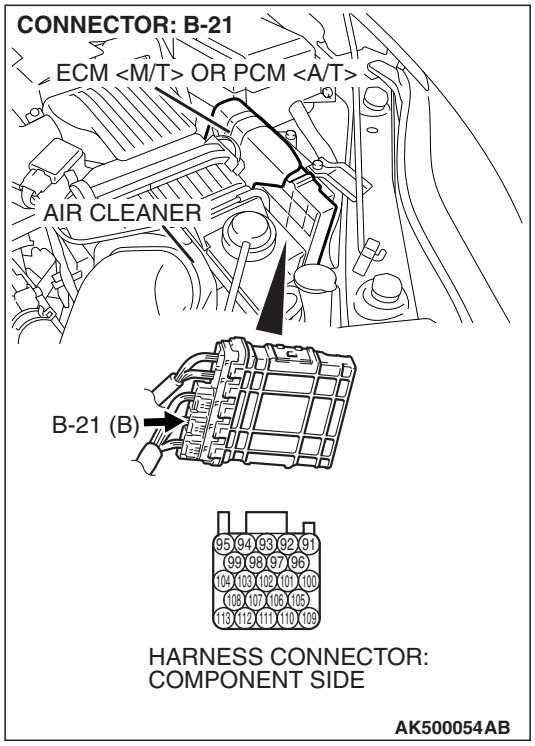
Standard value: 0.6 – 1.0 V

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

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

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

YES : Go to Step 9 .
NO : Replace the left bank heated oxygen sensor (rear). Then go to Step 23 .

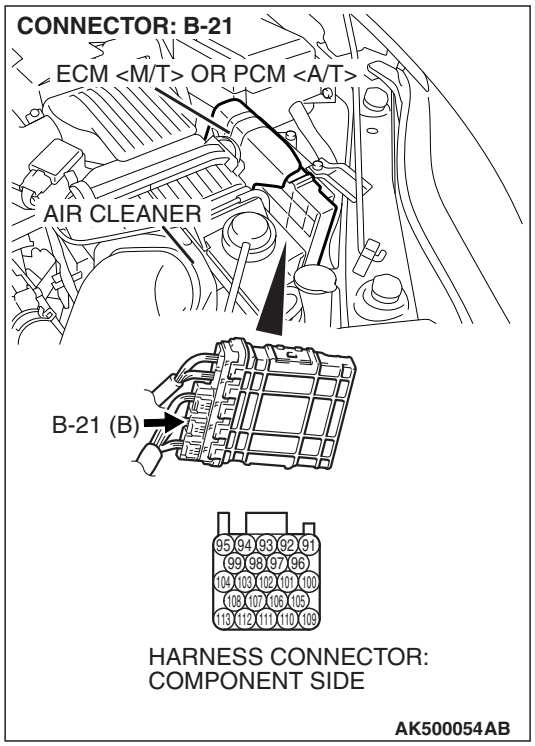


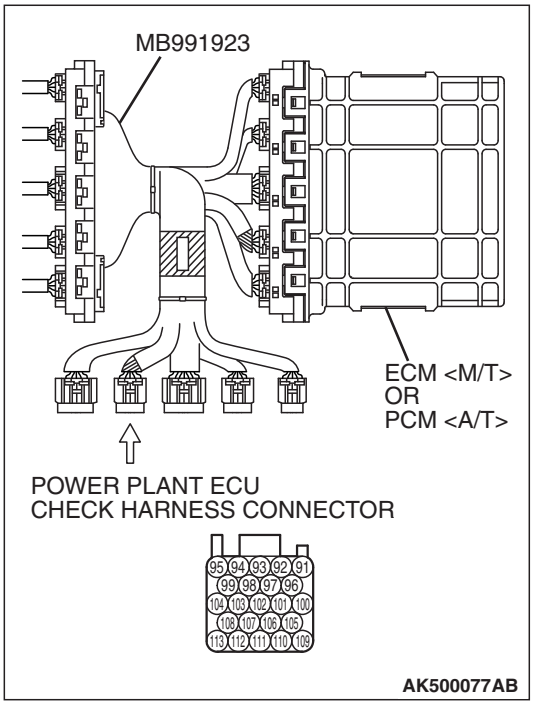
STEP 9. Check harness connector B-21 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10 .

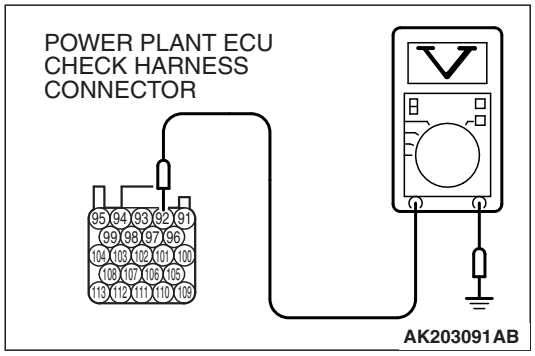
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 23 .





STEP 10. Measure the sensor offset voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.



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

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

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

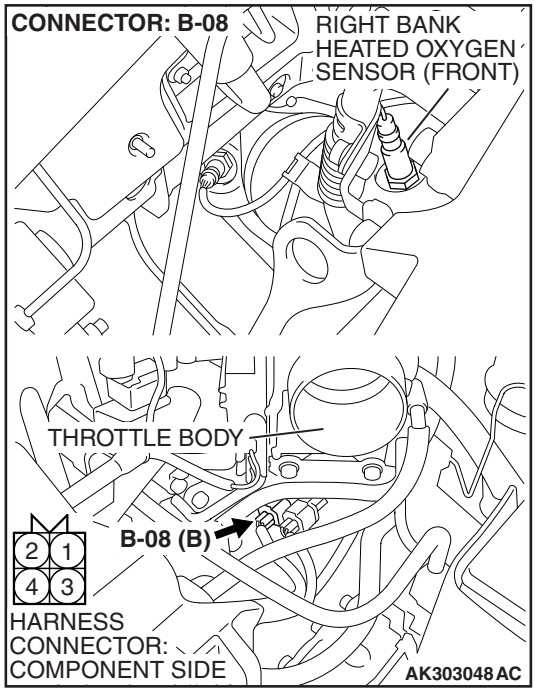
YES : Go to Step 13 .
NO : Go to Step 11 .

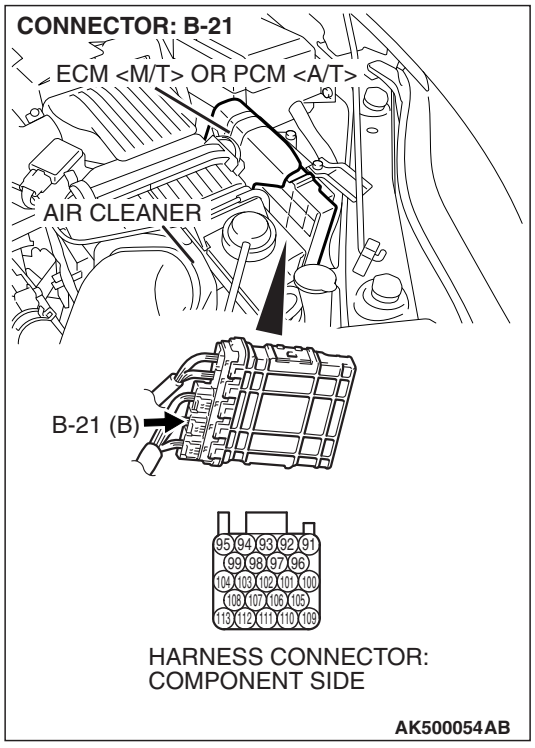
STEP 11. Check for short circuit to ground between right bank heated oxygen sensor (front) connector B-08 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 92).

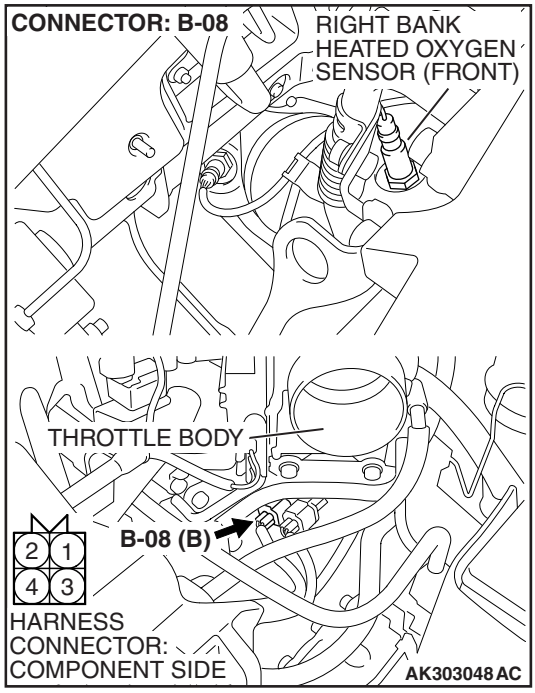
Q: Is the harness wire in good condition?

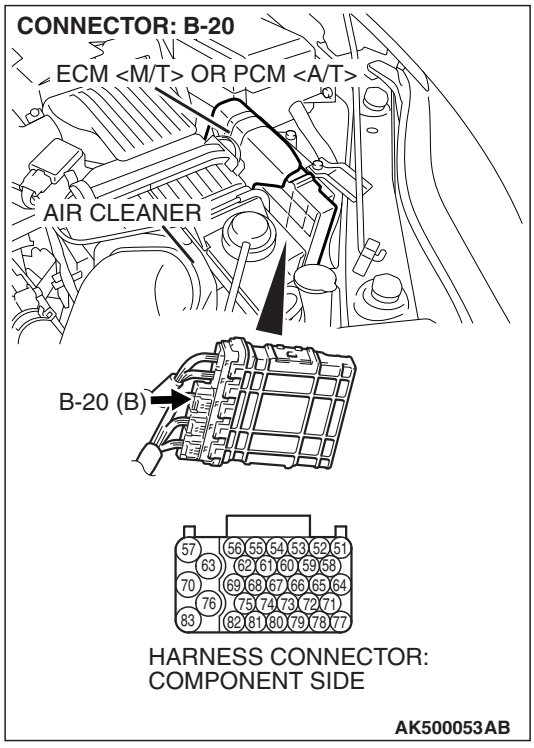
YES : Go to Step 12 .

NO : Repair it. Then go to Step 23 .







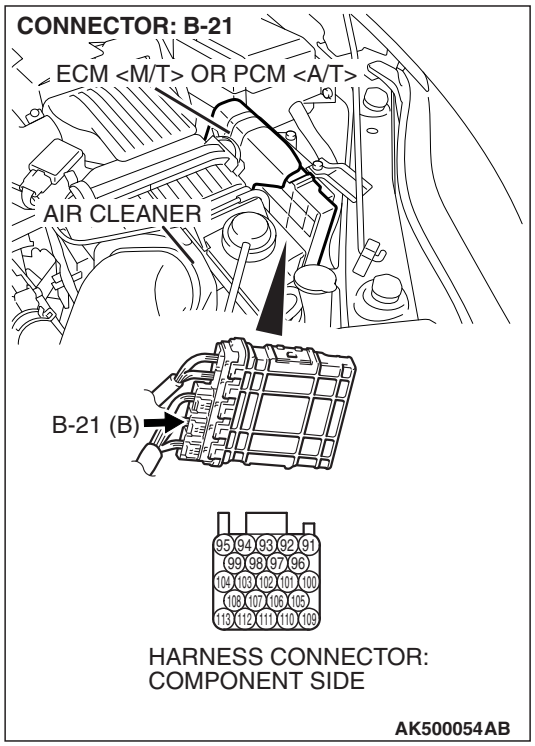


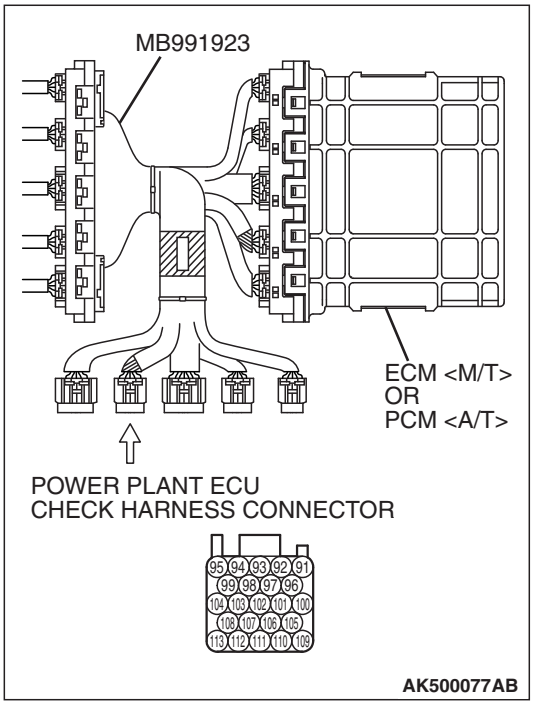
STEP 12. Check for short circuit to ground between right bank heated oxygen sensor (front) connector B-08 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 80).

Q: Is the harness wire in good condition?

YES : Go to Step 22 .

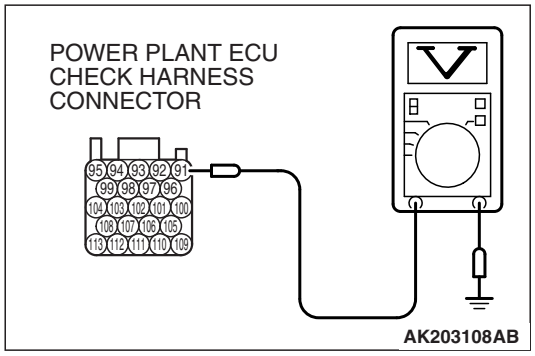
NO : Repair it. Then go to Step 23 .





STEP 13. Measure the sensor offset voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.



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

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

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

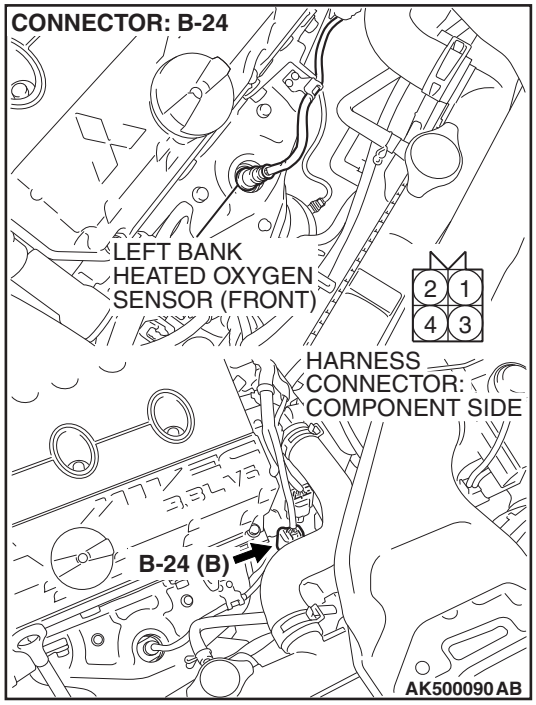
YES : Go to Step 16 .
NO : Go to Step 14 .

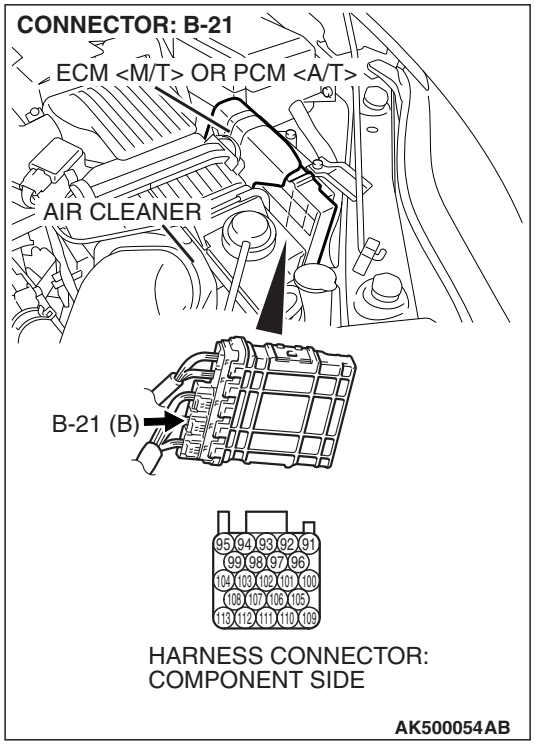
STEP 14. Check for short circuit to ground between left bank heated oxygen sensor (front) connector B-24 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 91).

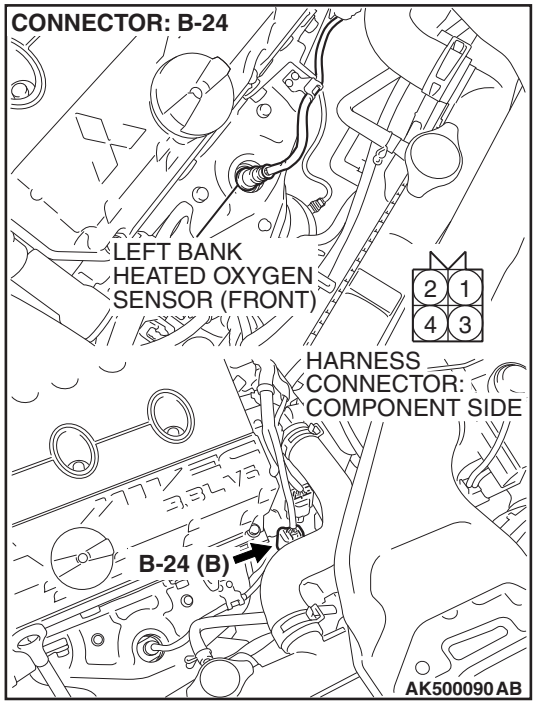
Q: Is the harness wire in good condition?

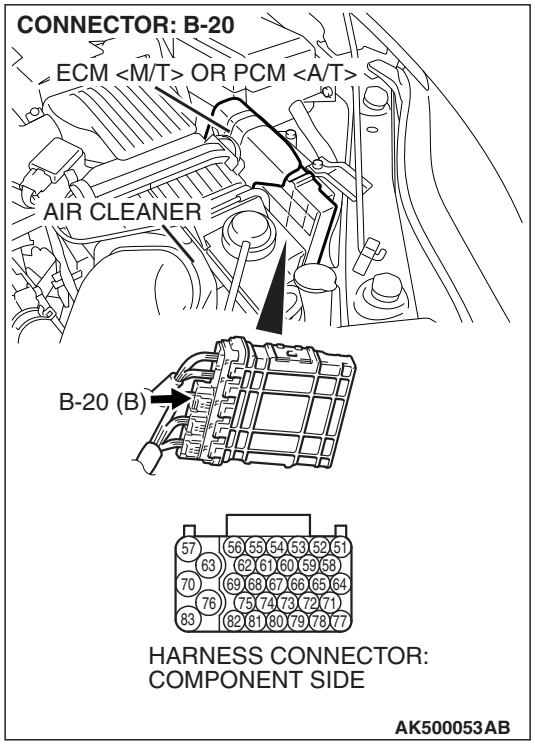
YES : Go to Step 15 .

NO : Repair it. Then go to Step 23 .







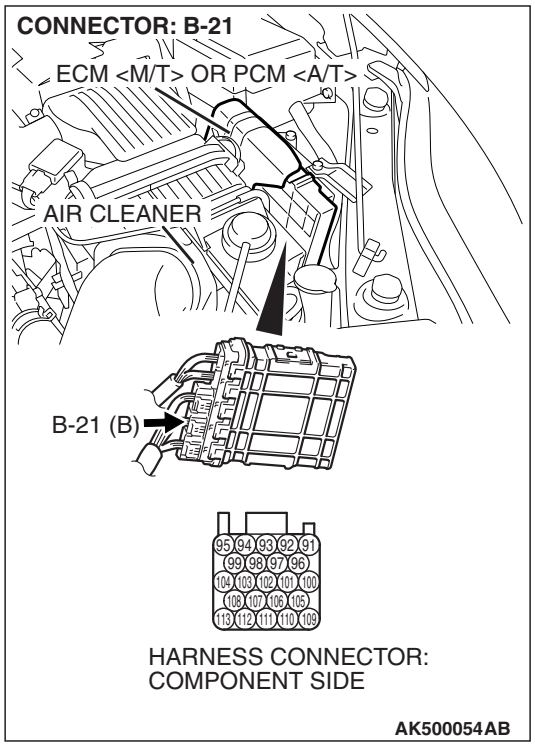


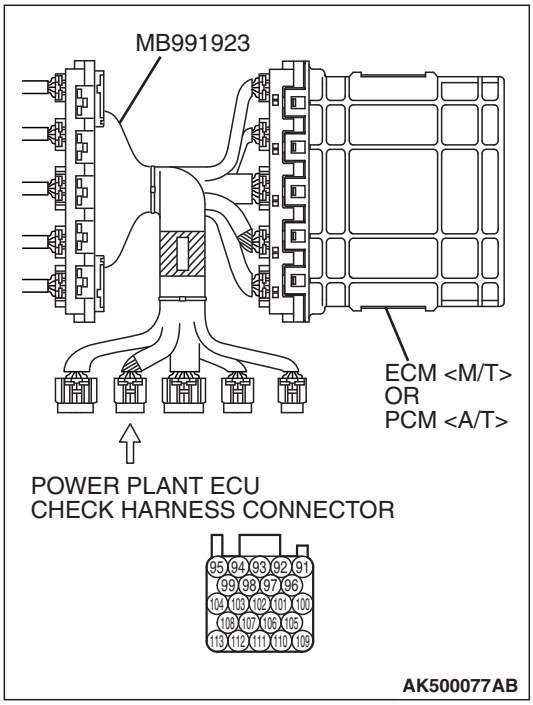
STEP 15. Check for short circuit to ground between left bank heated oxygen sensor (front) connector B-24 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 79).

Q: Is the harness wire in good condition?

YES : Go to Step 22 .

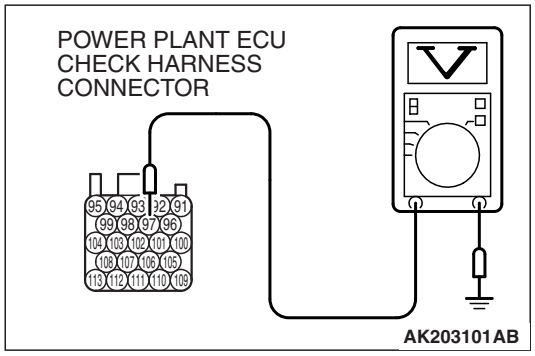
NO : Repair it. Then go to Step 23 .





STEP 16. Measure the sensor offset voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.

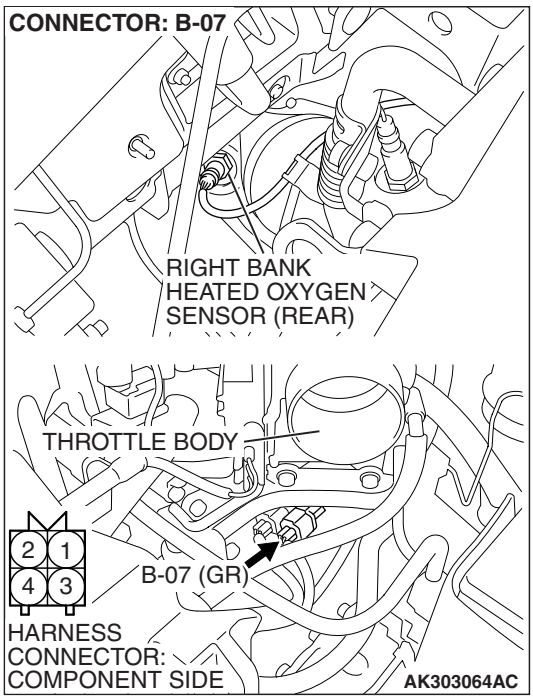


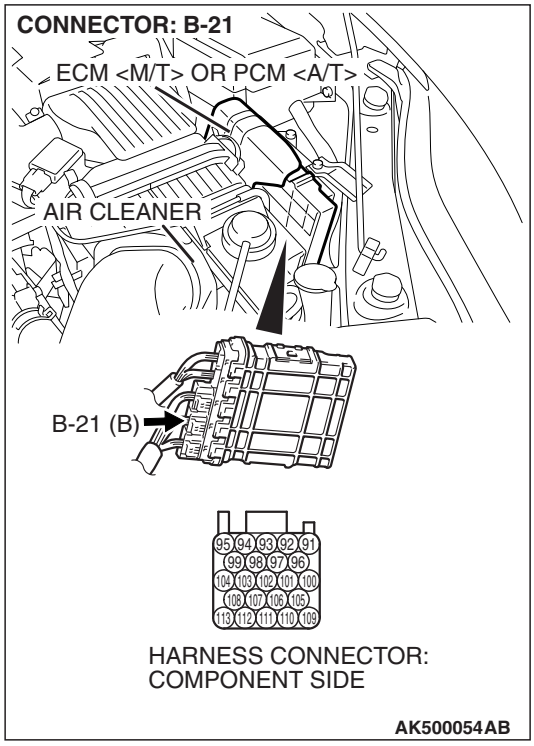
(3) Measure the voltage between terminal No. 97 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

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



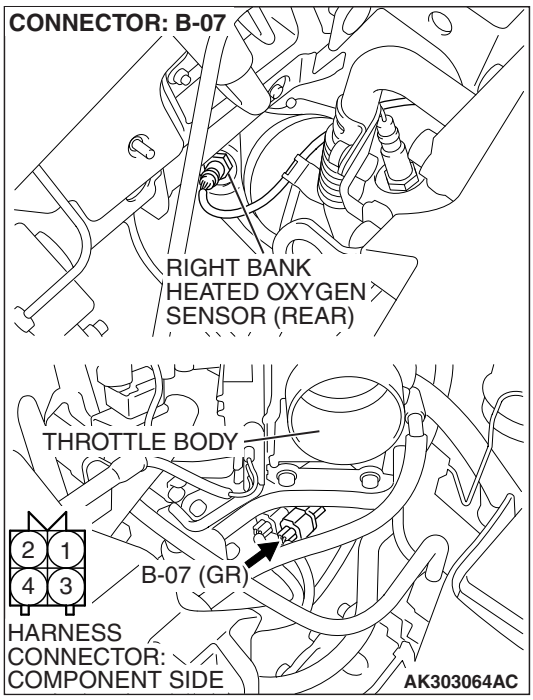


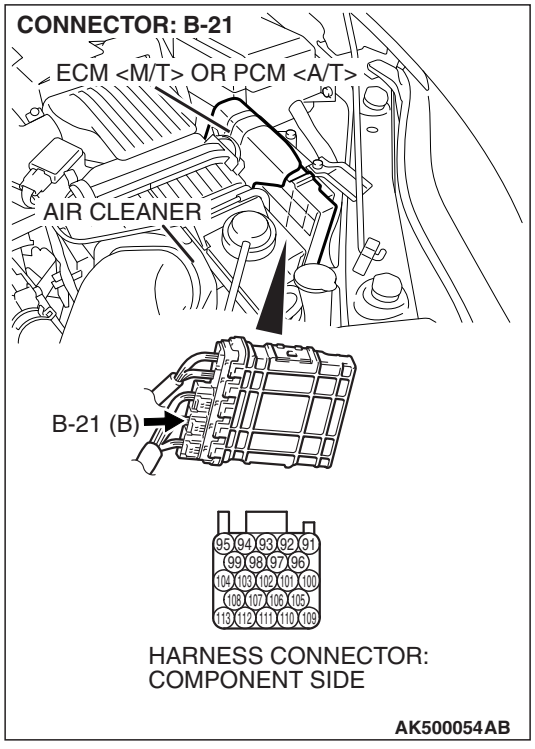
STEP 17. Check for short circuit to ground between right bank heated oxygen sensor (rear) connector B-07 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 97).

Q: Is the harness wire in good condition?

YES : Go to Step 18 .

NO : Repair it. Then go to Step 23 .



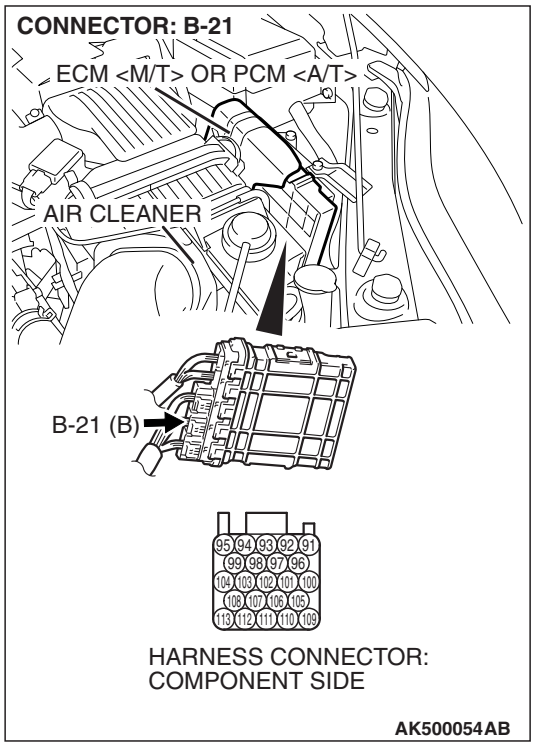


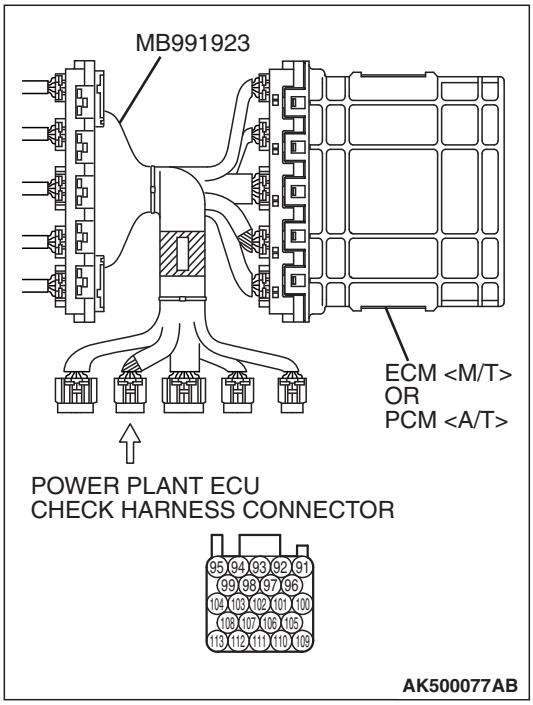
STEP 18. Check for short circuit to ground between right bank heated oxygen sensor (rear) connector B-07 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 106).

Q: Is the harness wire in good condition?

YES : Go to Step 22 .

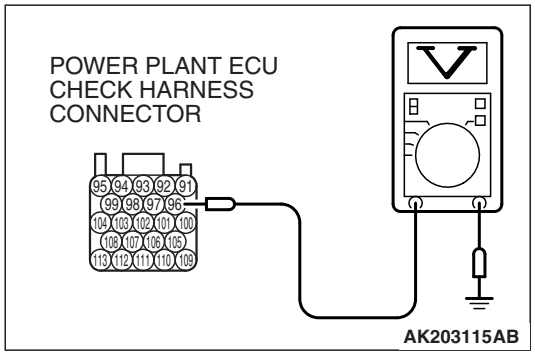
NO : Repair it. Then go to Step 23 .





STEP 19. Measure the sensor offset voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.

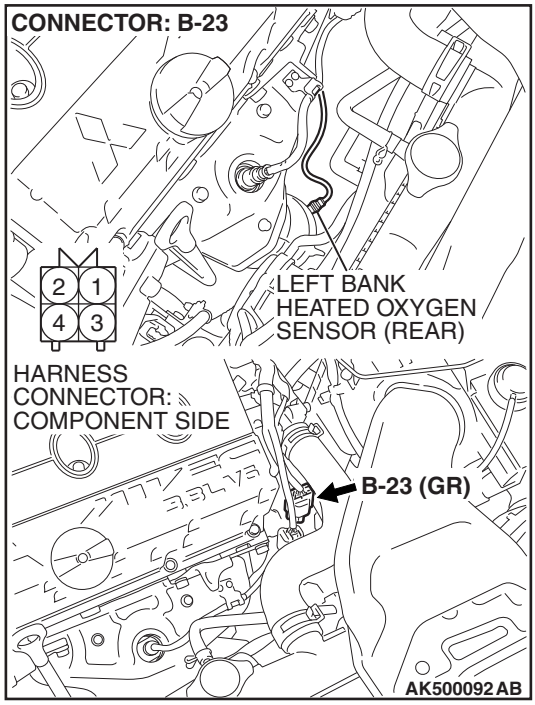


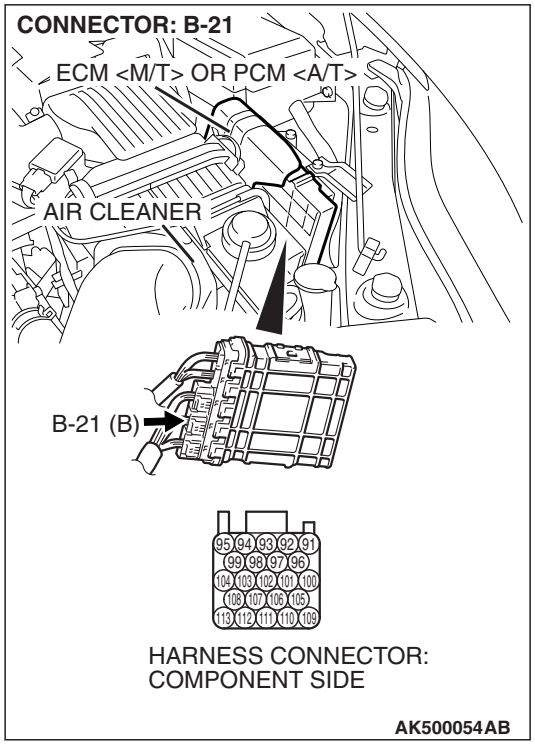
(3) Measure the voltage between terminal No. 96 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

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

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



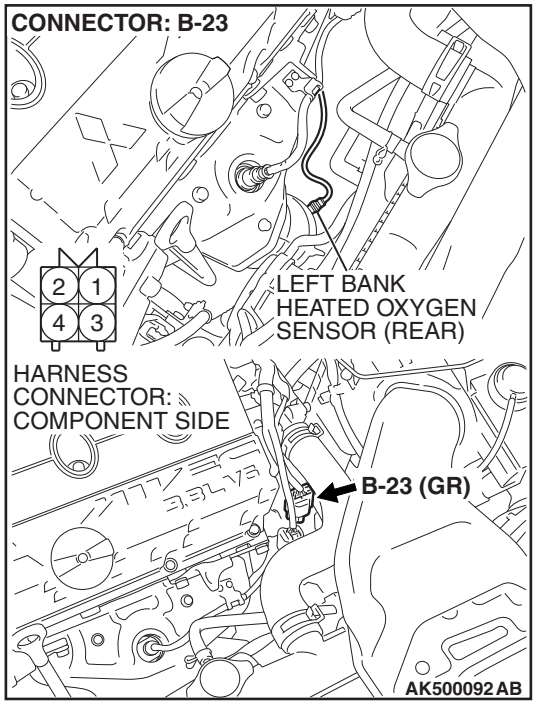


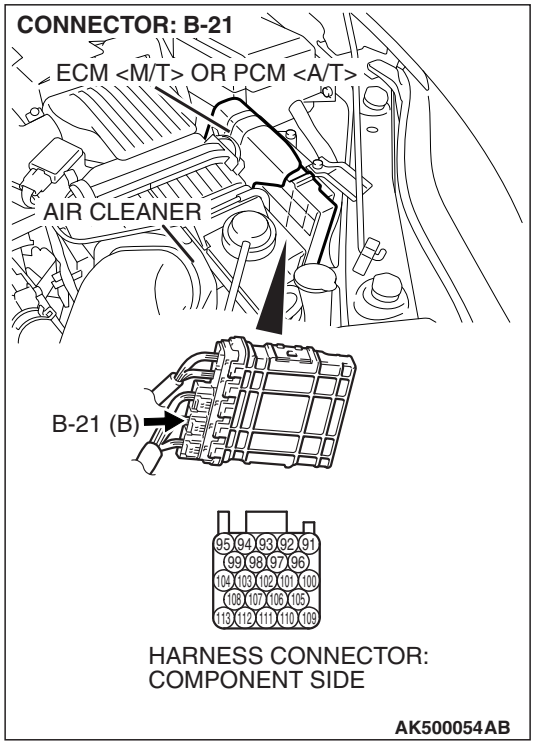
STEP 20. Check for short circuit to ground between left bank heated oxygen sensor (rear) connector B-23 (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 96).

Q: Is the harness wire in good condition?

YES : Go to Step 21 .

NO : Repair it. Then go to Step 22 .





STEP 21. Check for short circuit to ground between left bank heated oxygen sensor (rear) connector B-23 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-21 (terminal No. 105).

Q: Is the harness wire in good condition?

YES : Go to Step 22 .

NO : Repair it. Then go to Step 23 .

STEP 22. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 22 P.13B-6.

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

Q: Is DTC P2253 set?

YES : Replace the ECM <M/T> or the PCM <A/T> (Refer to, Removal and Installation P.13B-1291). Then go to Step 23.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.

STEP 23. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 22 P.13B-6.

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

Q: Is DTC P2253 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC U1073: Bus Off

⚠ CAUTION

- **If the ECM <M/T> or PCM <A/T> output the DTC U1073, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

Check Conditions

- Always

Judgement Criterion

- Bus off error detected

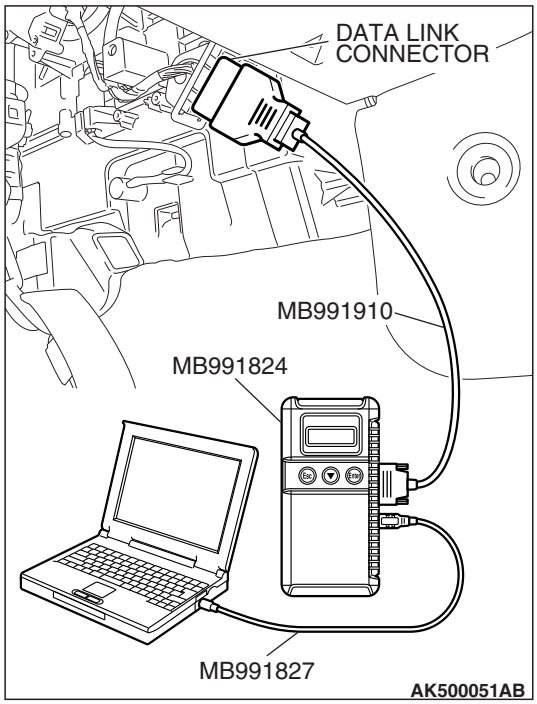
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

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

DIAGNOSIS

Required Special Tools:

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



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

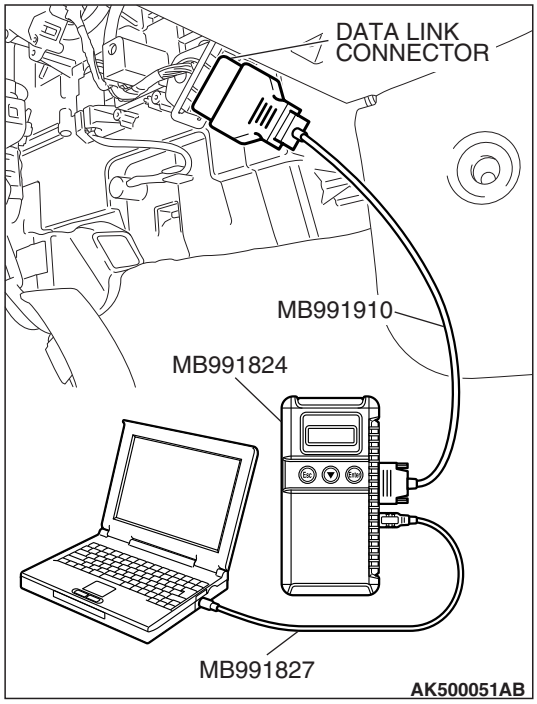
⚠ CAUTION

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

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can bus Diagnostics Table P.54C-17. Then go to Step 3.

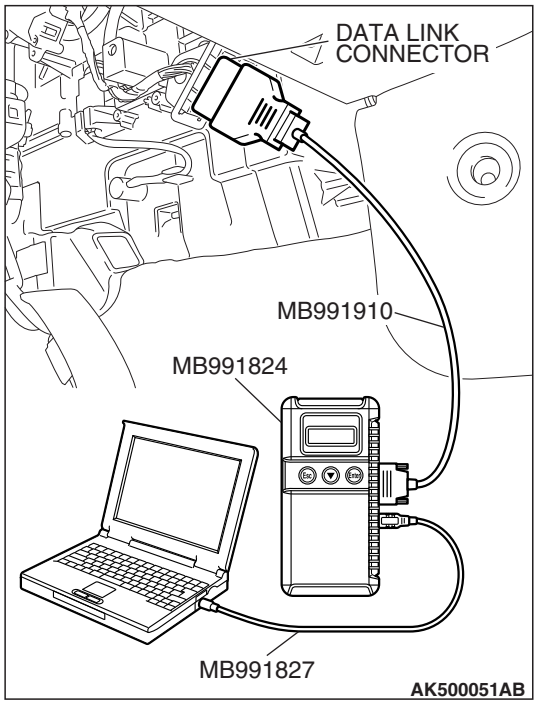


STEP 2. Recheck for diagnostic trouble code.

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

Q: Is DTC U1073 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 3.
NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.



STEP 3. Recheck for diagnostic trouble code.

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

Q: Is DTC U1073 set?

YES : Go to Step 1.
NO : The inspection is complete.

DTC U1102: ABS/TCL-ECU OR TCL/ASC-ECU TIME-OUT

⚠ CAUTION

- **If the ECM <M/T> or PCM <A/T> output the DTC U1102, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

Check Conditions

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

Judgement Criterion

- Unable to receive ABS/TCL-ECU or the TCL/ASC-ECU signals through the CAN bus line.

COMMENT

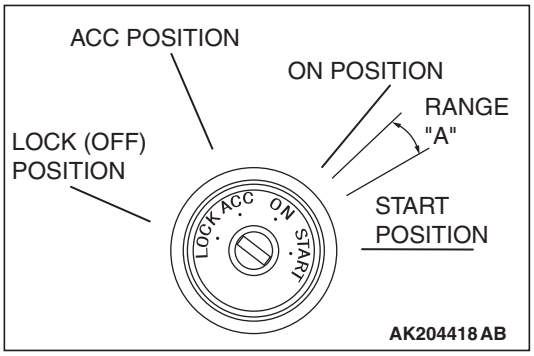
Current Trouble

- Some of the possible causes are a harness or connector damage between the ECM <M/T> or the PCM <A/T> and the ABS/TCL-ECU or the TCL/ASC-ECU on the CAN bus line, a failure in the ABS/TCL-ECU or the TCL/ASC-ECU power supply system, a failure in the ABS/TCL-ECU or the TCL/ASC-ECU, or a failure in the ECM <M/T> or the PCM <A/T>.

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM <M/T> or the PCM <A/T> and ABS/TCL-ECU or the TCL/ASC-ECU, and a failure in the ABS power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14).

⚠ CAUTION



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

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, CAN bus line Diagnostics Flow P.54C-10).

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

- CAN line harness damage or connector damage.
- ABS/TCL-ECU failed <vehicles without ASC>
- TCL/ASC-ECU failed <vehicles with ASC>
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

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

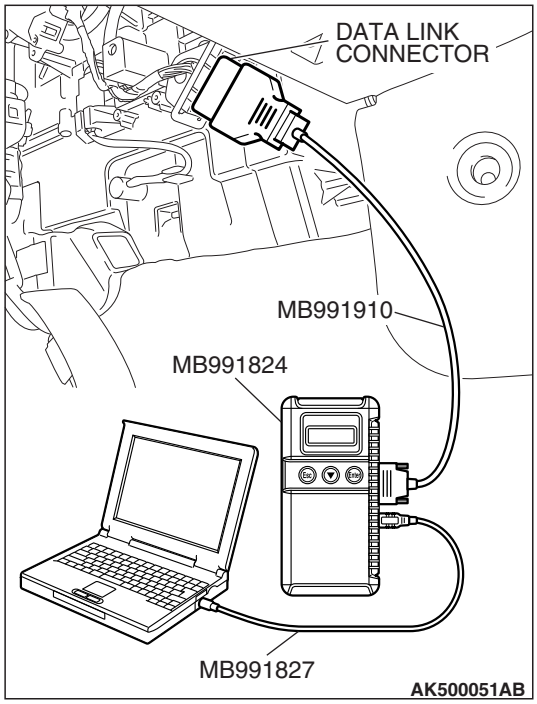
⚠ CAUTION

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

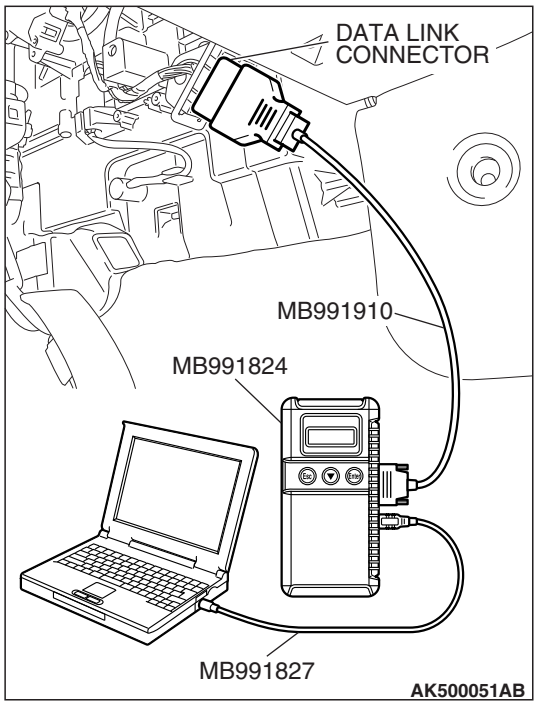
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can Bus Diagnostics Table P.54C-17. Then go to Step 6.



TSB Revision

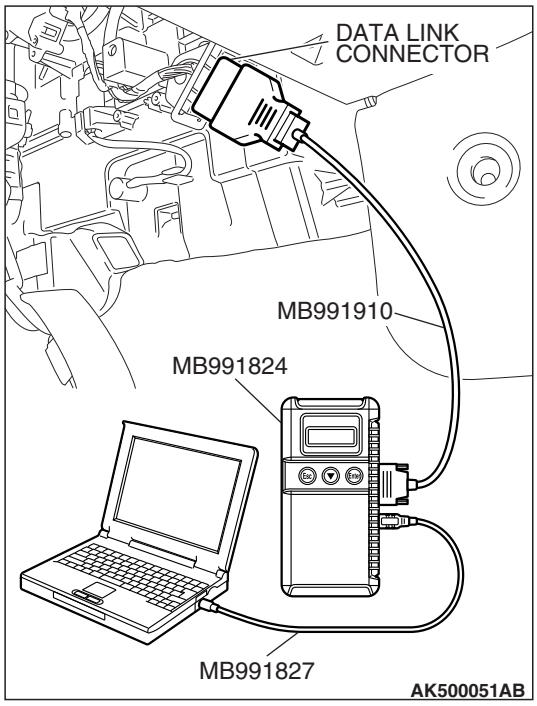


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is the ABS-DTC or ASC-DTC set?

YES : Refer to GROUP 35C, TCL/ASC Diagnostic – Diagnostic Trouble Code Chart P.35C-14.
NO : Go to Step 3.

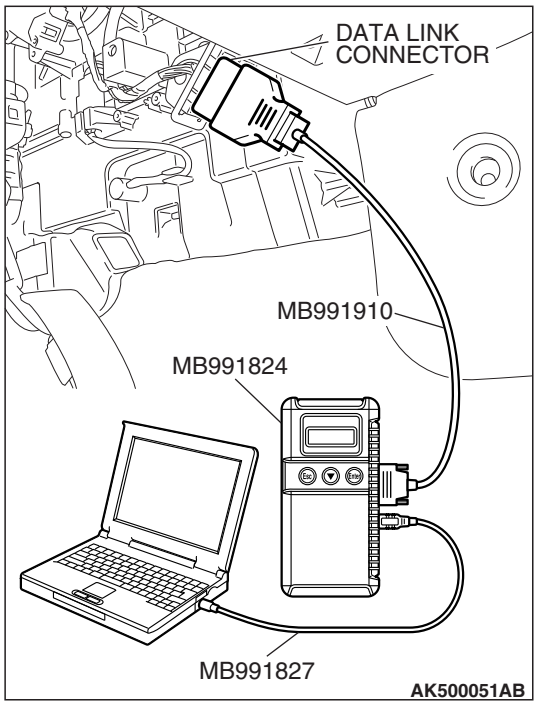


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1102 set?

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



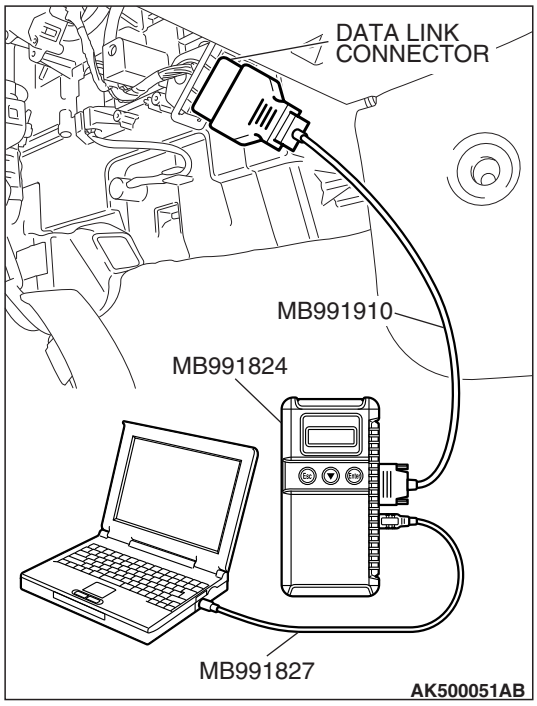
STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1102 set?

YES : Replace the ABS/TCL-ECU or the TCL/ASC-ECU. Then go to Step 6.

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



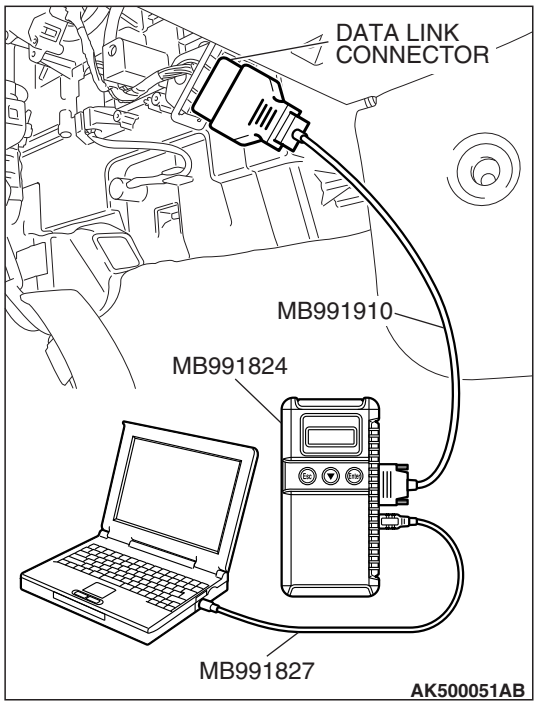
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1102 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.

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



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

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

Q: Is DTC U1102 set?

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

DTC U1108: COMBINATION METER TIME-OUT

⚠ CAUTION

- **If the ECM <M/T> or PCM <A/T> output the DTC U1102, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DESCRIPTIONS OF MONITOR METHODS

There is no data from combination meter for the specified time. (Meter also detect communication error with ECM <M/T> or PCM <A/T>.)

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)

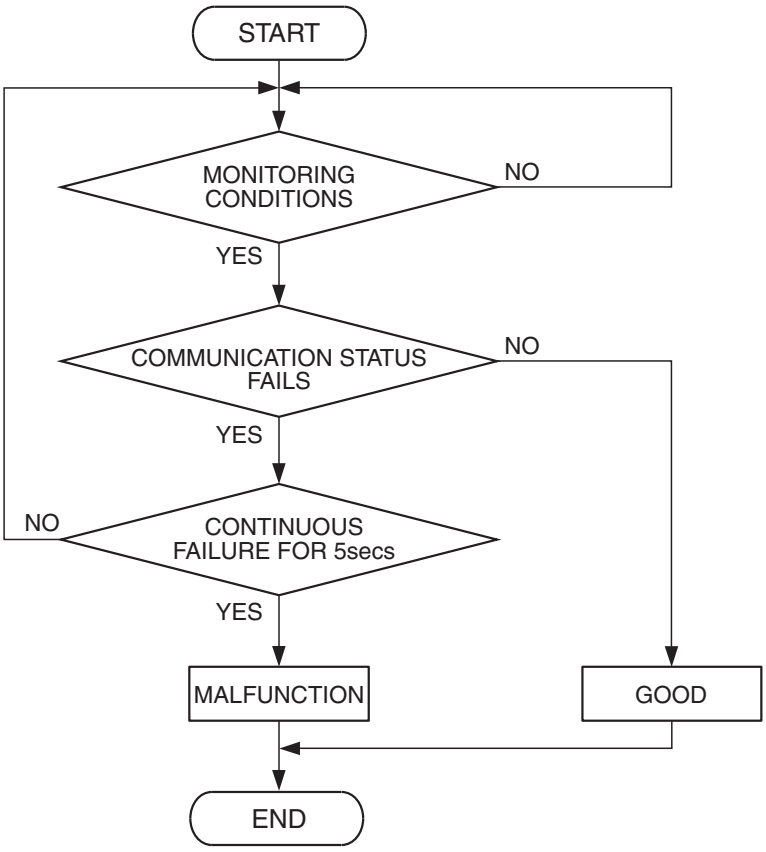
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK204025

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

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

COMMENT

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

Past Trouble
- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM <M/T> or the PCM <A/T> and combination meter, and a failure in the combination meter power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the M.U.T. – III CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, CAN bus line Diagnostics Flow P.54C-10).

TSB Revision

OBD-II DRIVE CYCLE PATTERN

None.

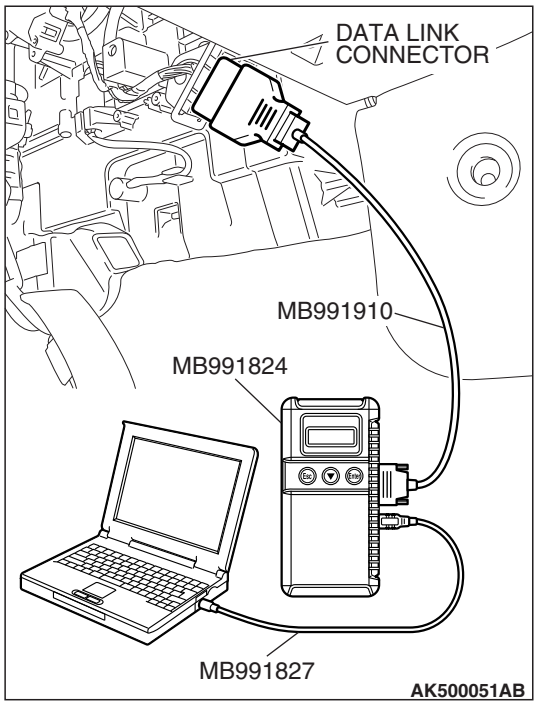
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- Combination meter failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



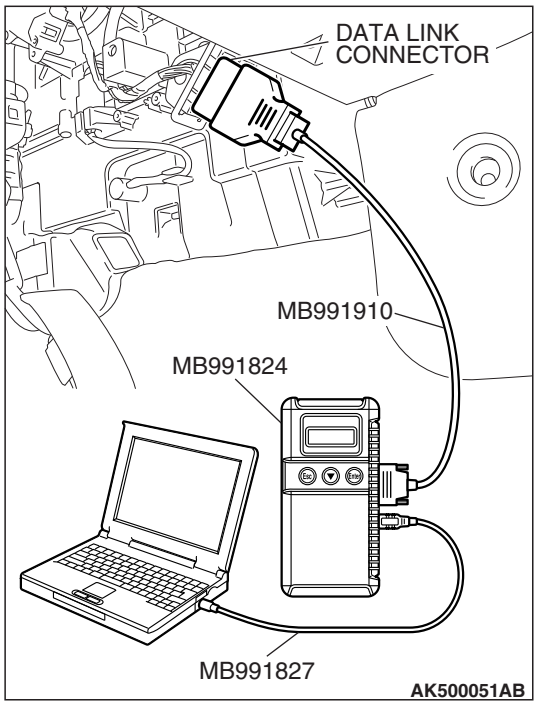
STEP 1. Using scan tool MB991958, diagnose CAN bus line.

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

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can Bus Diagnostics Table P.54C-17. Then go to Step 6.

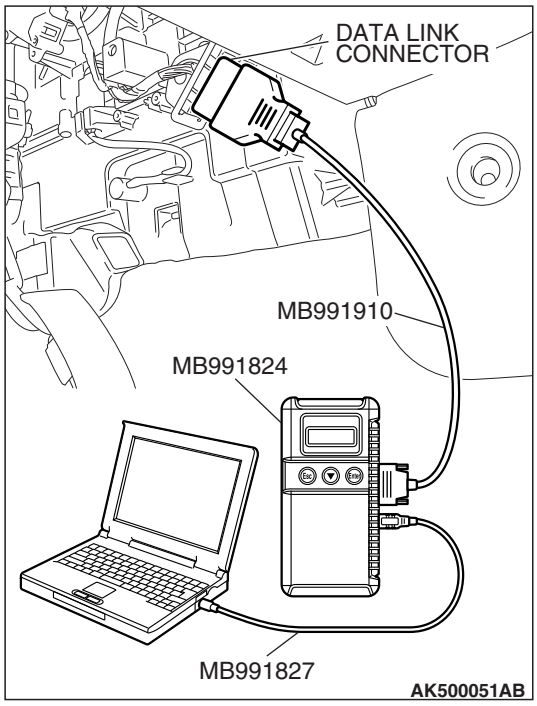


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) 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, Chassis Electrical – Combination Meter Assembly – Diagnostic Trouble Code Chart P.54A-60.
NO : Go to Step 3.

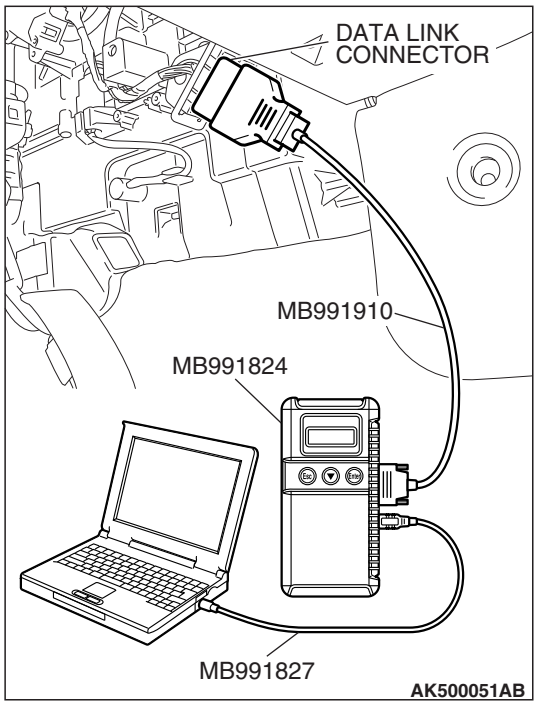


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1108 set?

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

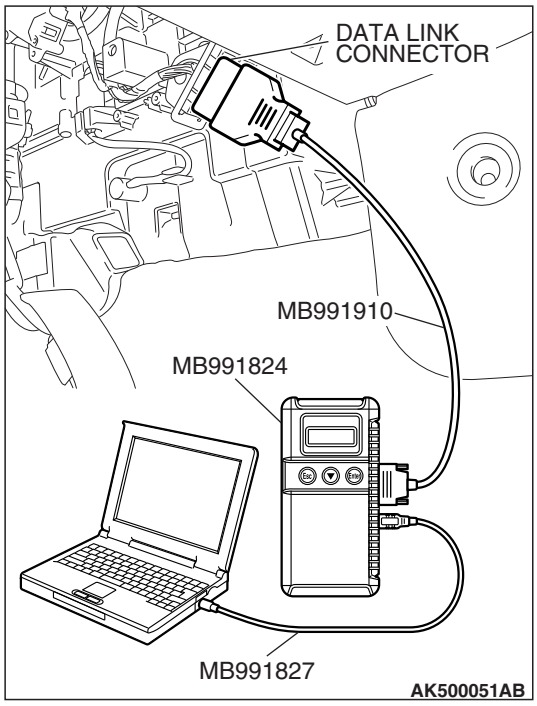


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1108 set?

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

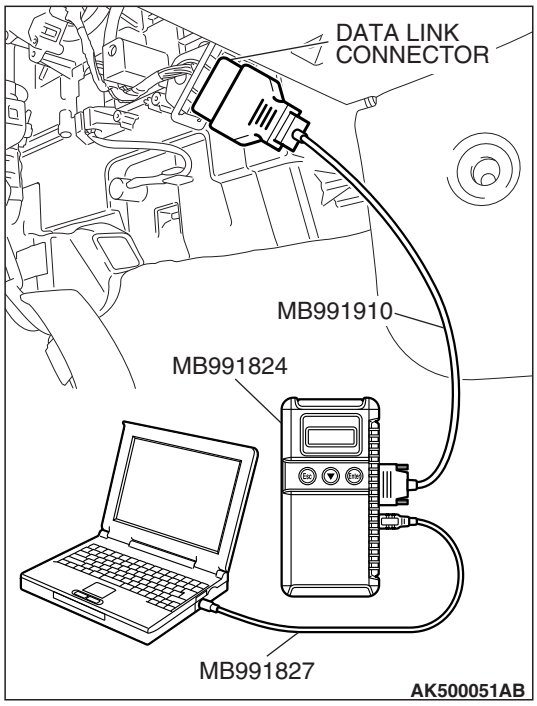


STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1108 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent of CAN bus line between ECM <M/T> or PCM <A/T> and combination meter. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14.



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

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

Q: Is DTC U1108 set?

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

DTC U1109: ETACS-ECU TIME-OUT

⚠ CAUTION

- **If the ECU <M/T> or the PCU <A/T> output the DTC U1109, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

Check Conditions

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

Judgement Criterion

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

COMMENT

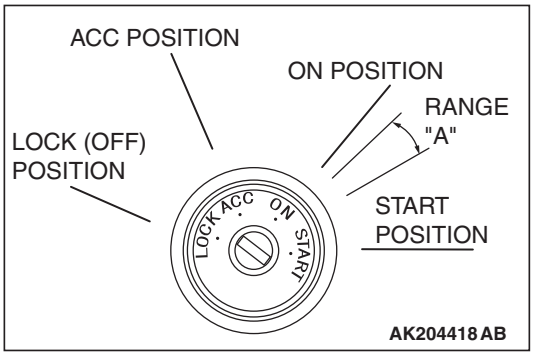
Current Trouble

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

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM <M/T> or the PCM <A/T> and ETACS-ECU, and a failure in the ETACS power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14).

⚠ CAUTION



When the ignition key is maintained within the range "A" (i.e., the ignition switch IG2 is in OFF position but the cranking does not start) for more than 1 second, ECM <M/T> or PCM <A/T> stores DTC U1109 (the past trouble).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, CAN bus line Diagnostics Flow P.54C-10).

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

- CAN line harness damage or connector damage.
- ETACS-ECU failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

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

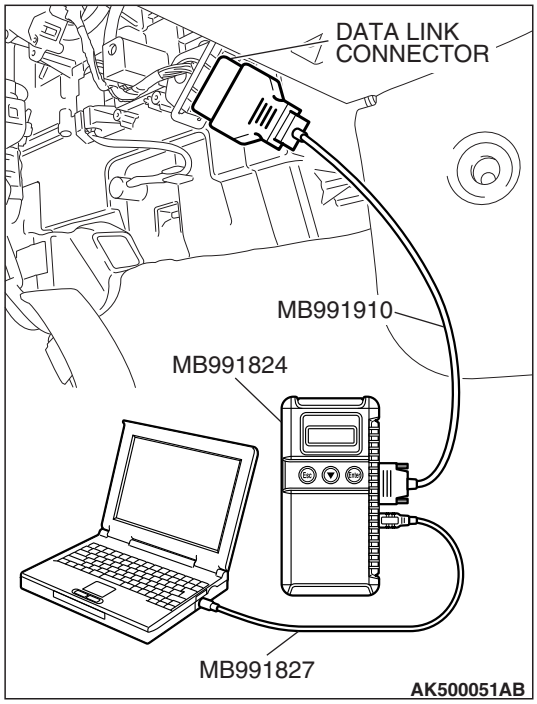
⚠ CAUTION

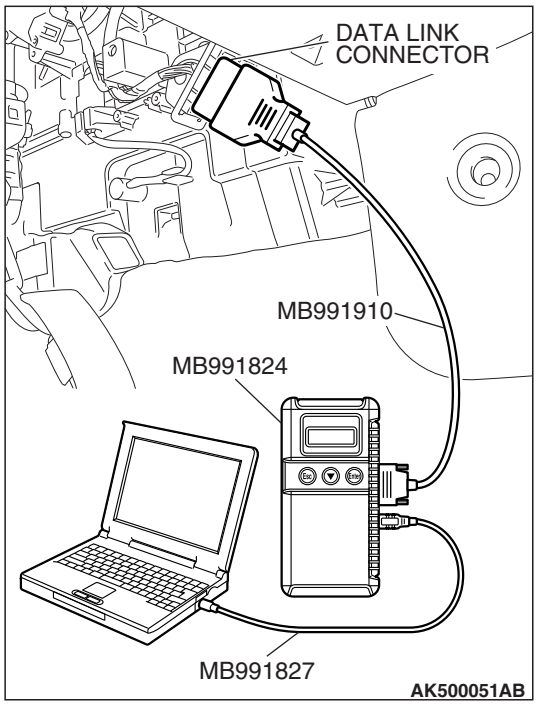
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can Bus Diagnostics Table P.54C-17. Then go to Step 6.



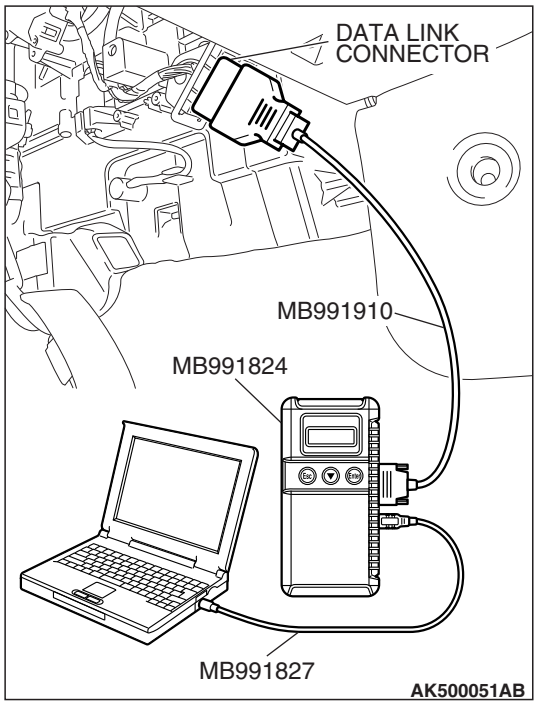


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is the ETACS-DTC set?

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



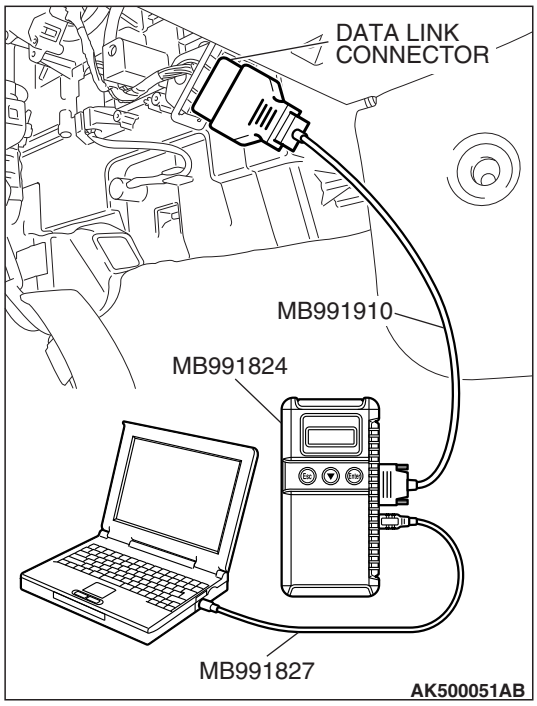
STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC 1109 set?

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

TSB Revision

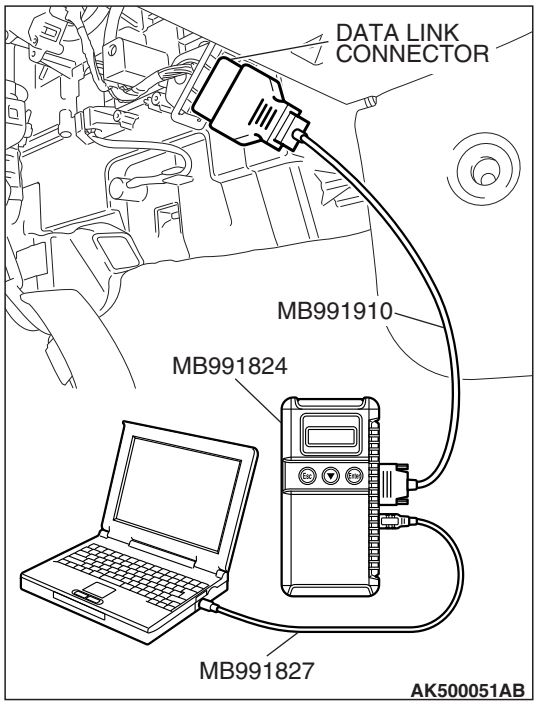


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1109 set?

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

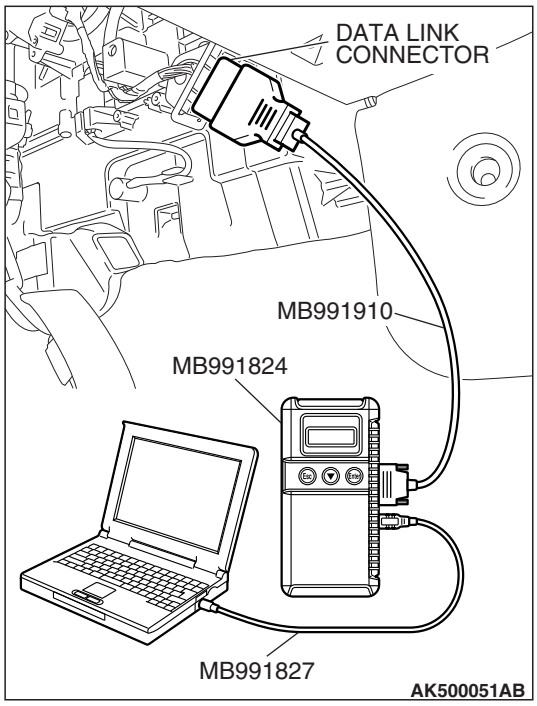


STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1109 set?

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



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

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

Q: Is DTC U1109 set?

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

DTC U1110: A/C-ECU TIME-OUT

⚠ CAUTION

- **If the ECM <M/T> or PCM <A/T> output the DTC U1110, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

Check Conditions

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

Judgement Criterion

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

COMMENT

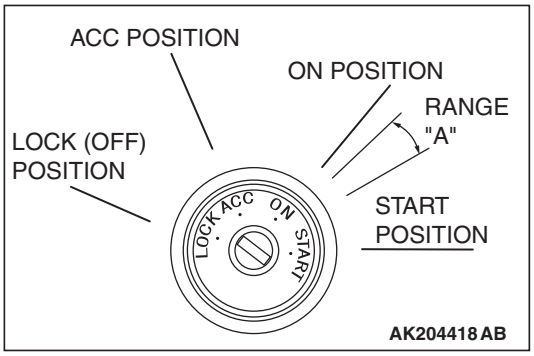
Current Trouble

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

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM <M/T> or the PCM <A/T> and A/C-ECU, and a failure in the A/C power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14).

⚠ CAUTION



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

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, CAN bus line Diagnostics Flow P.54C-10).

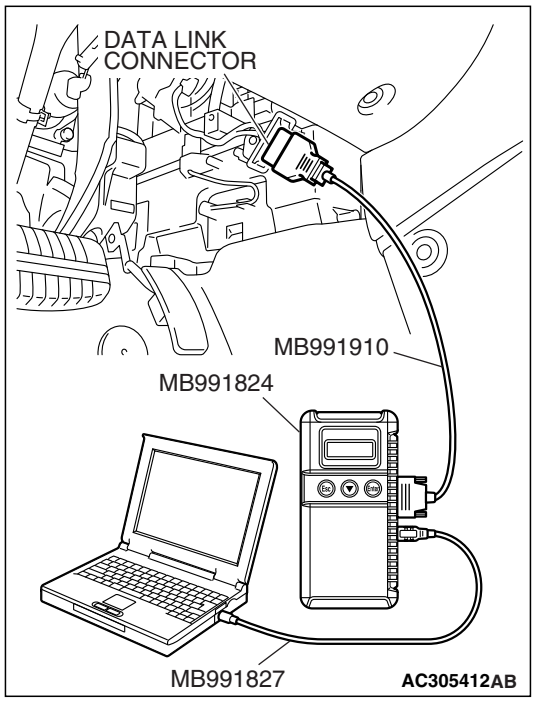
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- A/C-ECU failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

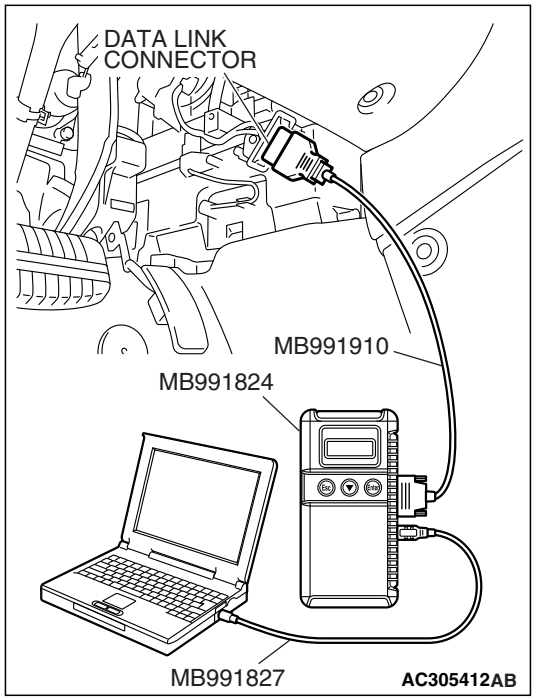
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can Bus Diagnostics Table P.54C-17. Then go to Step 6.

TSB Revision

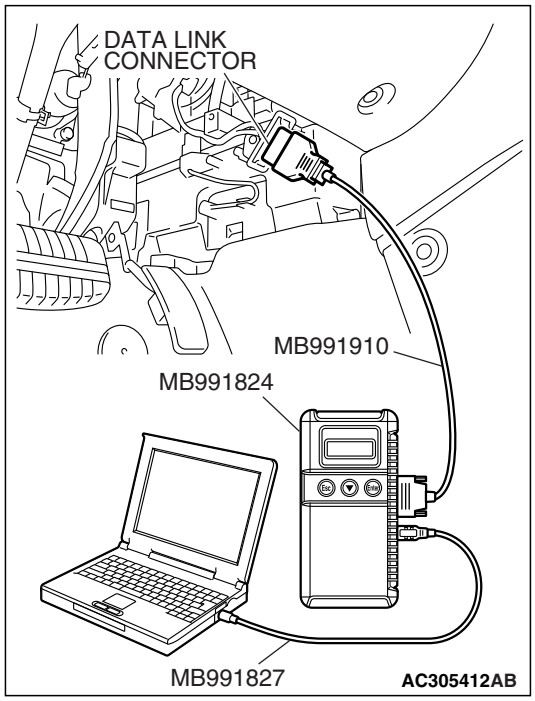


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is the A/C-DTC set?

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

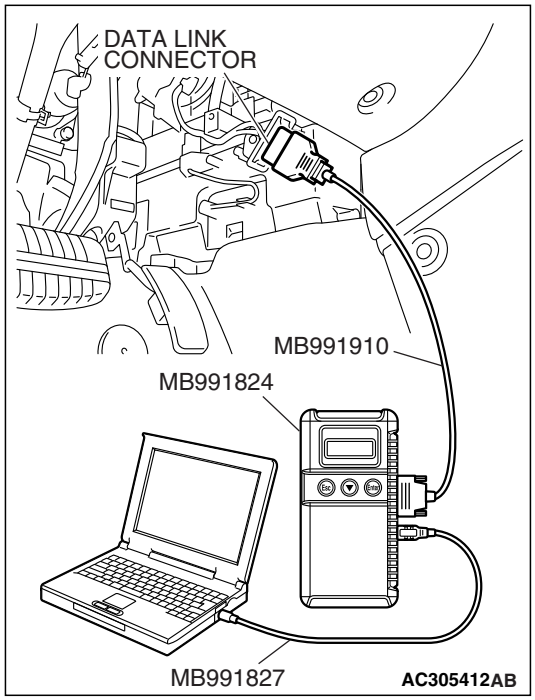


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1110 set?

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



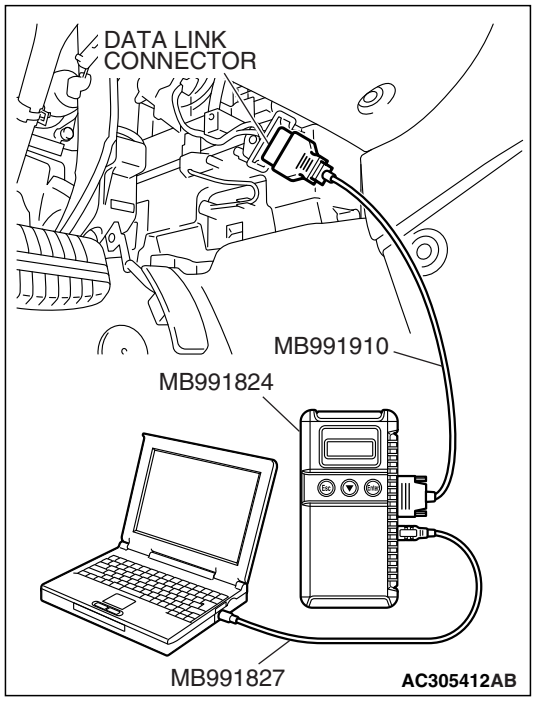
STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1110 set?

YES : Replace the A/C-ECU. Then go to Step 6.

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



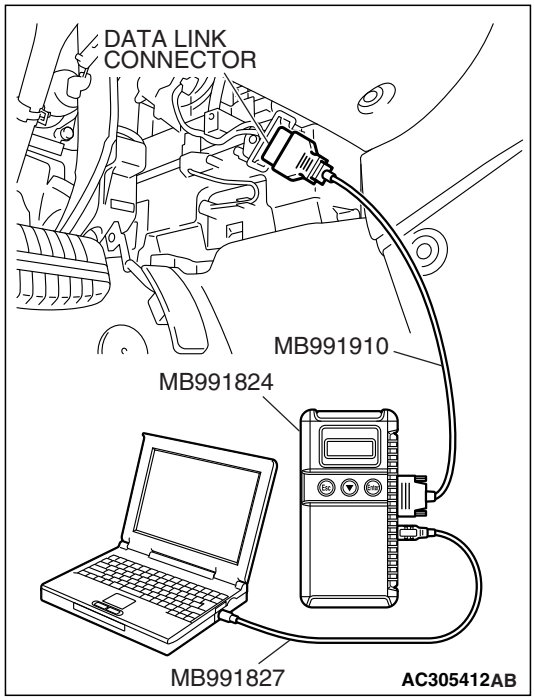
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is DTC U1110 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19. Then go to Step 6.

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



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

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

Q: Is DTC U1110 set?

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

DTC U1117: IMMOBILIZER-ECU TIME-OUT

⚠ CAUTION

- **If the ECM <M/T> or PCM <A/T> output the DTC U1117, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

Check Conditions

- Ignition switch is in ON position.

Judgement Criterion

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

COMMENT

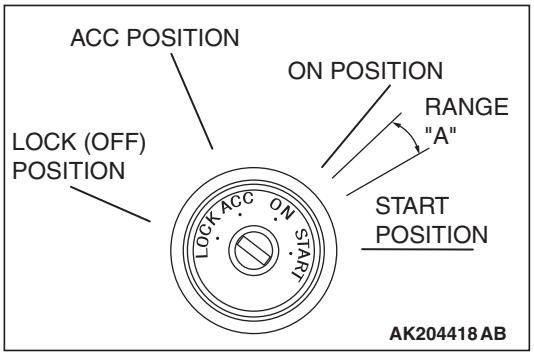
Current Trouble

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

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM <M/T> or the PCM <A/T> and ETACS-ECU (immobilizer-ECU), and a failure in the ETACS-ECU (immobilizer-ECU) power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14).

⚠ CAUTION



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

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00,How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, CAN bus line Diagnostics Flow P.54C-10).

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

- CAN line harness damage or connector damage.
- ETACS-ECU (immobilizer-ECU) failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

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

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

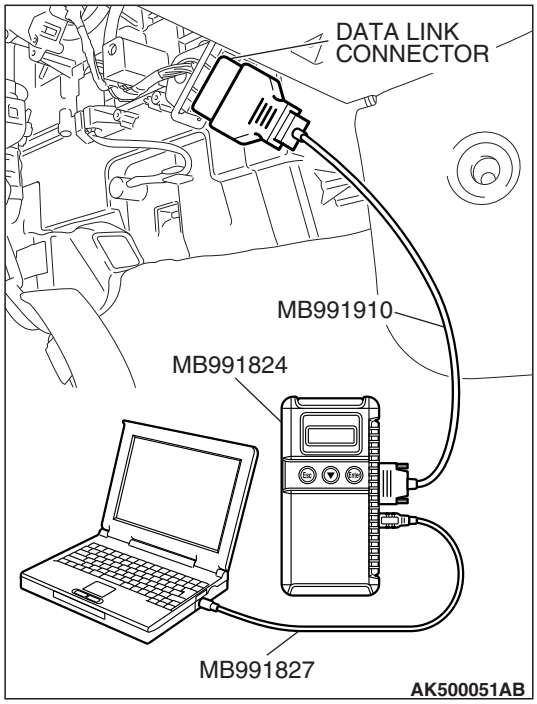
⚠ CAUTION

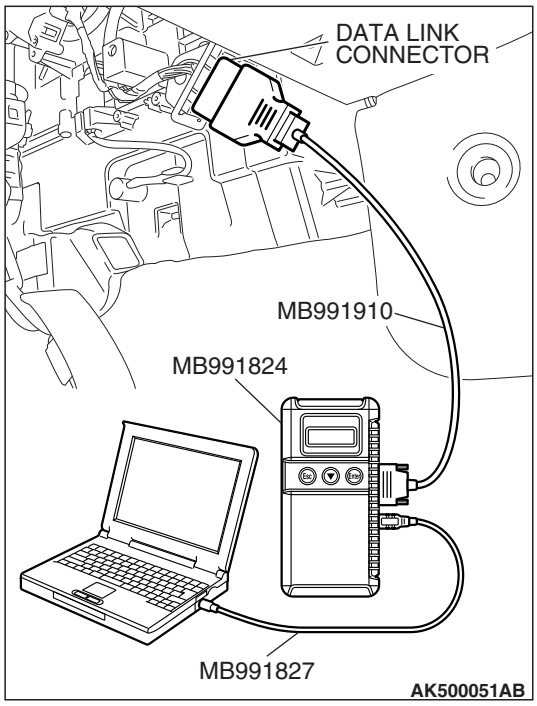
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Can Bus Diagnostics Table P.54C-17. Then go to Step 3.





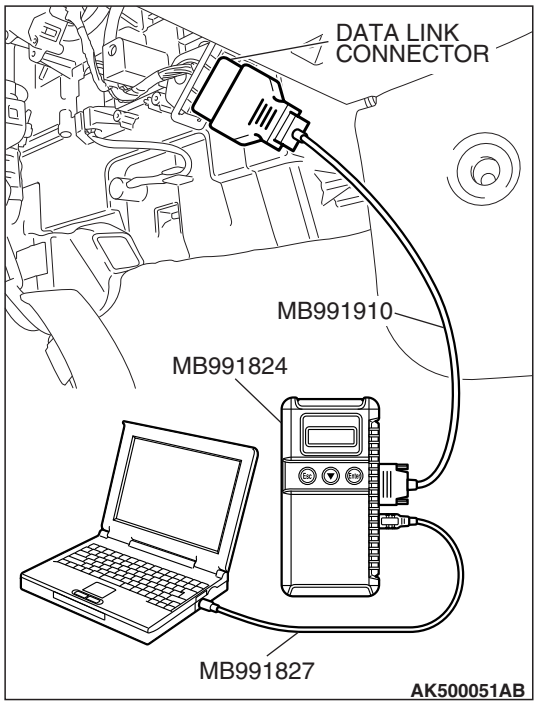
STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

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

Q: Is the immobilizer-DTC set?

YES : Refer to GROUP 54A, immobilizer System Diagnosis – Diagnostic Trouble Code Chart P.54A-22.

NO : Go to Step 3.



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

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

Q: Is DTC U1117 set?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-19.

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