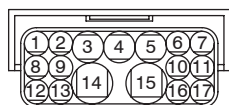
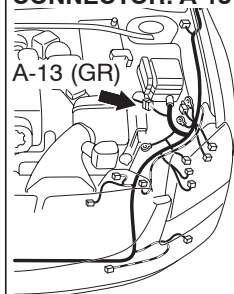


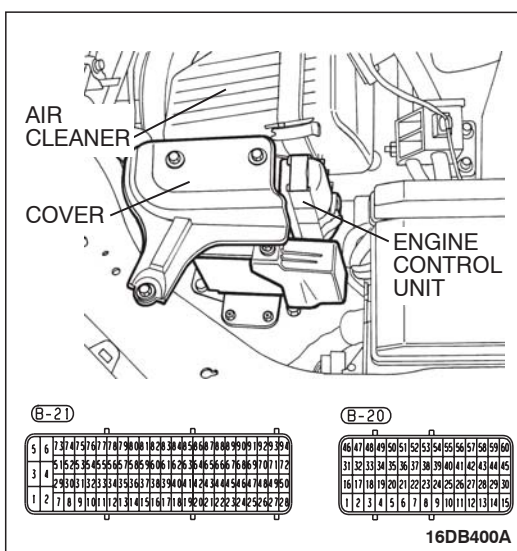
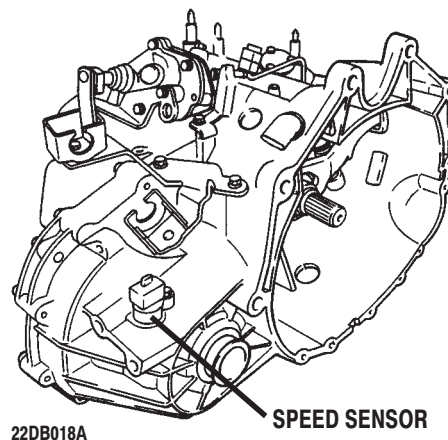
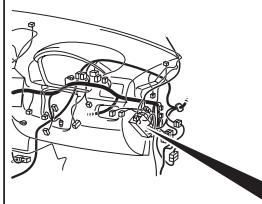
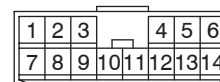
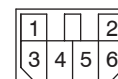
**P0500: Vehicle Speed Sensor System**

**NOTE:** If vehicle is equipped with an automatic transmission, the code P0720 will also be set in the A/T-ECU therefore refer to Output Shaft Speed Sensor troubleshooting procedure P.23A-72 and also CAN-BUS diagnosis section P.54C-13

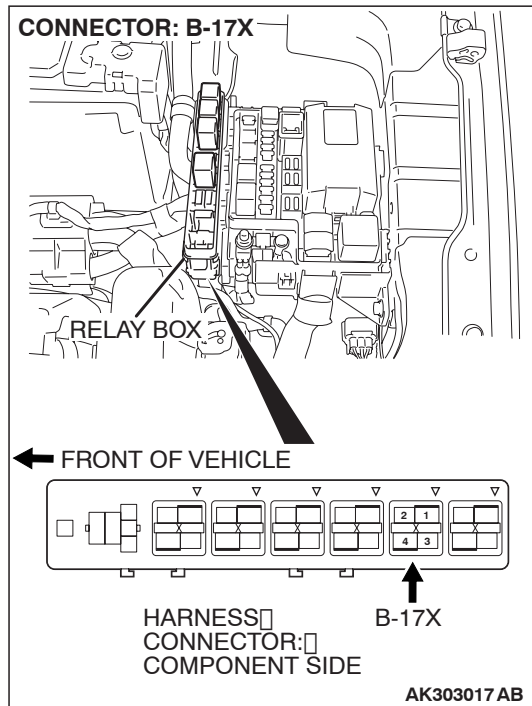
**NOTE:** If vehicle is equipped with a manual transmission, proceed with the following test procedures.

**CONNECTOR: A-13**

10DB083A

**MANUAL TRANSMISSION****CONNECTORS: C-214, 215****C-214****C-215**

10DB084A



## CIRCUIT OPERATION

- The vehicle speed sensor (manual) generates a 0 ⇔ 5 volt pulse signal when the driven (pinion) gear rotates. The pulse signal frequency increases with a rise in driven gear speed.
- The vehicle speed sensor (manual) is connected to the ENGINE-ECU connector B-21 (terminals 82 and 85) via the vehicle speed sensor connector B-121 (terminals 1 and 2).
- The ENGINE-ECU detects the vehicle speed by the signal input to terminal 85.
- The vehicle speed sensor generates the pulse signal as the teeth of the driven gear engages with the vehicle speed sensor gear.

## DTC SET CONDITIONS

### Check Conditions

- M/T gear range position: 1, 2, 3, 4, 5 and reverse
- Engine speed: 1,000 r/min or more.

### Judgement Criteria

- (P0500) will be set, and the check engine warning lamp will come on after 2 drive cycles.

## DRIVE CYCLE PATTERN

Start and drive vehicle at 50km/h for 3mins. Stop vehicle, turn engine "OFF". Restart engine and drive vehicle again at 50km/h for 3 mins. and confirm if speedometer is working and the status of the engine warning lamp.

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

- Malfunction of the vehicle speed sensor (M/T)
- Damaged harness or connector

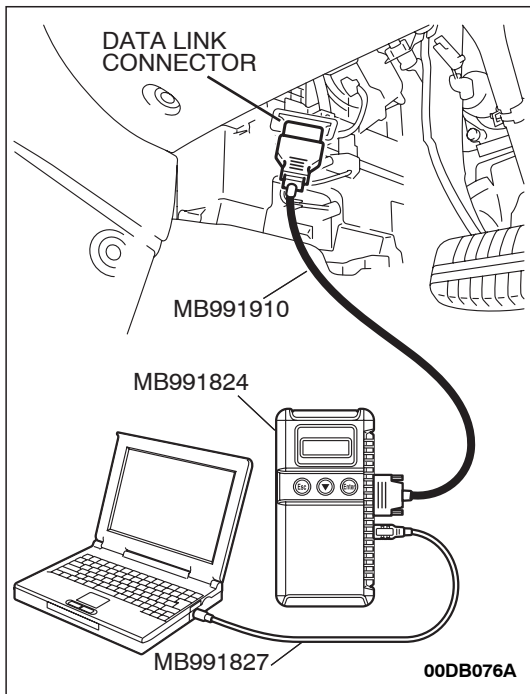
### Circuit drawings

- Refer to circuit diagrams [GROUP-90](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to component locations [GROUP-70](#)

## DIAGNOSIS

### Required Special Tool:

- MB991958: Diagnostic Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: MUT-III USB Cable
  - MB991910: MUT-III Main Harness A
  - MB992044: Engine-ECU Check Harness



**STEP 1.** Using diagnostic tool MB991958, check MPI data list item 4: Vehicle Speed Sensor System.

**⚠ CAUTION**

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

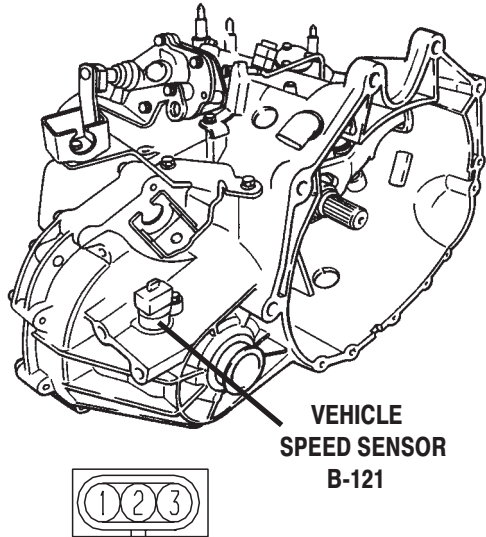
- (1) Connect diagnostic tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set diagnostic tool MB991958 to the data reading mode.
  - Item 4: Vehicle Speed Sensor.
    - When driving at a constant speed of 50km/h, the display should be "1,900 – 2,100 r/min".
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor within the specified range?**

**YES :** It can be assumed that this malfunction is intermittent.  
Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

**NO :** Go to Step 2.

**CONNECTOR: B-121**

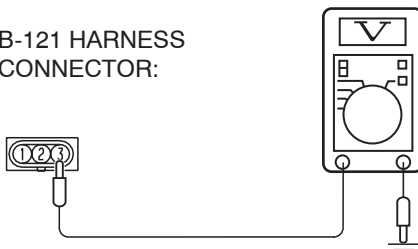


03DB234A

**STEP 2. Measure the power supply voltage at the vehicle speed sensor connector B-121.**

- (1) Disconnect connector B-121 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

B-121 HARNESS  
CONNECTOR:



03DB233A

- (3) Measure the voltage between terminal 1 and ground.
  - The voltage should measure battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the measured voltage battery positive voltage?**

**YES :** Go to Step 5.

**NO :** Go to Step 3.



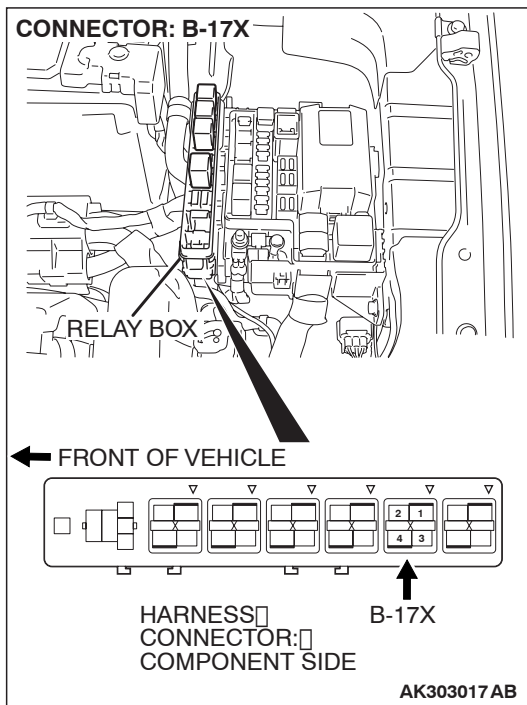
**STEP 3. Check harness connector B-17X at the MPI relay for damage.**

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

**YES :** Go to Step 4.

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

[P.00E-2.](#)

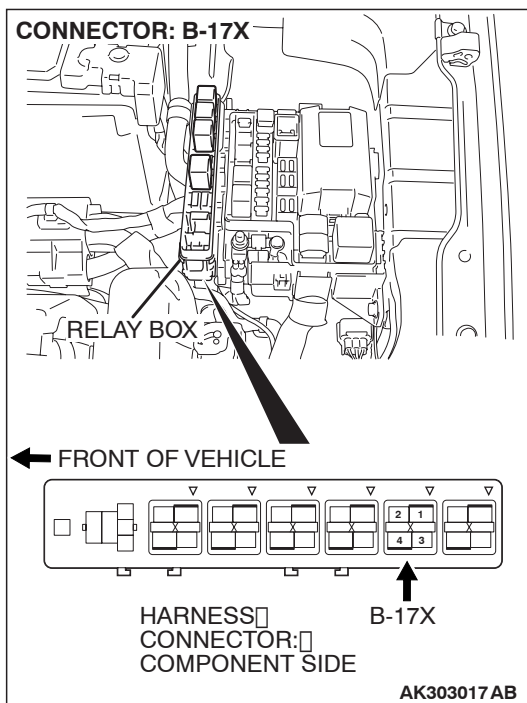


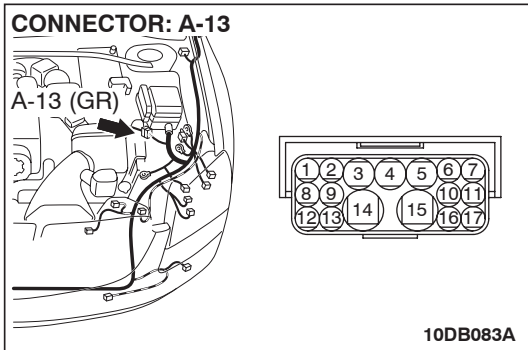
**STEP 4. Check for harness damage between MPI relay connector B-17X (terminal No. 4) and vehicle speed sensor connector B-121 (terminal No. 1).**

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

**YES :** Go to Step 5.

**NO :** Repair harness wire between MPI relay connector B-17X (terminal No. 4) and vehicle speed sensor connector B-121 (terminal No. 1).





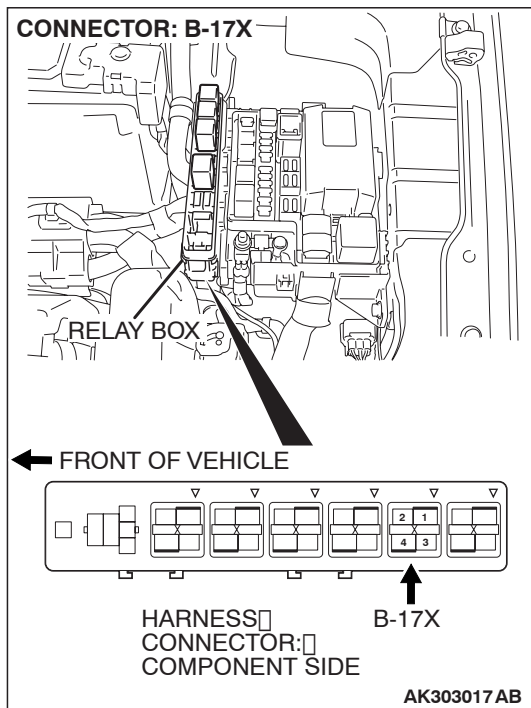
**STEP 5. Check intermediate connector A-13 and MPI relay connector B-17X for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

**YES :** Go to Step 6.

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

[P.00E-2.](#)



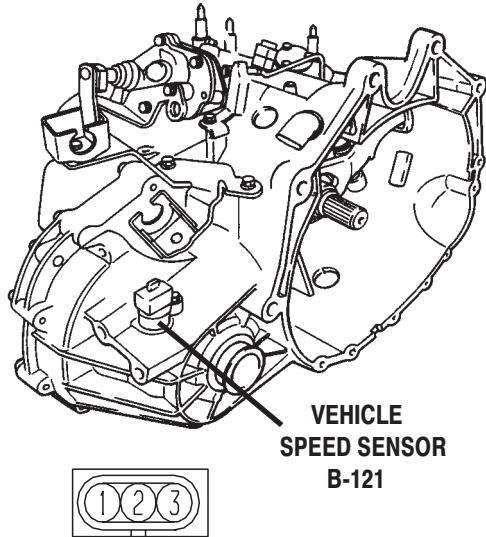
**STEP 6. Check the harness for open circuit or short circuit to ground between the MPI relay connector B-17X terminal 1 and the intermediate connector A-13 terminal 5.**

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

**YES :** Go to Step 7.

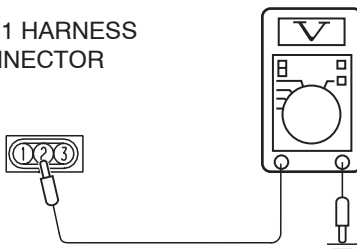
**NO :** Repair or replace the harness wire.

**CONNECTOR: B-121**



03DB234A

**B-121 HARNESS  
CONNECTOR**



**STEP 7. Measure the ENGINE-ECU to speed sensor, output voltage at the vehicle speed sensor connector B-121.**

- (1) Disconnect connector B-121 from the speed sensor and measure voltage at the harness side.
- (2) Turn the ignition switch to the "ON" position.

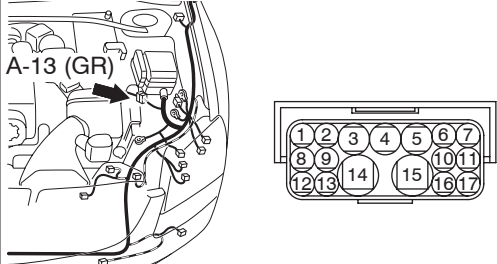
- (3) Measure the voltage between terminal 3 and ground.
  - The voltage should measure between 4.5 and 4.9 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 9.

**NO :** Go to Step 8.

**CONNECTOR: A-13**



10DB083A

**STEP 8. Check intermediate connector A-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

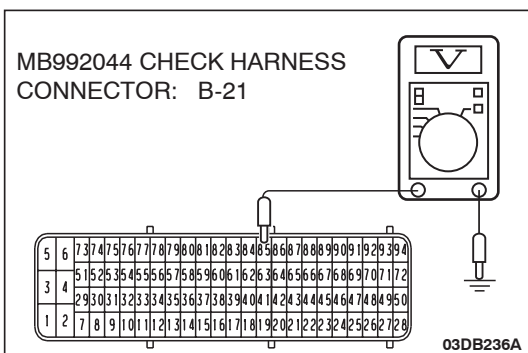
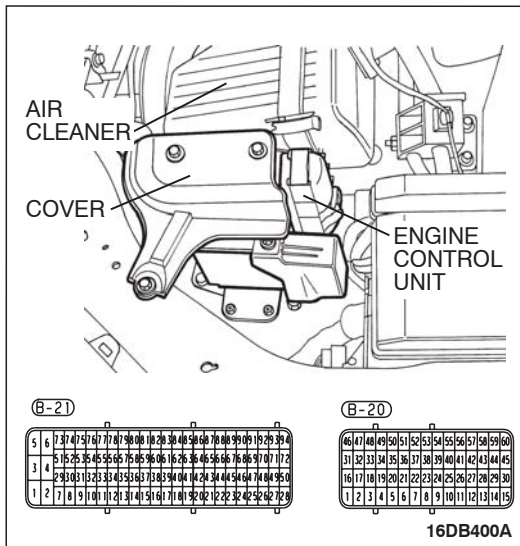
**YES :** Go to Step 9.

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

[P.00E-2.](#)

**STEP 9. Measure the ENGINE-ECU output voltage to the speed sensor at the ENGINE-ECU connector B-21 by using check harness special tool MB992044.**

- (1) Disconnect all the connectors from the ENGINE-ECU.
- (2) Connect special tool MB992044 (check harness) between the ENGINE-ECU and the control-side harness connectors.
- (3) Turn the ignition switch to the "ON" position.



- (4) Measure the voltage between connector B-21 (terminal 85) and ground.

- The voltage should measure between 4.5 and 4.9 volts.

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

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

**YES :** Go to Step 10.

**NO :** Go to Step 12.

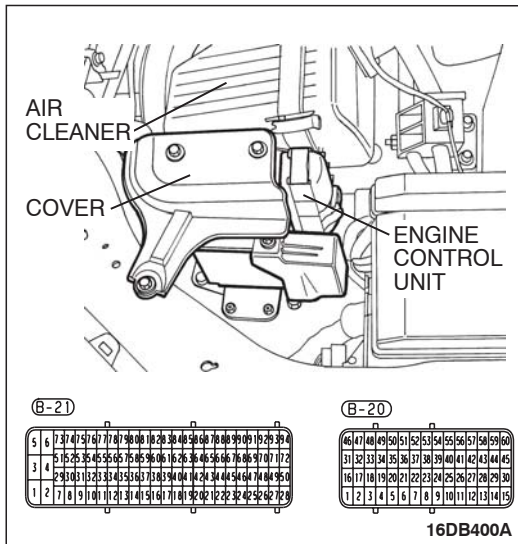
**STEP 10. Check ENGINE-ECU connector B-21 and vehicle speed sensor connector B-121 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

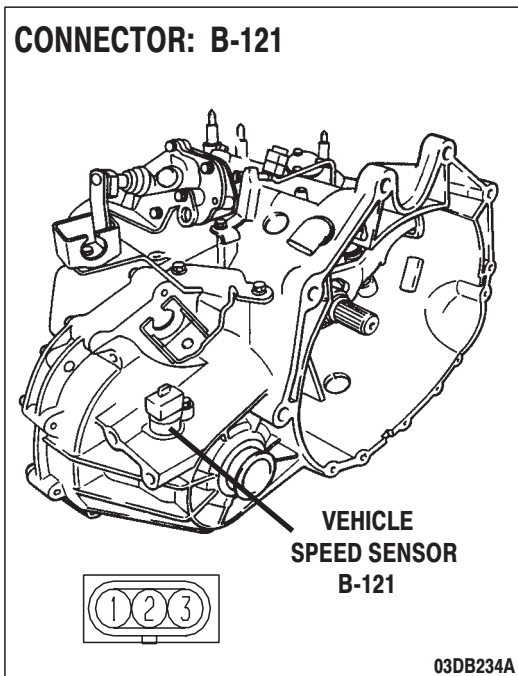
**YES :** Go to Step 11.

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

[P.00E-2.](#)



## CONNECTOR: B-121

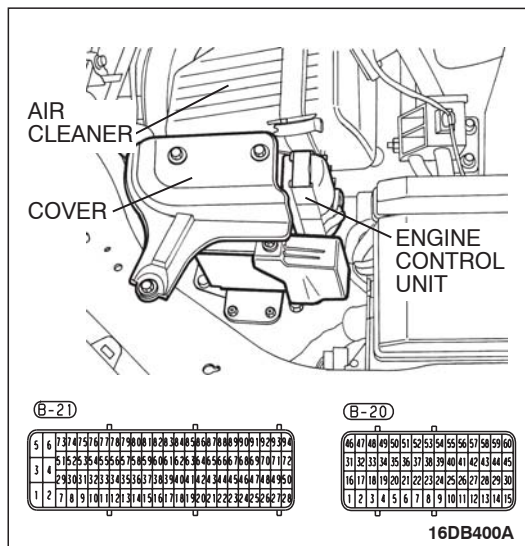


**STEP 11. Check the harness for open circuit or damage between ENGINE-ECU connector B-21 terminal 85 and vehicle speed sensor connector B-121 terminal 3.**

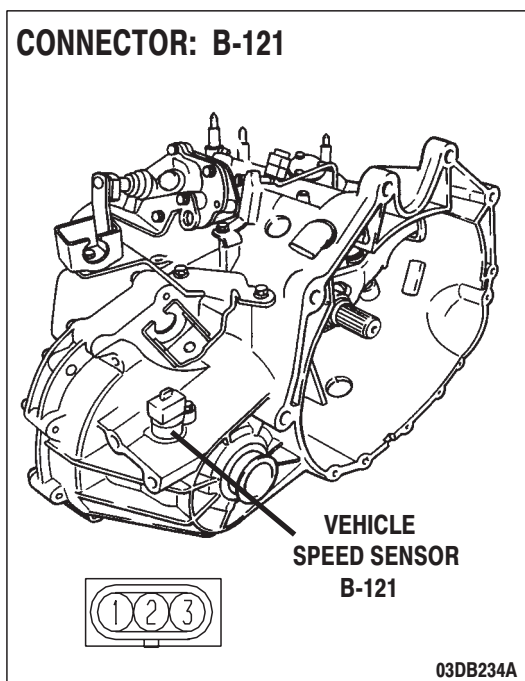
**Q: Is the harness wire in good condition?**

**YES :** Go to Step 12.

**NO :** Repair or replace the harness wire.



## CONNECTOR: B-121



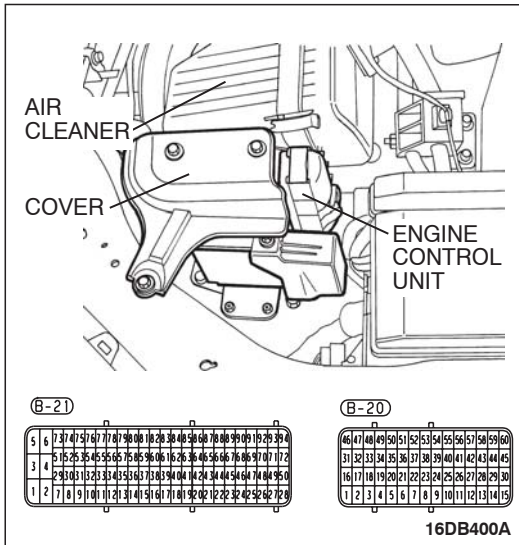
**STEP 12.** Check ENGINE-ECU connector B-21 and vehicle speed sensor connector B-121 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

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

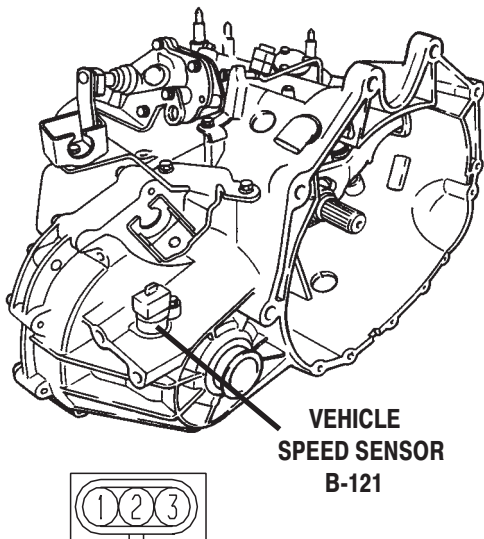
**YES :** Go to Step 13.

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

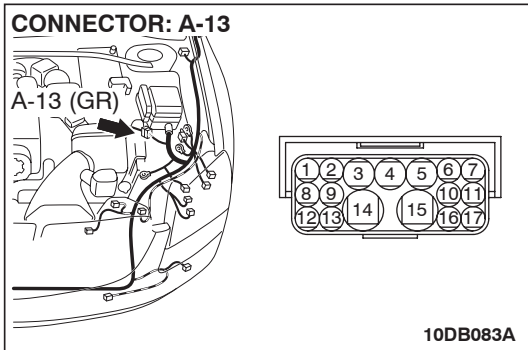
[P.00E-2.](#)



## CONNECTOR: B-121



03DB234A



**STEP 13. Check intermediate connector A-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

**YES :** Go to Step 14.

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

[P.00E-2.](#)

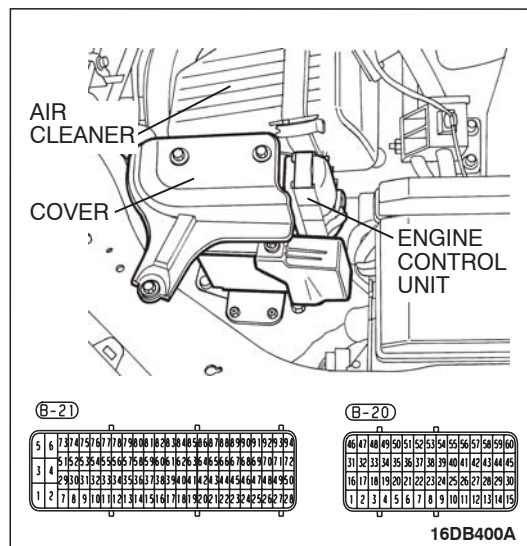


**STEP 14. Check the harness for short circuit to ground between ENGINE-ECU connector B-21 terminal 85 and vehicle speed sensor connector B-121 terminal 3.**

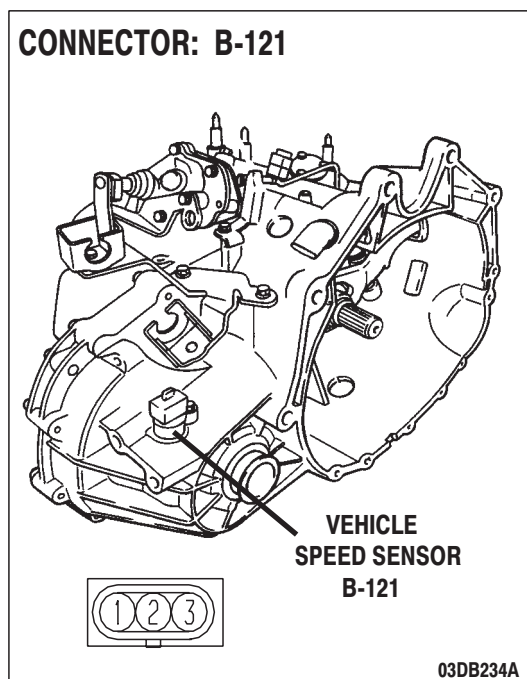
**Q: Is the harness wire in good condition?**

**YES :** Go to Step 15.

**NO :** Repair or replace the harness wire.

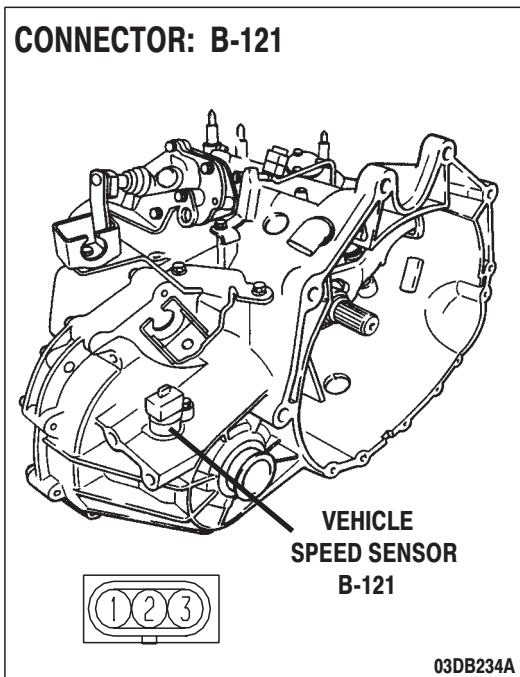


## CONNECTOR: B-121



**STEP 15. Measure the ground circuit for resistance at the vehicle speed sensor connector B-121.**

- (1) Disconnect connector B-121 from the speed sensor and measure at the harness side.

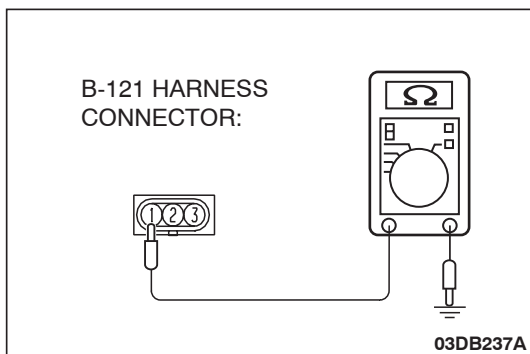


- (2) Measure the resistance between terminal 2 and ground.
- The resistance should measure less than 2 ohms.

**Q: Is the measured resistance less than 2 ohms?**

**YES :** Go to Step 17.

**NO :** Go to Step 16.



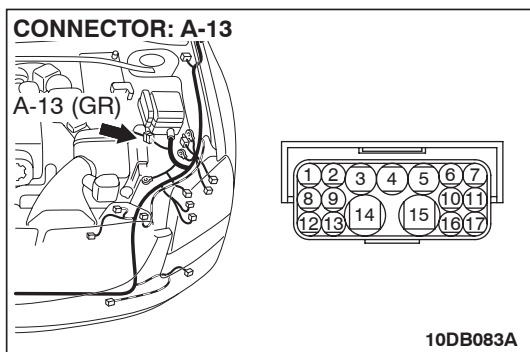
**STEP 16. Check intermediate connector A-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

**YES :** Go to Step 17.

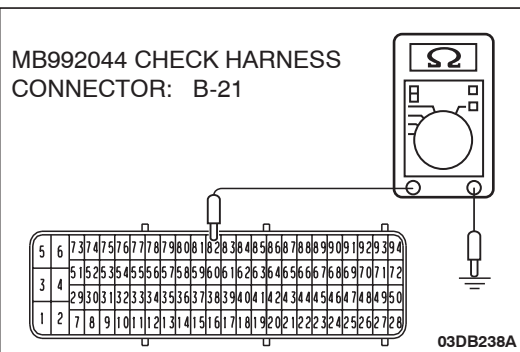
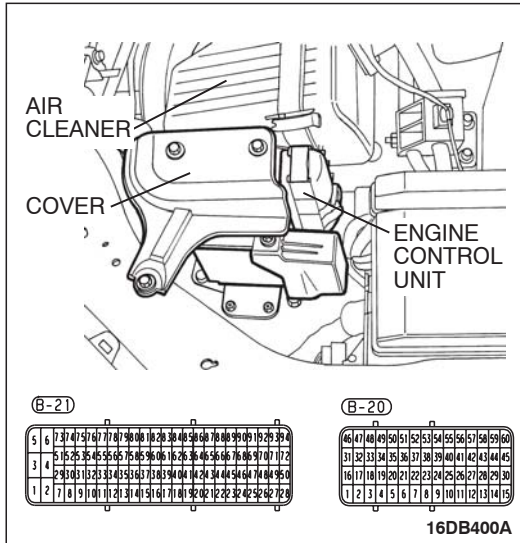
**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)



**STEP 17. Measure the resistance at the ENGINE-ECU connector B-21 by using check harness special tool MB992044.**

- (1) Disconnect all the connectors from the ENGINE-ECU.
- (2) Connect special tool MB992044 (check harness) between the ENGINE-ECU and the body and control-side harness connector.
- (3) Turn the ignition switch to the "ON" position.



- (4) Measure the resistance between terminal 82 and ground.
  - The resistance should measure less than 2 ohms.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the measured resistance less than 2 ohms?**

**YES :** Go to Step 18.

**NO :** Repair or replace wiring harness.

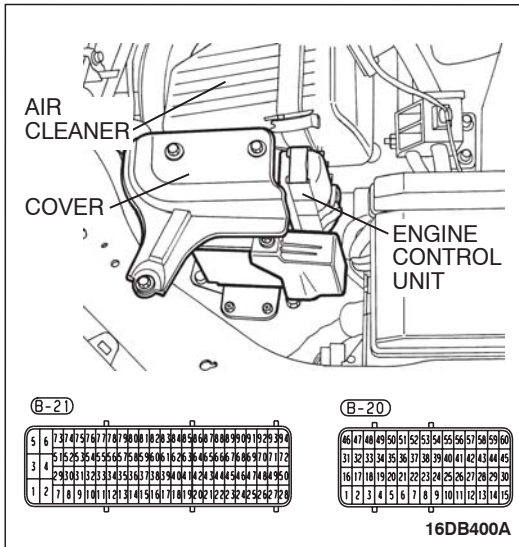
**STEP 18. Check ENGINE-ECU connector B-21 and vehicle speed sensor connector B-121 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

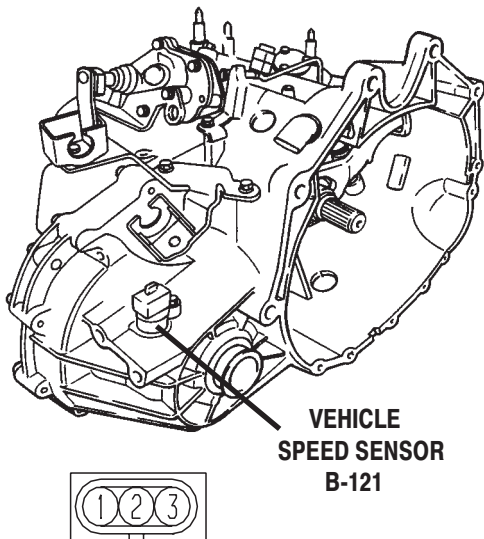
**YES :** Go to Step 19.

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

[P.00E-2.](#)



## CONNECTOR: B-121



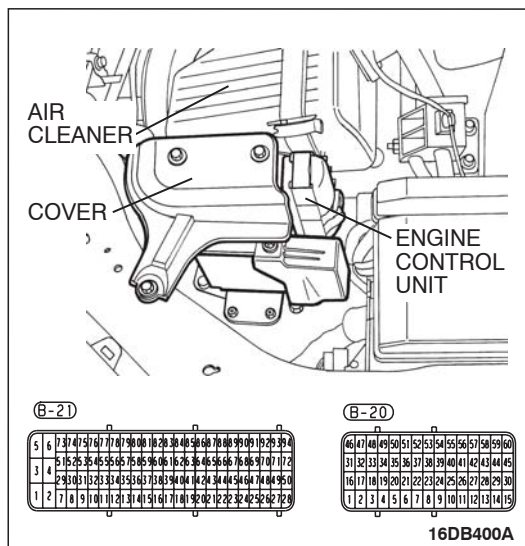
03DB234A

**STEP 19. Check the harness for open circuit or damage between ENGINE-ECU connector B-21 terminal 82 and vehicle speed sensor connector B-121 terminal 2.**

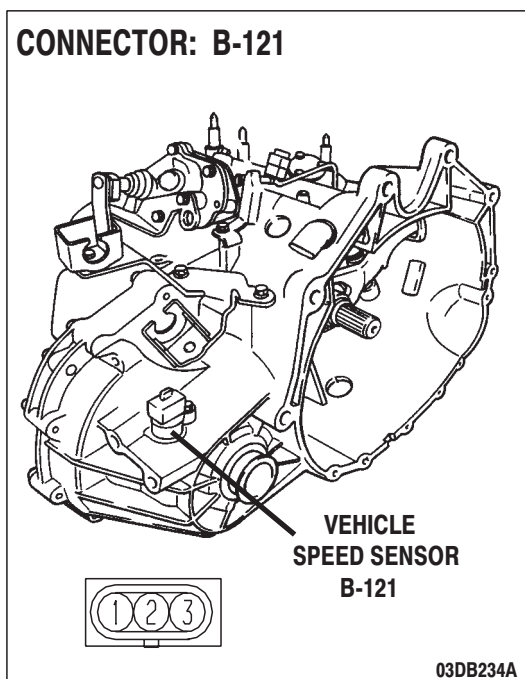
**Q: Is the harness wire in good condition?**

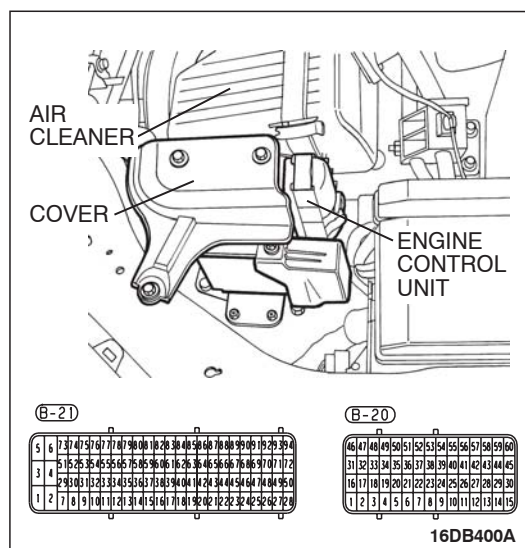
**YES :** Go to Step 20.

**NO :** Repair or replace the harness wire.



## CONNECTOR: B-121



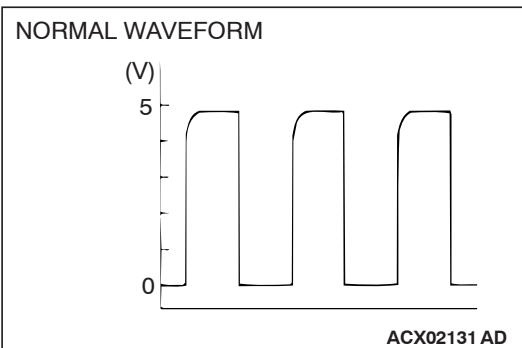
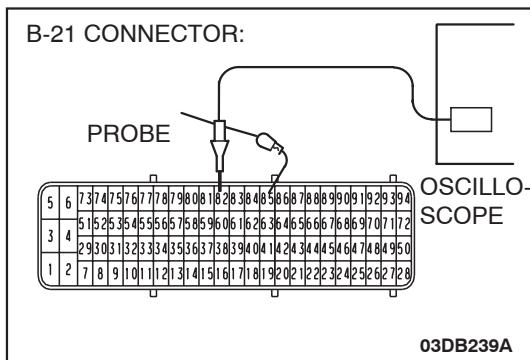
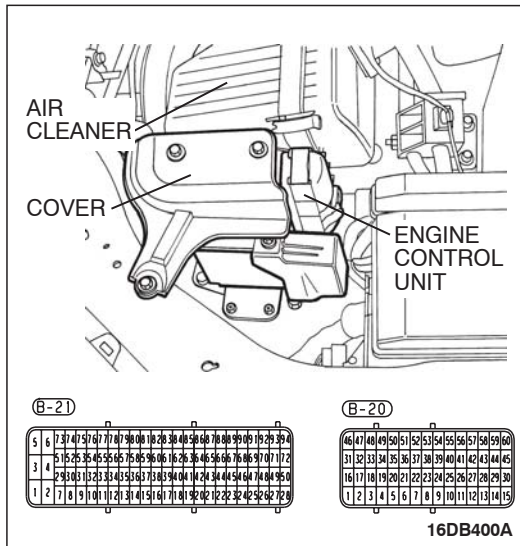


**STEP 20. Check ENGINE-ECU connector B-21 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

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

**YES** : Go to Step 21.

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



**STEP 21. Using the oscilloscope, check the vehicle speed sensor waveform at ENGINE-ECU connector B-21 by using check harness special tool MB992044.**

- (1) Disconnect all the connectors from the ENGINE-ECU.
- (2) Connect special tool MB992044 (check harness) between the ENGINE-ECU and the body and control-side harness connector.

- (3) Connect an oscilloscope probe to ENGINE-ECU connector B-21 terminal 85 and 82.

- (4) Start the engine and drive the vehicle at constant speed of 50 km/h.

- (5) Check the vehicle speed sensor waveform.

- The vehicle speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.8 volt or less. The output waveform should not contain electrical noise.

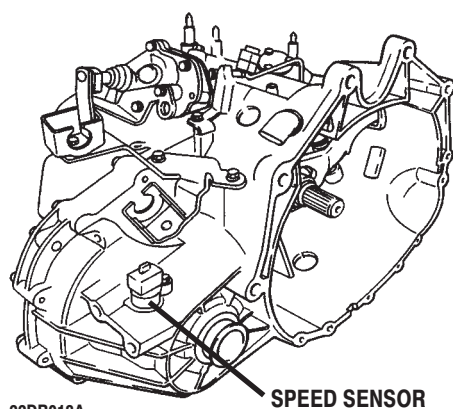
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the waveform normal?**

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction [P.00-14](#).

**NO :** Go to Step 22.

**MANUAL  
TRANSMISSION**



22DB018A

**STEP 22. Replace the vehicle speed sensor.**

- (1) Replace the vehicle speed sensor. Refer to GROUP 22B, Manual transmission overhaul [P.22B-30](#).
- (2) Test drive the vehicle.
- (3) Check for Engine MPI diagnostic trouble code.

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

**YES :** The procedure is complete.

**NO :** Repeat the troubleshooting procedure again. Go back to Step 1.



**DTC P0506: Idle Control Sytem RPM Lower Than Expected**

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ENGINE-ECU checks the difference between the actual engine speed and the target engine speed.

**Check Conditions**

- Vehicle speed is 0 km/h.
- Intake air temperature is above -9.8°C.
- Engine speed is idle.
- Engine coolant temperature is above 60°C.
- Altitude is lower than 3000 meters.

**Judgment Criteria**

- Idle correction deviation is below -200r/min for 19 seconds.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

**DIAGNOSIS**

**Required Special Tools**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

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

**⚠ CAUTION**

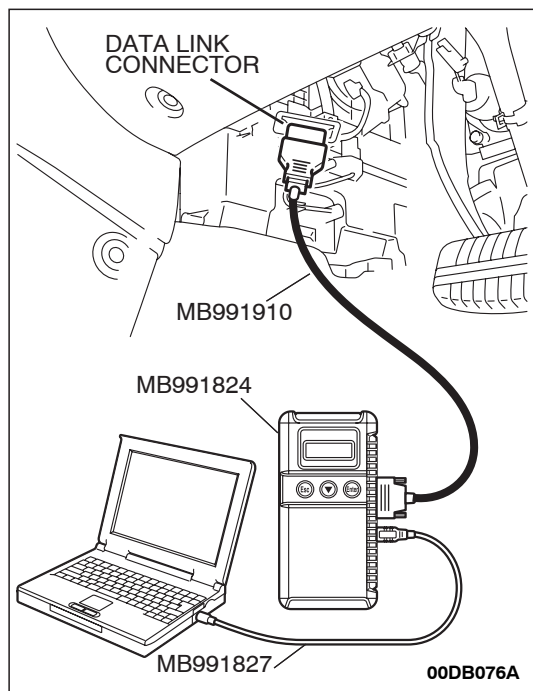
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool 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 a diagnostic trouble code other than P0506 set?**

**YES** : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**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.13A-660](#). Then go to Step 4.

**NO** : Go to Step 3.

---

**STEP 3. Replace the throttle body assembly.**

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

**Q: Is DTC P0506 set?**

**YES** : Then go to Step 4.

**NO** : The inspection is complete.

---

**STEP 4. Test the EOBD drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0506 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P0507: Idle Control Sytem RPM Higher Than Expected**

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ENGINE-ECU checks the difference between the actual engine speed and the target engine speed.

**Check Conditions**

- Vehicle speed is 0 km/h.
- Intake air temperature is above -9.8?.
- Engine speed is idle.
- Engine coolant temperature is above 60?.
- Altitude is lower than 3000 meters.

**Judgment Criteria**

- Idle correction deviation is above 100r/min for 19 seconds.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Intake system vacuum leak.
- Throttle body assy failed.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

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

**⚠ CAUTION**

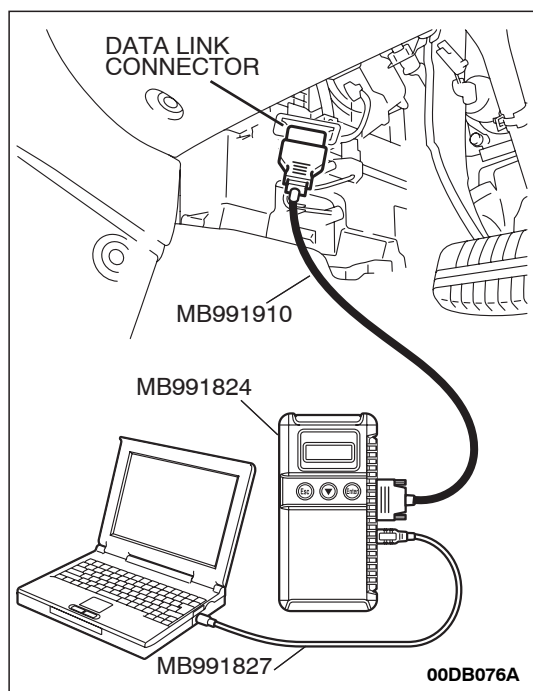
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 a diagnostic trouble code other than P0507 set?**

**YES :** Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**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) 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 P0507 set?**

**YES :** Then go to Step 4.

**NO :** The inspection is complete.

---

**STEP 4. Test the EOBD drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to –  
[P.13A-11](#).

(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

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

### DTC SET CONDITIONS

#### Check Conditions

- Ignition switch: ON

#### Judgment Criteria

- When the communication error between ENGINE-ECU and the ETACS-ECU continues for 2 seconds or more.

- No MIL
- Engine will not start.

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

- Incorrect VIN in ENGINE-ECU.
- ENGINE-ECU programmed VIN does not match ETACS VIN.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

### STEP 1. Using diagnostic tool , read the immobilizer diagnostic trouble code (DTC).

#### **CAUTION**

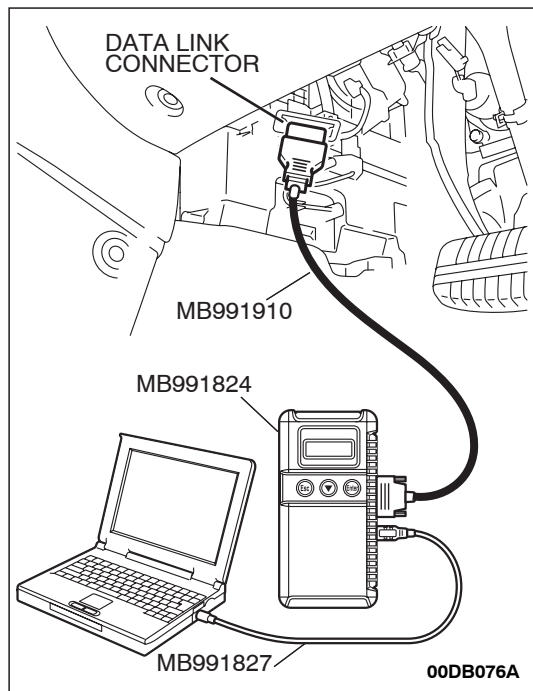
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- Connect diagnostic tool to the data link connector.
- Turn the ignition switch to the "ON" position.
- Read the immobilizer-DTC.
- After the DTC has been deleted, read the DTC again.
- Turn the ignition switch to the "LOCK" (OFF) position.

### Q: Is the immobilizer-DTC- P0513 or P0630 set?

**YES** : Refer to GROUP 54A, Ignition Switch and Immobilizer System – Diagnostic Trouble Code Chart P.54A-13.

**NO** : Inspection is complete.



## DTC P0562: Battery Voltage too Low

### TECHNICAL DESCRIPTION

- ENGINE-ECU monitors the supply voltage.

### DTC SET CONDITIONS

#### Check Conditions

- Vehicle speed is 5 km/h.
- Time after start is 3 minutes.

#### Judgment Criteria

- Supply voltage is below 9.99 volts.

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

- Malfunction of Alternator.
- Battery failed.
- Battery terminals dirty.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

### DIAGNOSIS

#### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

#### STEP 1. Using diagnostic tool , check data list item 1: Power supply voltage.

##### CAUTION

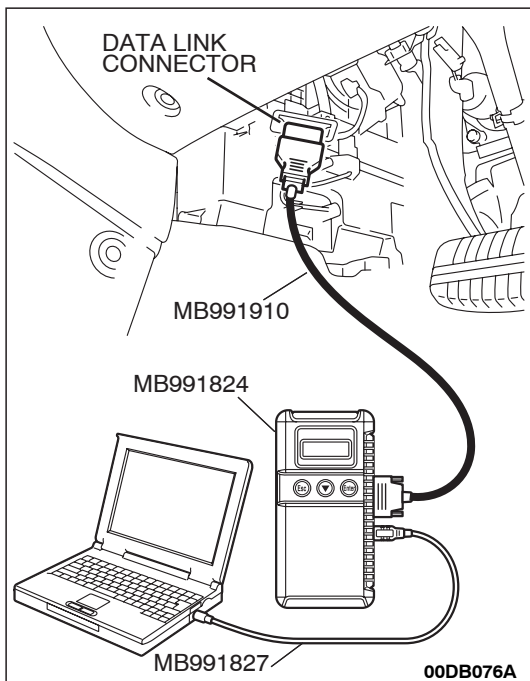
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- Connect diagnostic tool to the data link connector.
- Turn the ignition switch to the "ON" position.
- Set diagnostic tool to the data reading mode for item 1, Power supply voltage.
  - Check that it is between 9.99 and 17.05 volts.
- Turn the ignition switch to the "LOCK"(OFF) position.

#### Q: Is the measured voltage within specification?

**YES** : Go to Step 2.

**NO** : Refer to GROUP 16 , Engine Electrical - Charging System P.16-3. Then go to Step 2.



#### STEP 2. Using diagnostic tool , read the diagnostic trouble code (DTC)

- Turn the ignition switch to the "ON" position.
- Check the diagnostic trouble code (DTC).

#### Q: Is DTC P0562 set?

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P0563: Battery Voltage too High**

**TECHNICAL DESCRIPTION**

- ENGINE-ECU monitors the supply voltage.

**DTC SET CONDITIONS**

**Check Conditions**

- Vehicle speed is 5 km/h.
- Time after start is 3 minutes.

**Judgment Criteria**

- Supply voltage is above 17.05 volts.

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

- Malfunction of Alternator.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 1: Power supply voltage.**

**⚠ CAUTION**

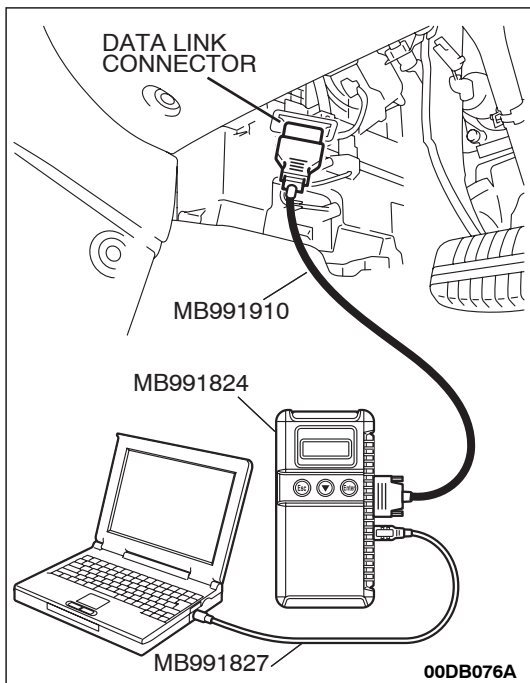
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 1, Power supply voltage.
  - Check that it is between 9.99 and 17.05 volts.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is the measured voltage within specification?**

**YES :** Go to Step 2.

**NO :** Refer to [GROUP 16](#) , Engine Electrical - Charging System [P.16-3](#). Then go to Step 2.



**STEP 2. Using diagnostic tool , 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 P0563 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## DTC P0603: EEPROM Malfunction

### CAUTION

The MIL may or may not illuminate when DTC P0603 is detected. Refer below:

### TECHNICAL DESCRIPTION

- ENGINE-ECU performs a check on the match between hardware and software for different transmission configurations (M/T, A/T).

### Check Conditions

- Ignition switch is in "ON" position.

### Judgement Criteria

- Mismatch between software variant and transmission.

- EPPROM defect - No MIL.
- Incorrect ECU fitted - MIL activated immediately and engine only idling.

### EOBD DRIVE CYCLE PATTERN

None.

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

- EPPROM defect in ENGINE-ECU.
- Incorrect ENGINE-ECU fitted.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

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

#### CAUTION

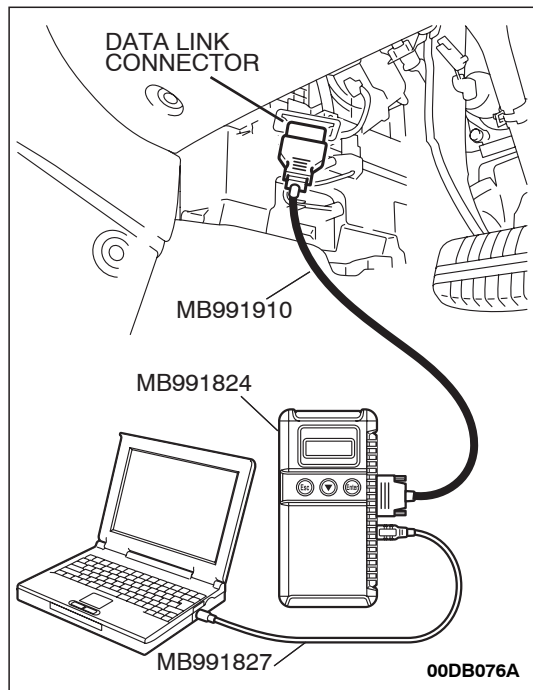
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 ENGINE-ECU.

**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: Powertrain Control Module Main Processor Malfunction**

**TECHNICAL DESCRIPTION**

- Throttle actuator control module processor checks the ENGINE-ECU for abnormal conditions.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition "ON".

**EOBD DRIVE CYCLE PATTERN**

None.

**Judgement Criteria**

- MIL activated immediately.
- Fuel cut and engine speed limited.

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

- ENGINE-ECU failed.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

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

**⚠ CAUTION**

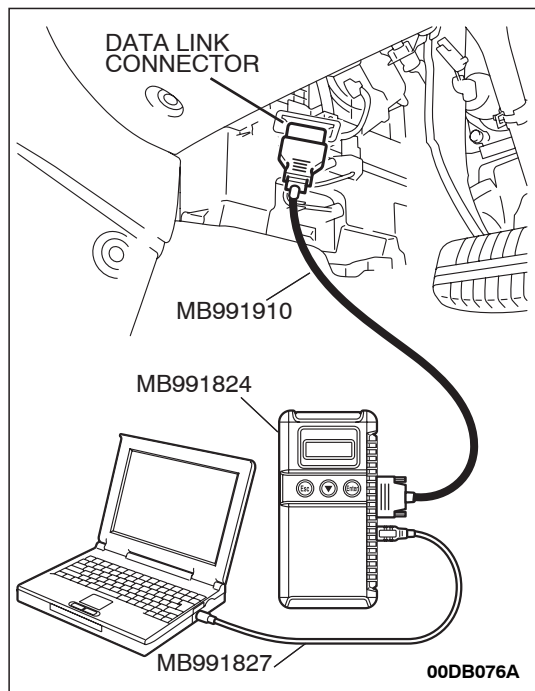
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 ENGINE-ECU.

**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 P0630: Vehicle Identification Number (VIN) Malfunction

### TECHNICAL DESCRIPTION

- The Vehicle Identification Number (VIN) is stored in the ENGINE-ECU by the vehicle manufacturer.

### DTC SET CONDITIONS

#### Check Conditions

- Ignition switch is in "ON" position.
- EPPROM is normal.

#### Judgement Criteria

- VIN (current) has not been written.
- No MIL
- Engine will not start.

### EOBD DRIVE CYCLE PATTERN

None.

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

- Incorrect VIN in ENGINE-ECU.
- ENGINE-ECU programmed VIN does not match ETACS VIN.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

### DIAGNOSIS

#### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

#### STEP 1. Using diagnostic tool , check VIN Information.

##### CAUTION

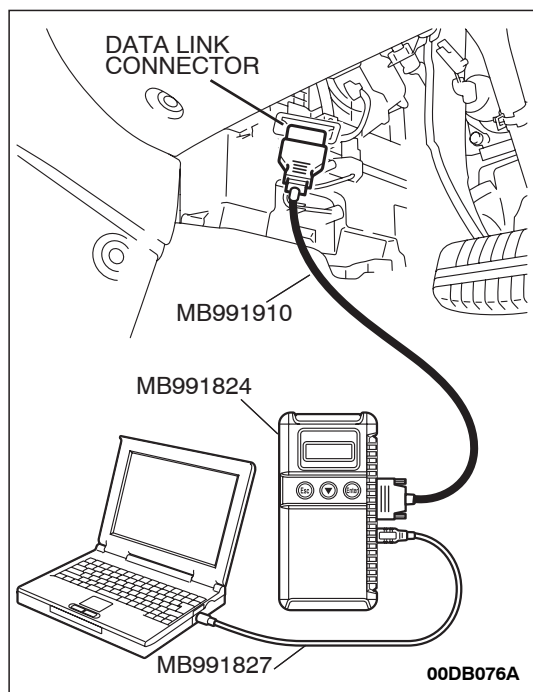
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

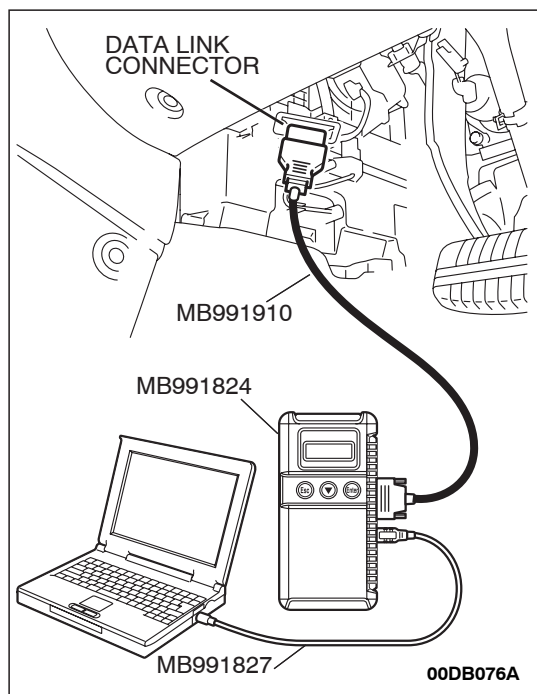
- (1) Connect diagnostic tool to the data link connector.
- (2) Set diagnostic tool to the coding mode for VIN Information.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

#### Q: Has VIN (current) been written?

**YES** : Go to Step 2.

**NO** : Write VIN. Then go to Step 2.





**STEP 2. Using diagnostic tool , 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 ENGINE-ECU.

**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](#).

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**DTC P0638: Throttle Actuator Control Motor Circuit Range/Performance Problem**

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**THROTTLE ACTUATOR CONTROL  
MOTOR CIRCUIT  
RANGE/PERFORMANCE PROBLEM  
CIRCUIT**

- Refer to DTC P2101 – Throttle Actuator Control Motor Circuit [P.13A-461](#).

**CIRCUIT OPERATION**

- Refer to DTC P2101 – Throttle Actuator Control Motor Circuit [P.13A-461](#).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU checks the electronic controlled throttle system for abnormal conditions.

**DTC SET CONDITIONS <Throttle Body: Error at spring check>**

**Check Conditions**

- Vehicle speed is 0 km/h.
- Engine speed is below 300 r/min.
- Engine coolant temperature is above 5.3 degreeC.
- Intake air temperature is above 5.3 degreeC.
- Battery voltage is above 6.5 volts.

**Judgement Criteria**

- Throttle angle is 12% more than adapted limp home for 0.14s.  
or
- Throttle angle is 3% lower than adapted limp home for 0.56s.

**DTC SET CONDITIONS <Throttle Body: Error at Emergency Air Position Test>**

**Check Conditions**

- Vehicle speed is 0 km/h.
- Engine speed is below 300 r/min.
- Engine coolant temperature is between 5.3 and 105 degreeC.
- Intake air temperature is between 5.3 and 143.3 degreeC.

- Battery voltage is higher than 10 volts.
- Time with ignition on (engine off) is more than 1310.7 seconds.

**Judgement Criteria**

- Throttle angle at limp-home air position is below 1.0697% or above 13.0785%.

**DTC SET CONDITIONS <Throttle Body: Error at UMA-Learning>**

**Check Conditions**

- Vehicle speed is 0 km/h.
- Engine speed is below 300 r/min.
- Engine coolant temperature is between 5.3 and 105 degreeC.
- Intake air temperature is between 5.3 and 143.3 degreeC.
- Battery voltage is above 10 volts.
- Time with ignition on (engine off) is more than 1310.7 seconds.

- Gas pedal angle is below 14.9%.

**Judgement Criteria**

- Voltage sensor 1 at lower throttle stop is above 0.89111377 volt.
- Stationary portion is below 0.212402 volt.
- or
- Voltage sensor 2 at lower throttle stop is above 4.841309 volts.  
Stationary portion is below 4.11621123 volts.

## DTC SET CONDITIONS <Throttle Body: Adaption caused by Ambient Conditions>

### Check Conditions

- Vehicle speed is above 0km/h.
- Engine speed is above 300 r/min.
- Engine coolant temperature is below 5.3 degreeC or above 105 degreeC.
- Intake air temperature is below 5.3 degreeC or above 143,3 degreeC.

- Battery voltage is below 10 volts.
- Throttle valve currentless.

### Judgement Criteria

- None.

## DTC SET CONDITIONS <Throttle Body: Error at UMA-Relearning>

### Check Conditions

- Vehicle speed is 0 km/h.
- Engine speed is below 300 r/min.
- Engine coolant temperature is between 5.3 and 105 degreeC.
- Intake air temperature is between 5.3 and 143.3 degreeC.
- Battery voltage is above 10V.
- Time with ignition on (engine off) is more than 1310.7 seconds.

- Gas pedal angle is below 14.9%.

### Judgement Criteria

- Voltage sensor 1 at lower throttle stop is above 0.89111377 volt.
- Stationary portion is below 0.212402 volt.
- or
- Voltage sensor 2 at lower throttle stop is above 4.841309 volts.
- Stationary portion is below 4.11621123 volts.

## DTC SET CONDITIONS <Throttle Body: Error at Amplifier Adjustment>

### Check Conditions

- Vehicle speed is 0 km/h.
- Engine speed is below 300 r/min.
- Engine coolant temperature is between 5.3 and 105 degreeC.
- Intake air temperature is between 5.3 and 143.3 degreeC.
- Battery voltage is above 10 volts.

- Time with ignition on (engine off) is more than 1310.7 seconds.
- Gas pedal angle is below 14.9%.

### Judgement Criteria

- Amplifier value is above 4.324219 volts or below 3.996064 volts.
- Offset limit for amplifier value is above 0.054932 volt or below -0.054932 volt.

## EOBD DRIVE CYCLE PATTERN

None.

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

- Throttle valve return spring failed.
- Throttle valve operation failed.
- Throttle actuator control motor failed.

- Harness damage in throttle actuator control motor circuit, or connector damage.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 59:  
Target ETV Value.**

**⚠ CAUTION**

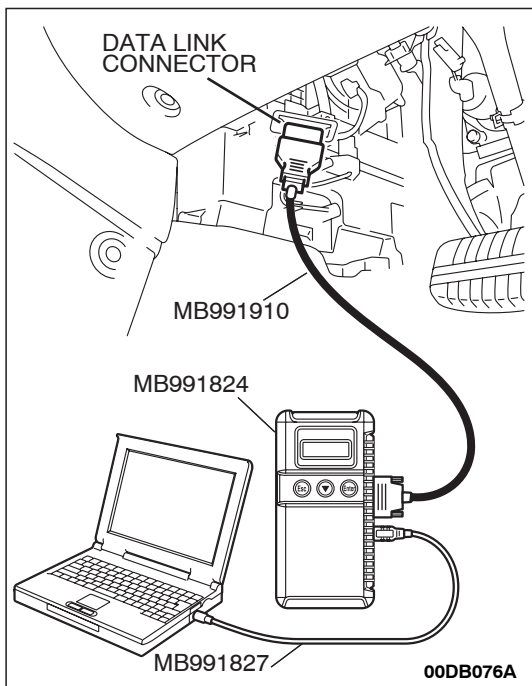
**To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .**

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 59, Target ETV Value.
  - Check that it is between 0.6 and 1.2 volts.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is the measured voltage between 0.6 and 1.2 volts?**

**YES :** Go to Step 2..

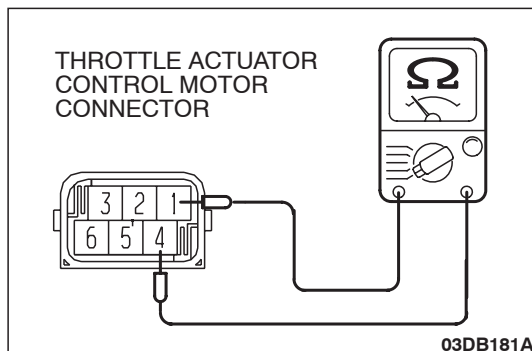
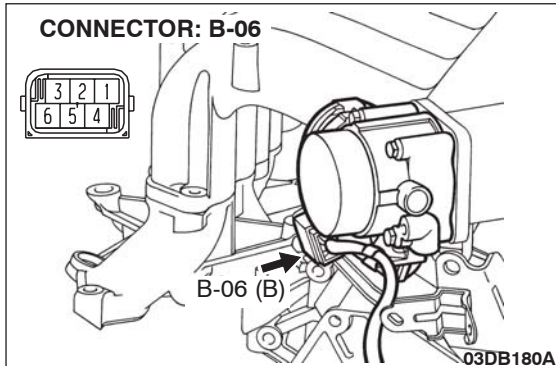
**NO :** Replace the throttle body assembly. Then go to Step 8.



**⚠ WARNING**

*If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstances activate the throttle plate by hand. When removing the throttle body from the intake manifold disconnect the wiring first. During replacement connect the wiring last.*

*Do not activate the throttle body using a DC supply to test the motor, as permanent damage to the throttle body will result.*



**STEP 2. Check the throttle actuator control motor.**

(1) Disconnect the connector B-06.

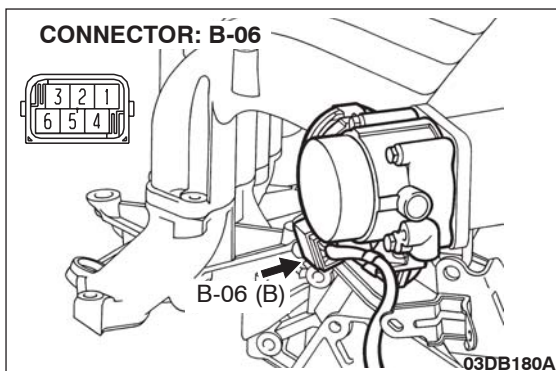
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 4.

**Standard value:  $1.5 \pm 0.3$  ohms [at 20°C]**

**Q: Is the measured resistance between the standard value?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 8.



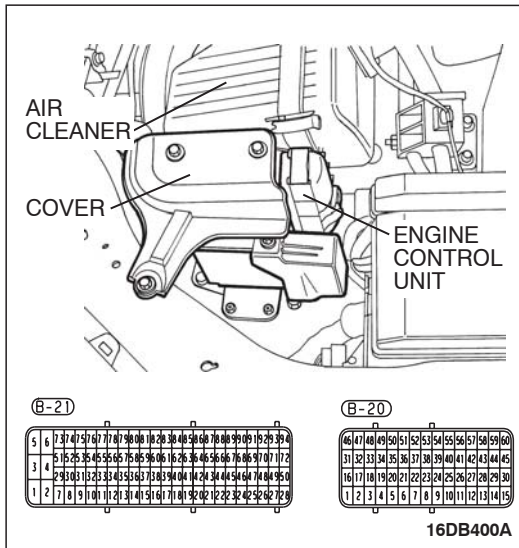
**STEP 3. Check harness connector B-06 at throttle actuator control motor for damage.**

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

**YES :** Go to Step 4.

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



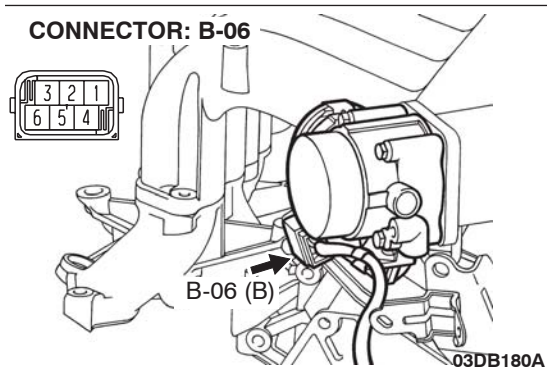


**STEP 4. Check harness connector B-20 at ENGINE-ECU for damage.**

**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.

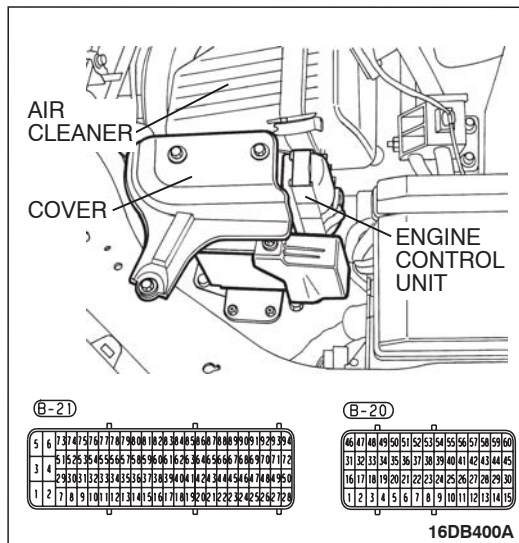


**STEP 5. Check for harness damage between throttle actuator control motor connector B-06 (terminal No. 4) and ENGINE-ECU connector B-20 (terminal No. 50).**

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

**YES :** Go to Step 6.

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



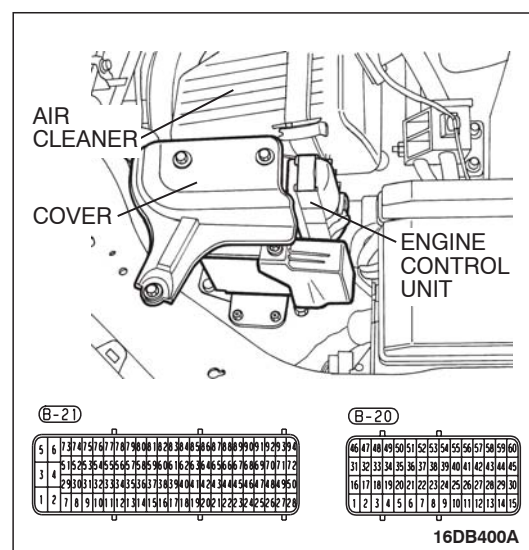
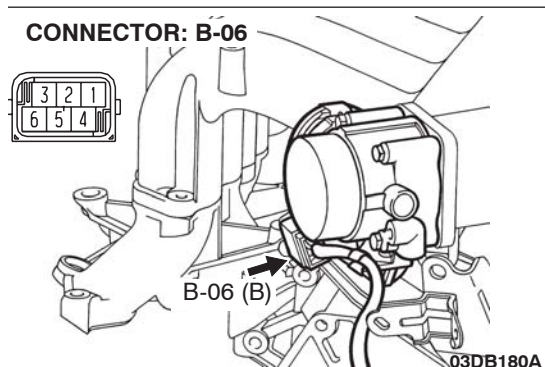


**STEP 6.** Check for harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ENGINE-ECU connector B-20 (terminal No. 49).

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

**YES :** Go to Step 7.

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



**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

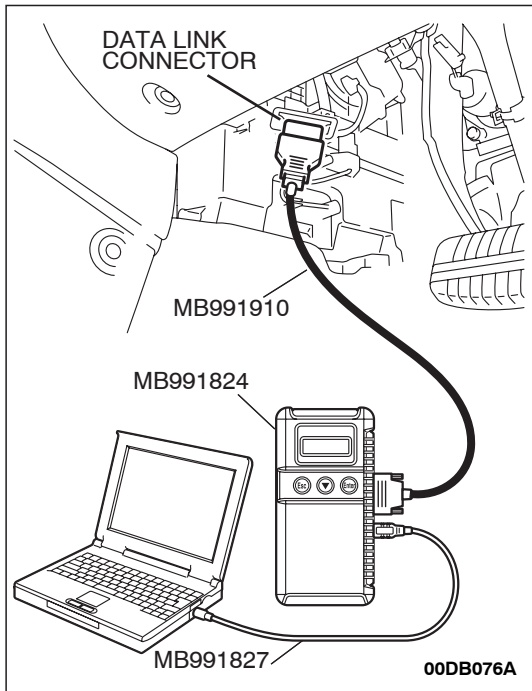
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 :** 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](#).



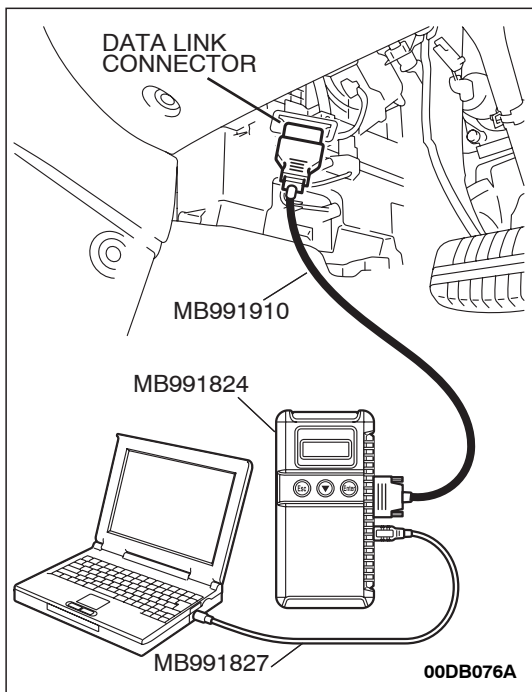
**STEP 8. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.

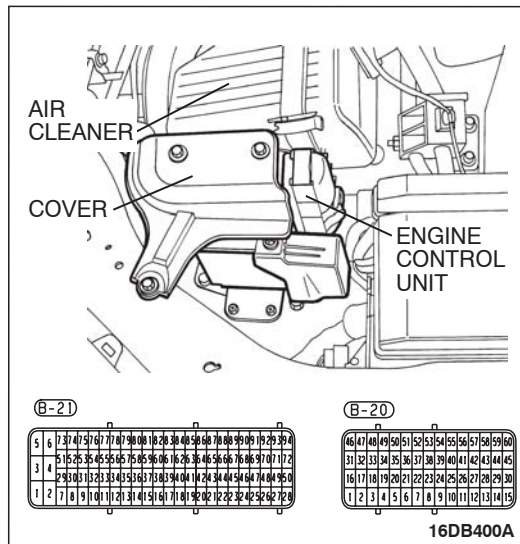
**Q: Is DTC P0638 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## DTC P1603: Battery Backup Line Malfunction



### TECHNICAL DESCRIPTION

- The ENGINE-ECU checks the open circuit of battery backup line.

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

### DTC SET CONDITIONS

#### Check Conditions

- None

#### Judgement Criteria

- RAM area check failed

### EOBD DRIVE CYCLE PATTERN

None.

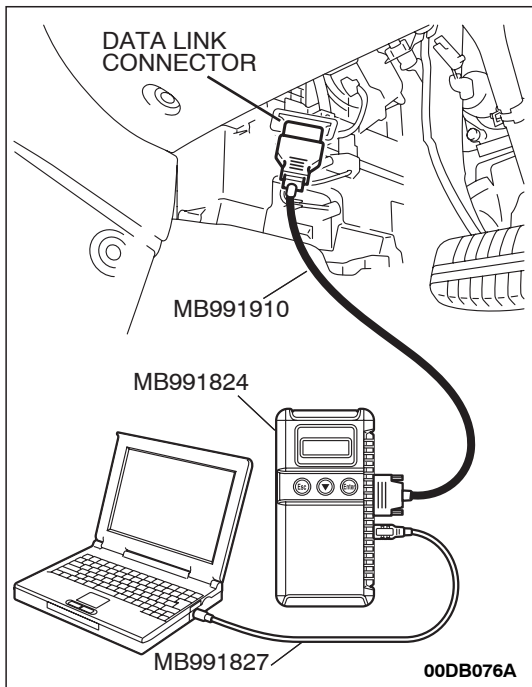
### TROUBLESHOOTING HINTS (The most likely causes for this code to be set are: )

- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90
- Open or shorted battery backup line, harness damage or connector damage.
- ENGINE-ECU failed.

### DIAGNOSIS

#### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB992044: Power Plant ENGINE-ECU Check Harness



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

**⚠ CAUTION**

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

- (1) Connect diagnostic tool 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.

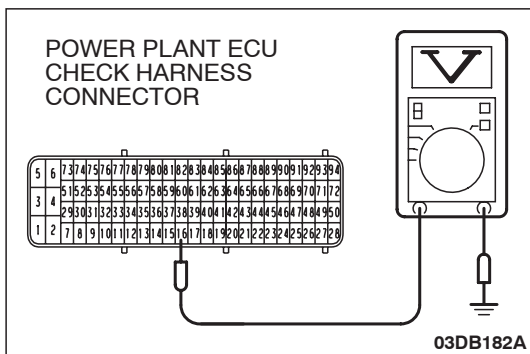
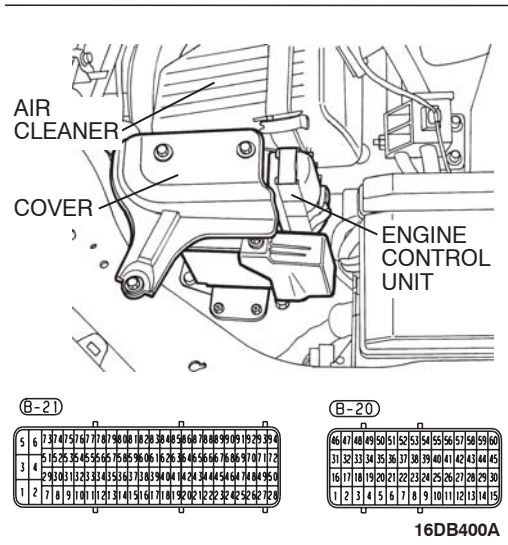
**Q: Is DTC P1603 set?**

**YES :** Go to Step 2.

**NO :** The inspection is complete.

**STEP 2. Measure the backup power supply voltage at ENGINE-ECU connector B-21 by using power plant ENGINE-ECU check harness special tool MB992044.**

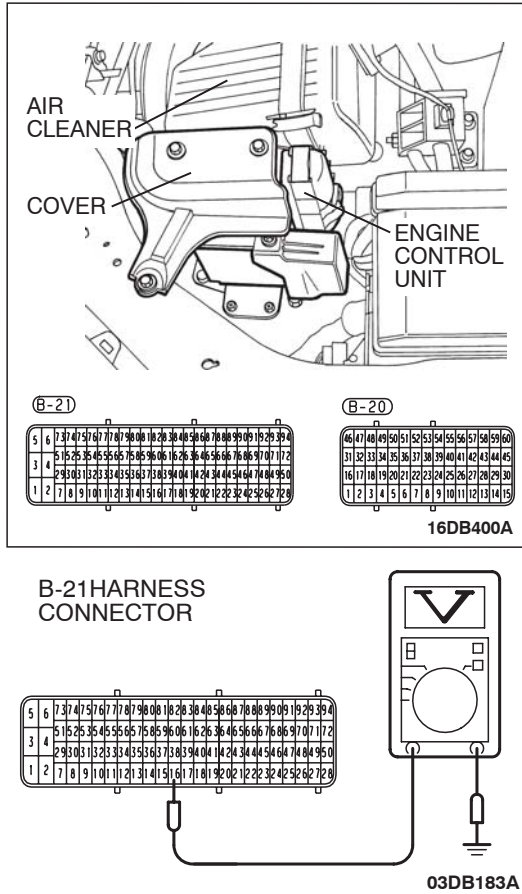
- (1) Disconnect the all ENGINE-ECU connectors and connect power plant ENGINE-ECU check harness special tool MB992044 between the separated connectors.



- (2) Measure the voltage between terminal No.16 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 ENGINE-ECU harness side connector B-21.**

- (1) Disconnect the ENGINE-ECU connector B-21 and measure at the harness side.

- (2) Measure the voltage between terminal No. 16 and ground.
  - Voltage should be battery positive voltage.

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

**YES :** Go to Step 5.

**NO :** Then go to Step 4.

**STEP 4. Check No. 9 fuse, 20 A in Relay box.**

**Q: Is the Fuse servicable and in good condition?**

**YES :** Repair harness wire between battery and ENGINE-ECU connector B-21 (terminal No. 16) because of harness damage. Then go to Step 6.

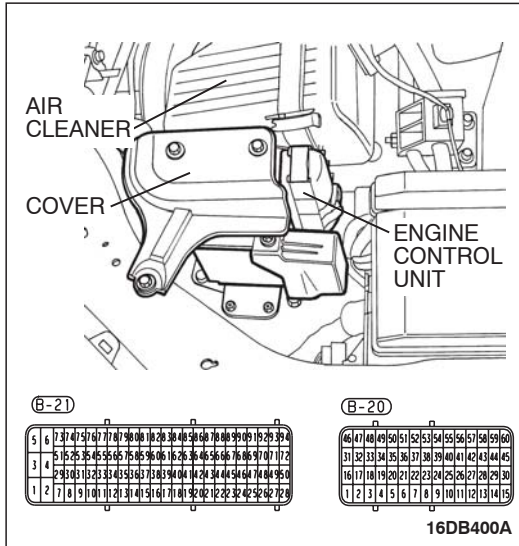
**NO :** Replace the fuse. Then go to Step 7.

**STEP 5. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Then go to Step 6.

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

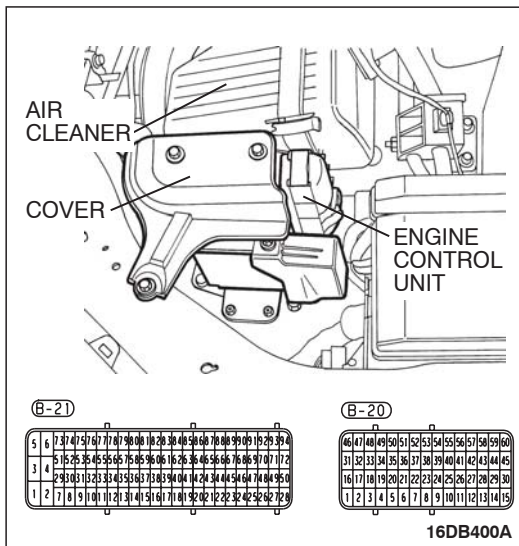


**STEP 6. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Replace the ENGINE-ECU. Then go to Step 7.

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



**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

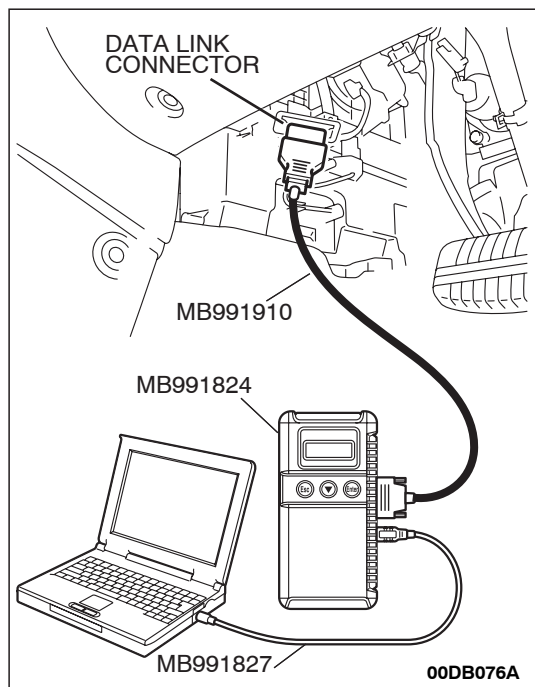
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 P2096: Post Catalyst System too Lean (bank 1)**

---

**TECHNICAL DESCRIPTION**

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor. That is because the catalytic converter purifies exhaust gas. When the catalytic converter or oxygen sensor has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.

- The ECU compares the output of the front and rear heated oxygen sensor signals.

**DTC SET CONDITIONS**

**Check Conditions**

- None

**Judgment Criteria**

- Oxygen sensor slow response.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Right bank heated oxygen sensor deteriorated/failed.
- Right bank side catalytic converter deteriorated.
- Exhaust leak.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

---

**STEP 1. Check for exhaust leak.**

**Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 7.

**NO** : Go to Step 2.

**STEP 2. Using diagnostic tool, check data list item AD:  
Heated Oxygen Sensor Bank 1, Sensor 2 (right rear).**

**⚠ CAUTION**

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

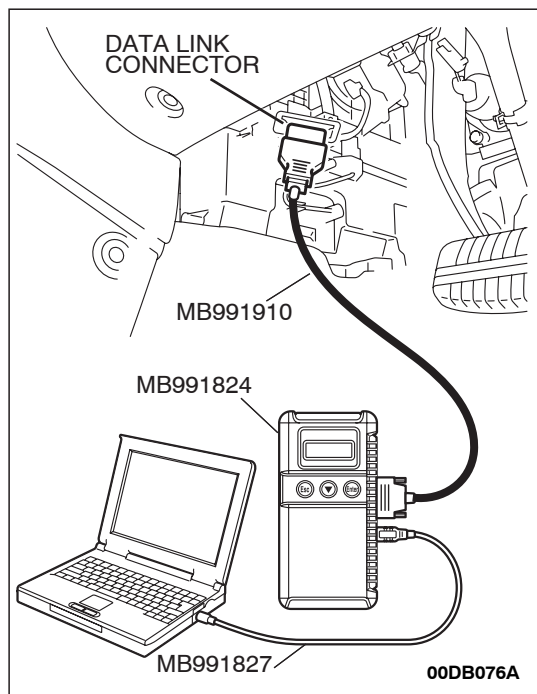
- (1) Connect diagnostic tool to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set diagnostic tool to the data reading mode for item AD, Heated Oxygen Sensor Bank 1, Sensor 2 (right rear).
  - Warming up the engine. When the engine is revved, the output voltage should repeat 0 volt and 0.6 to 1.0 volt alternately.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Replace right bank, rear oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*



**STEP 3. Using diagnostic tool, check data list item AC:  
Heated Oxygen Sensor Bank 1, Sensor 1 (right front).**

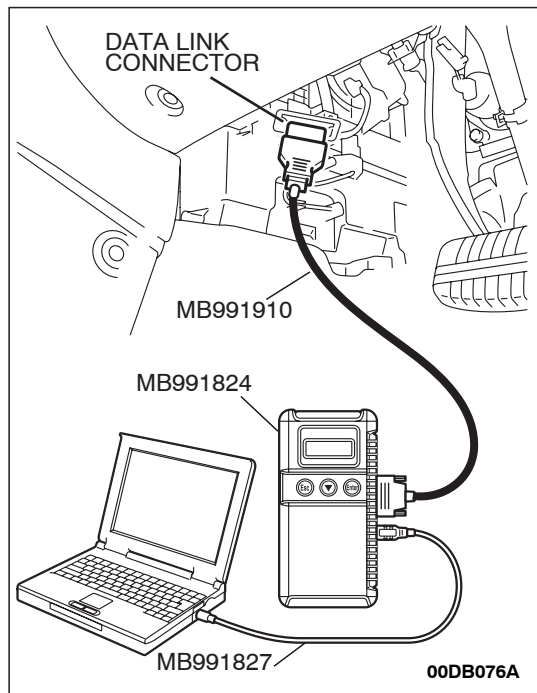
- (1) Start the engine and run at idle.
- (2) Set diagnostic tool to the data reading mode for item AC, Heated Oxygen Sensor Bank 1, Sensor 1 (right front).
  - Warming up the engine. When the engine is revved, the output voltage should be 0.6 to 1.0 volt.
- (3) Turn the ignition switch to the "LOCK"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

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

**YES :** Go to Step 4.

**NO :** Replace the right bank, front oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*



---

**STEP 4. Test the EOBD drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#)
- (2) Read the diagnostic trouble code.

**Q: Is DTC P2096 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

---

**DTC P2097: Post Catalyst System too Lean (bank 2)**

---

**TECHNICAL DESCRIPTION**

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor. That is because the catalytic converter purifies exhaust gas. When the catalytic converter or oxygen sensor has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.

- The ECU compares the output of the front and rear heated oxygen sensor signals.

**DTC SET CONDITIONS**

**Check Conditions**

- None.

**Judgment Criteria**

- Oxygen sensor slow response.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Left bank heated oxygen sensor deteriorated/failed.
- Left bank side catalytic converter deteriorated.
- Exhaust leak.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

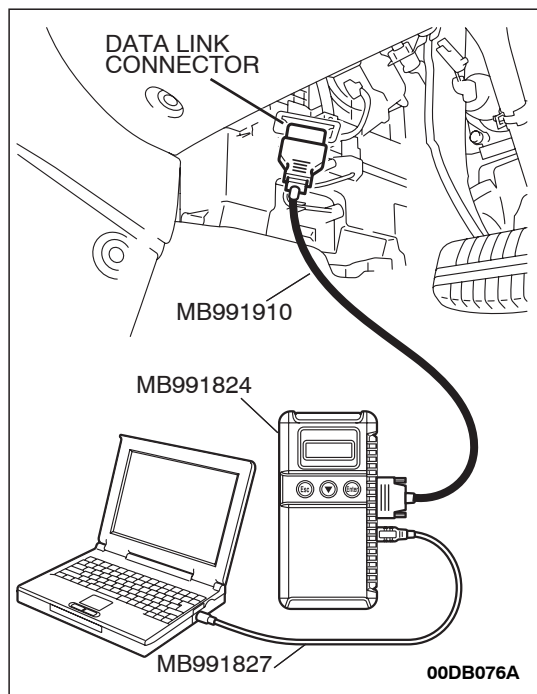
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**STEP 1. Check for exhaust leak.**

**Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 4.

**NO** : Go to Step 2.



**STEP 2. Using diagnostic tool, check data list item AF: Heated Oxygen Sensor Bank 2, Sensor 2 (left rear).**

**⚠ CAUTION**

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

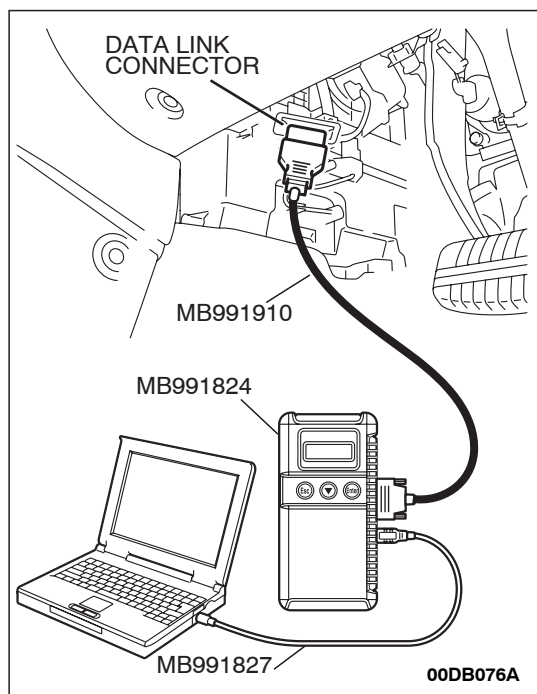
- (1) Connect diagnostic tool to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set diagnostic tool to the data reading mode for item AF, Heated Oxygen Sensor Bank 2, Sensor 2 (left rear).
  - Warming up the engine. When the engine is revved, the output voltage should repeat 0 volt and 0.6 to 1.0 volt alternately.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Replace the left bank, rear oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*



**STEP 3. Using diagnostic tool, check data list item AE: Heated Oxygen Sensor Bank 2, Sensor 1 (left front).**

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

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

**YES :** Go to Step 4.

**NO :** Replace the left bank, front oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*

---

**STEP 4. Test the EOBD drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

---

**DTC P2098: Post Catalyst System too Rich (bank 1)**

---

**TECHNICAL DESCRIPTION**

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor. That is because the catalytic converter purifies exhaust gas. When the catalytic converter or oxygen sensor has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.

- The ECU compares the output of the front and rear heated oxygen sensor signals.

**DTC SET CONDITIONS**

**Check Conditions**

- None.

**Judgment Criteria**

- Oxygen sensor slow response.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Right bank heated oxygen sensor deteriorated/failed.
- Right bank side catalytic converter deteriorated.
- Exhaust leak.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

---

**STEP 1. Check for exhaust leak.**

**Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 4.

**NO** : Go to Step 2.

**STEP 2. Using diagnostic tool, check data list item AD: Heated Oxygen Sensor Bank 1, Sensor 2 (right rear).**

**⚠ CAUTION**

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

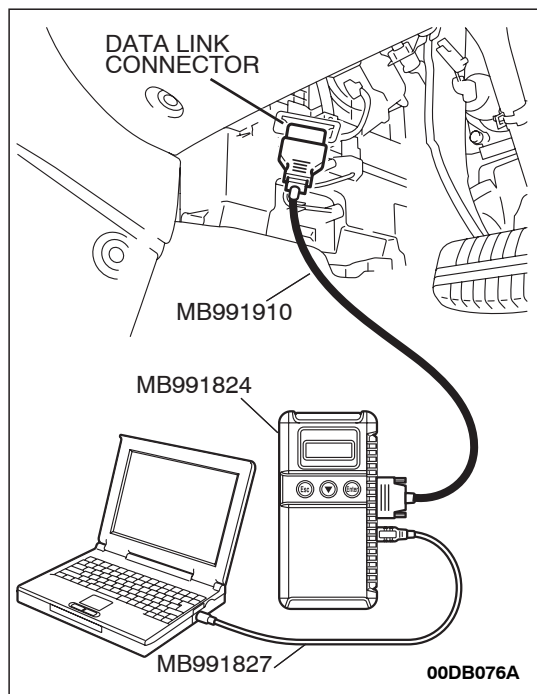
- (1) Connect diagnostic tool to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set diagnostic tool to the data reading mode for item AD, Heated Oxygen Sensor Bank 1, Sensor 2 (right rear).
  - Warming up the engine. When the engine is revved, the output voltage should repeat 0 volt and 0.6 to 1.0 volt alternately.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Replace the right bank, rear oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*



**STEP 3. Using diagnostic tool, check data list item AC: Heated Oxygen Sensor Bank 1, Sensor 1 (right front).**

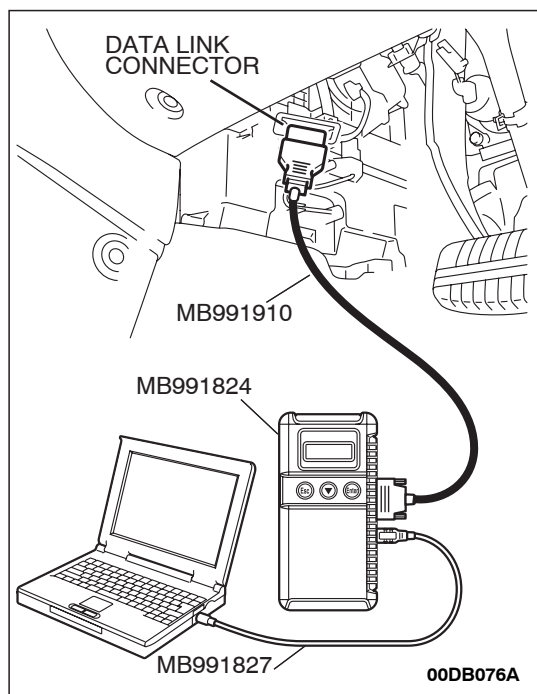
- (1) Start the engine and run at idle.
- (2) Set diagnostic tool to the data reading mode for item AC, Heated Oxygen Sensor Bank 1, Sensor 1 (right front).
  - Warming up the engine. When the engine is revved, the output voltage should be 0.6 to 1.0 volt.
- (3) Turn the ignition switch to the "LOCK"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

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

**YES :** Go to Step 4.

**NO :** Replace the right bank, front oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*





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**STEP 4. Test the EOBD drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2098 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

---

**DTC P2099: Post Catalyst System too Rich (bank 2)**

---

**TECHNICAL DESCRIPTION**

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor. That is because the catalytic converter purifies exhaust gas. When the catalytic converter or oxygen sensor has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.

- The ECU compares the output of the front and rear heated oxygen sensor signals.

**DTC SET CONDITIONS**

**Check Conditions**

- None.

**Judgment Criteria**

- Oxygen sensor slow response.
- MIL activated after 2 drive cycles.
- No Limp home.

**EOBD DRIVE CYCLE PATTERN**

Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).

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

- Left bank heated oxygen sensor deteriorated/failed.
- Left bank side catalytic converter deteriorated.
- Exhaust leak.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

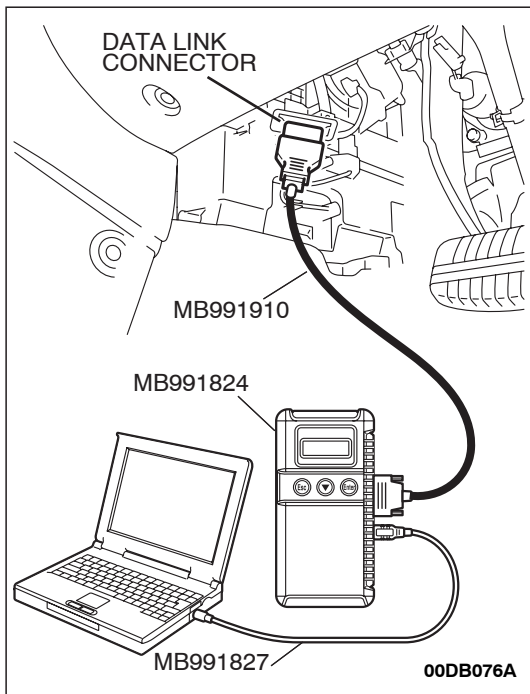
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**STEP 1. Check for exhaust leak.**

**Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 4.

**NO** : Go to Step 2.



**STEP 2. Using diagnostic tool, check data list item AF: Heated Oxygen Sensor Bank 2, Sensor 2 (left rear).**

**⚠ CAUTION**

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

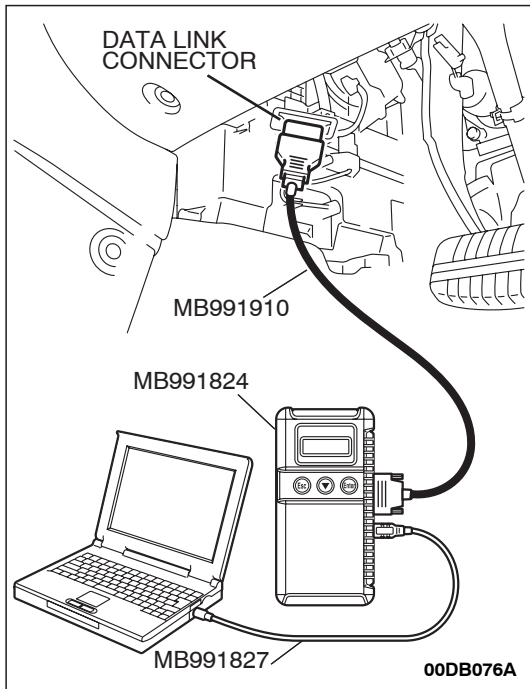
- (1) Connect diagnostic tool to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set diagnostic tool to the data reading mode for item AF, Heated Oxygen Sensor Bank 2, Sensor 2 (left rear).
  - Warming up the engine. When the engine is revved, the output voltage should repeat 0 volt and 0.6 to 1.0 volt alternately.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Replace the left bank, rear oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*



**STEP 3. Using diagnostic tool, check data list item AE: Heated Oxygen Sensor Bank 2, Sensor 1 (left front).**

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

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

**YES :** Go to Step 4.

**NO :** Replace the left bank, front oxygen sensor. Then go to Step 4.

*NOTE: When replacing a deteriorated oxygen sensor the vehicle mileage is most likely high and as a result the emission control system will be deteriorated considerably. Therefore it is recommended to replace both front and rear oxygen sensors as a set. Also check that the Catalytic convertor is functioning correctly.*

---

**STEP 4. Test the EOBD drive cycle.**

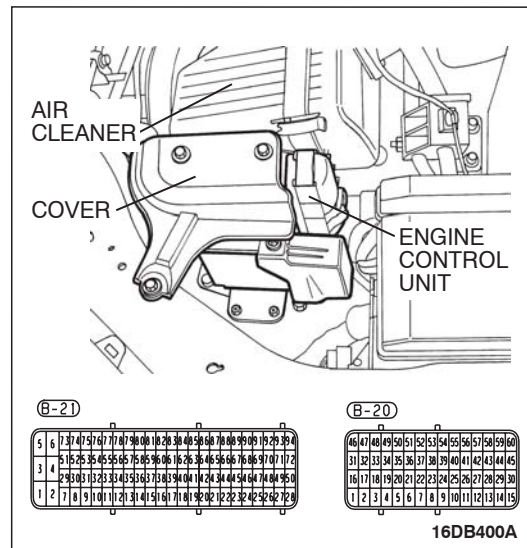
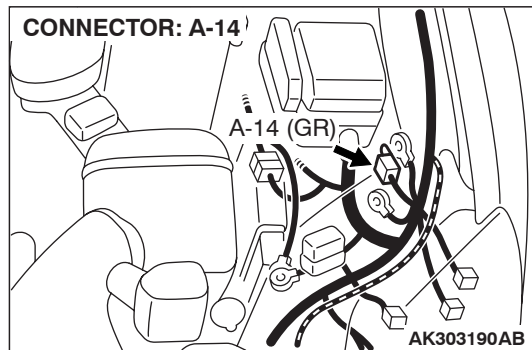
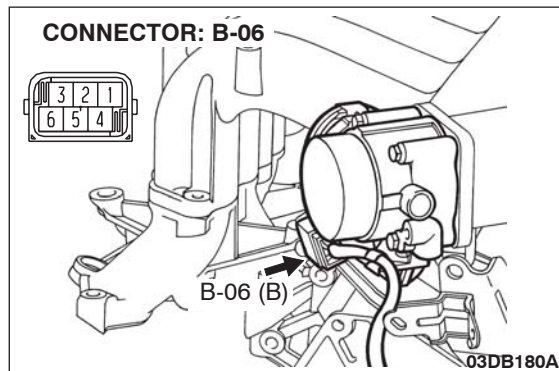
- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – EOBD Drive Cycle – [P.13A-11](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2099 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

## DTC P2100: Throttle Actuator Control Motor Circuit (Open)



### CIRCUIT OPERATION

- Controls the current that is applied from the ENGINE-ECU (terminals No. 49, No. 50) to the throttle actuator control motor (terminals No. 1, No. 4).

### TECHNICAL DESCRIPTION

- ENGINE-ECU 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.

### DTC SET CONDITIONS

#### Check Condition

- None.

#### Judgement Criteria

- Throttle power stage current is above 8 amps.

or

- Throttle power stage voltage is below 5 volts.
- or
- Throttle power stage temperature is above 175°C.
  - MIL activated immediately.
  - Fuel cut and engine speed limited.

### EOBD 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.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

### DIAGNOSIS

#### Required Special Tools:

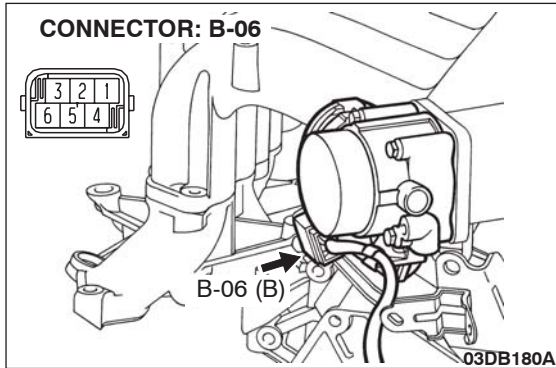
- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.**

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

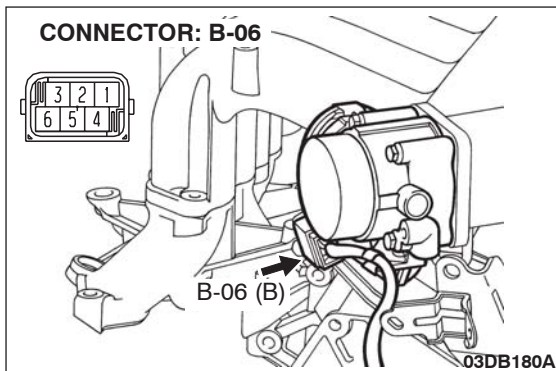
**YES :** Go to Step 2.

**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.



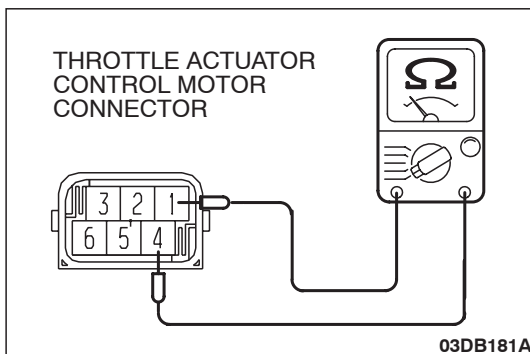
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 4.

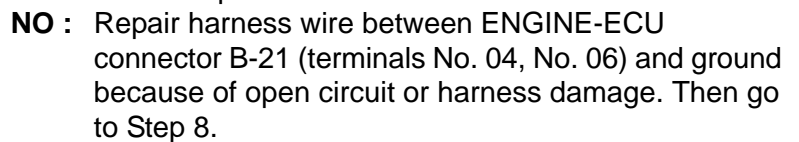
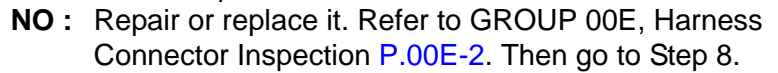
**Standard value:  $1.5 \pm 0.3$  ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between standard value?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 8.



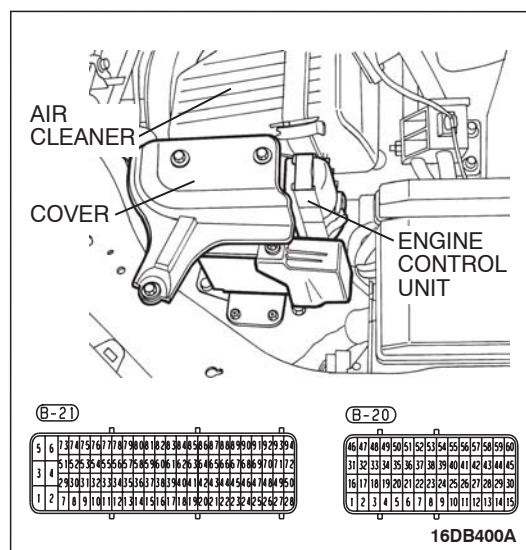
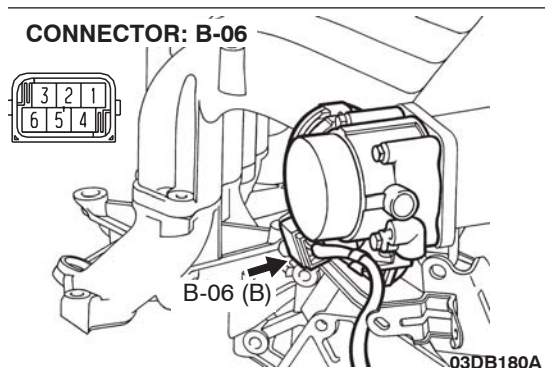


**STEP 5. Check for open circuit and harness damage between throttle actuator control motor connector B-06 (terminal No. 4) and ENGINE-ECU connector B-20 (terminal No. 50).**

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

**YES :** Go to Step 6.

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



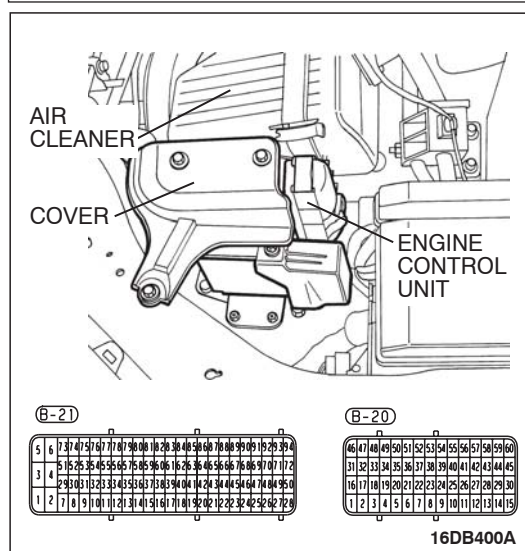
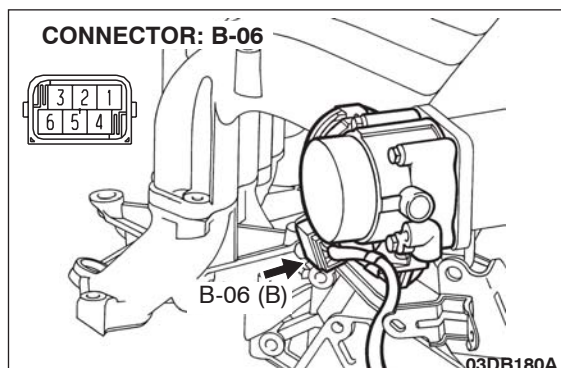


**STEP 6. Check for open circuit and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ENGINE-ECU connector B-20 (terminal No. 49).**

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

**YES :** Go to Step 7.

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



**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

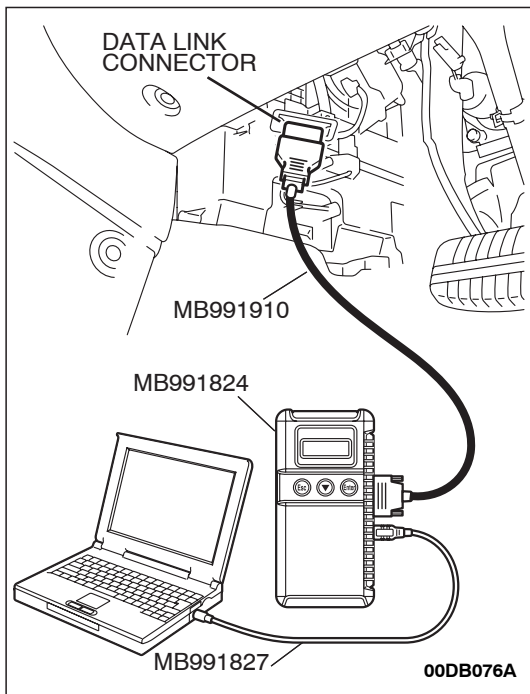
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 :** 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](#).



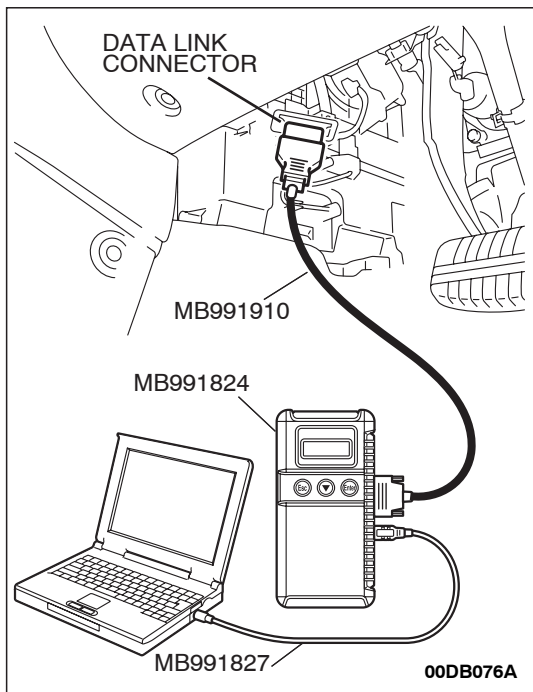
**STEP 8. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.

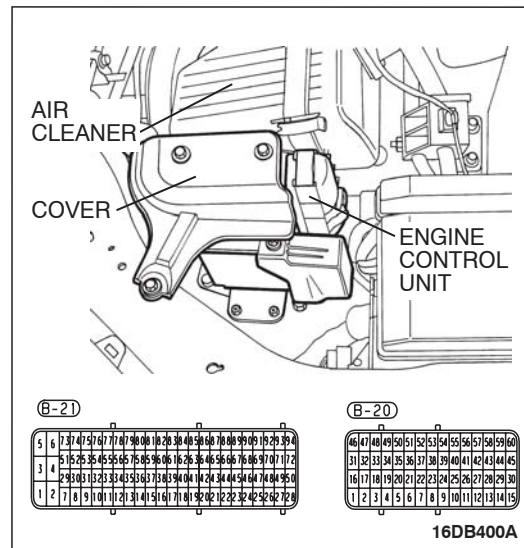
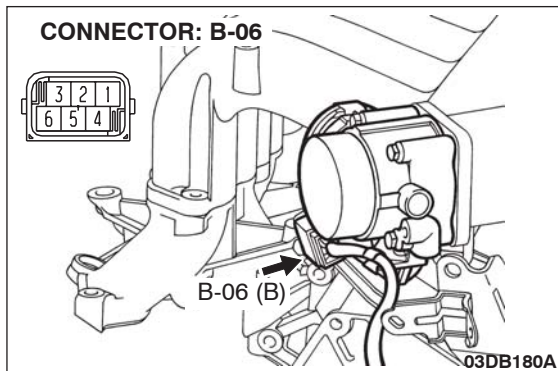
**Q: Is DTC P2100 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P2101: Throttle Actuator Control Motor Magneto Malfunction.**



**CIRCUIT OPERATION**

- Controls the current that is applied from the ENGINE-ECU (terminals No. 49, No. 50) to the throttle actuator control motor (terminals No. 1, No. 4).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU check whether the throttle actuator control motor magneto has failed.

**DTC SET CONDITIONS**

**Check Condition**

- Battery positive voltage is higher than 8.3 volts.

**Judgement Criteria**

- The coil current of the throttle actuator control motor is 8 ampere or more for 0.3 second.

- Throttle valve position does not match with ECU requested position.
- MIL activated immediately.
- Fuel cut and engine speed limited.

**EOBD 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.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

**DIAGNOSIS**

**Required Special Tools:**

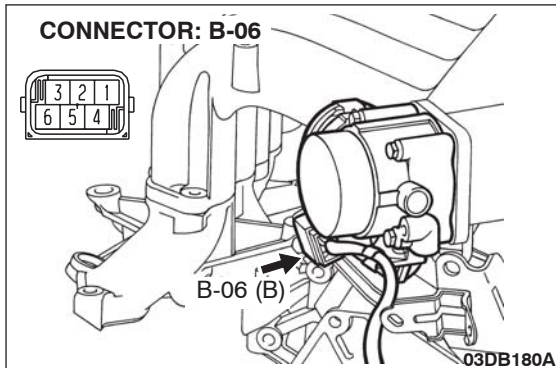
- Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.**

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

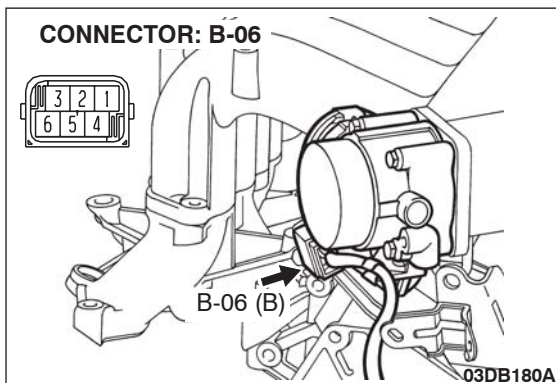
**YES :** Go to Step 2.

**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.



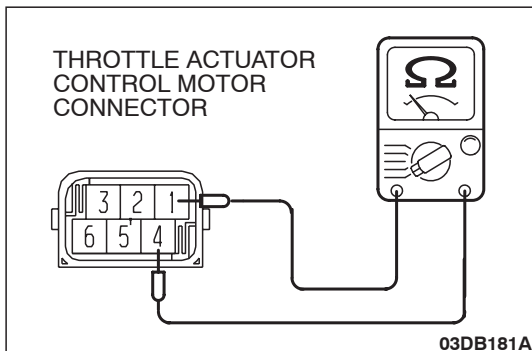
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 4.

**Standard value:  $1.5 \pm 0.3$  ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between standard value?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 7.

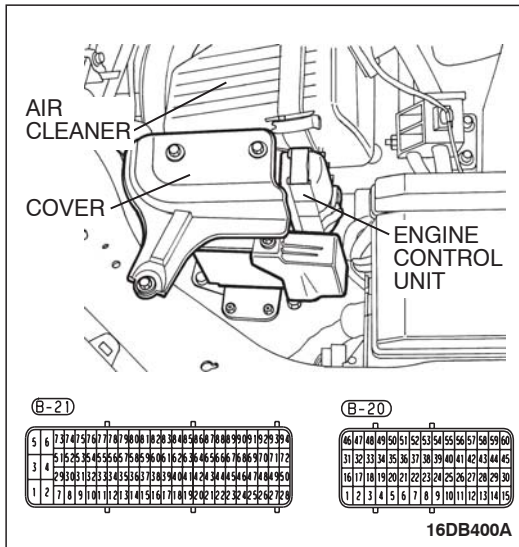


**STEP 3. Check harness connector B-20 at ENGINE-ECU for damage**

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

**YES :** Go to Step 4.

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

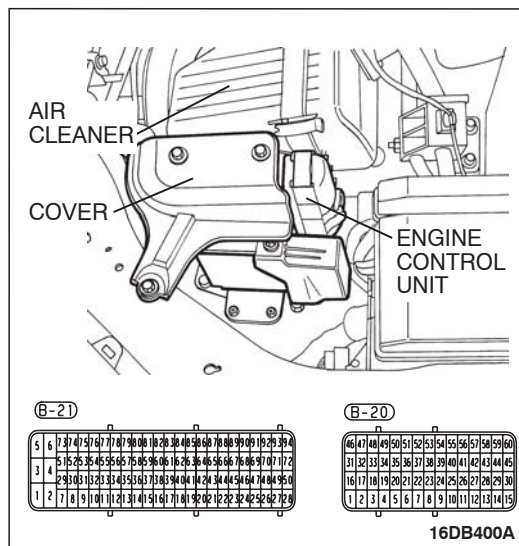
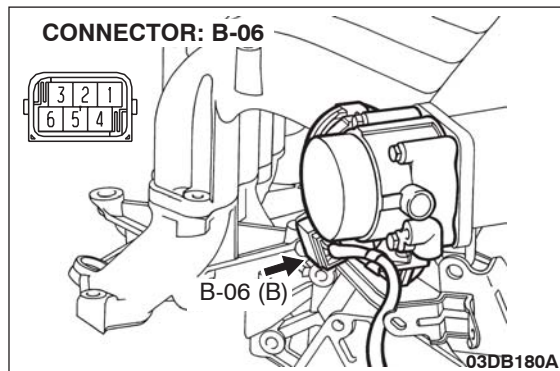


**STEP 4. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 4) and ENGINE-ECU connector B-20 (terminal No. 50).**

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

**YES :** Go to Step 5.

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

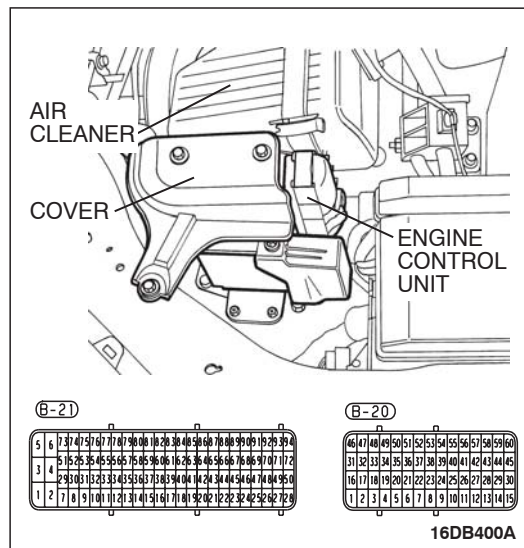
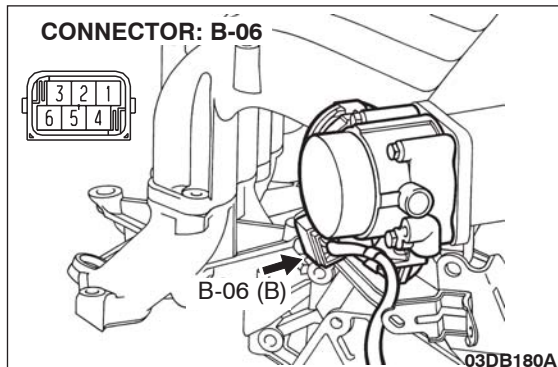


**STEP 5. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ENGINE-ECU connector B-20 (terminal No. 49).**

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

**YES :** Go to Step 6.

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





**STEP 6. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

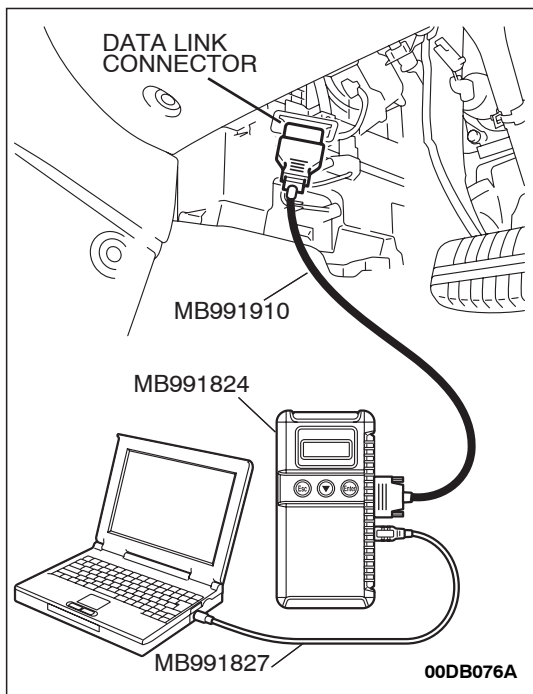
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 :** 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](#).



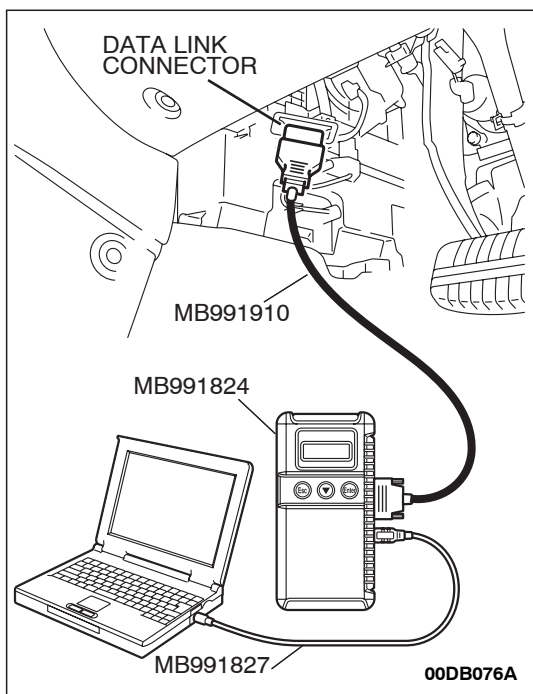
**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.

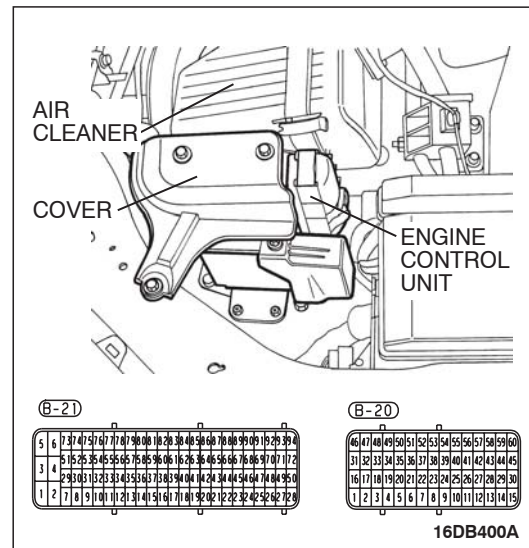
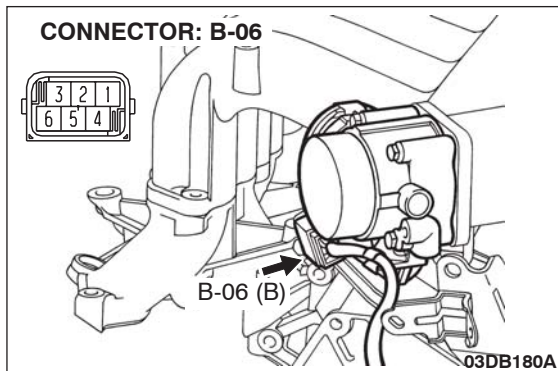
**Q: Is DTC P2101 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P2102: Throttle Actuator Control Motor Circuit (Shorted Low).**



**CIRCUIT OPERATION**

- Controls the current that is applied from the ENGINE-ECU (terminals No. 49, No. 50) to the throttle actuator control motor (terminals No. 1, No. 4).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU 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.

**DTC SET CONDITIONS**

**Check Condition**

- Battery positive voltage is higher than 6.5 volts.

**Judgement Criteria**

- Maximum permissible PWM pulse duty factor is above 80% for 0.6 sec.gement Criteria.
- MIL activated immediately.
- Fuel cut and engine speed limited.

**EOBD 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.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

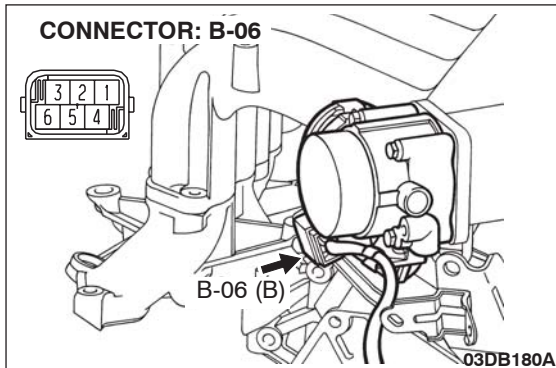


**STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.**

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

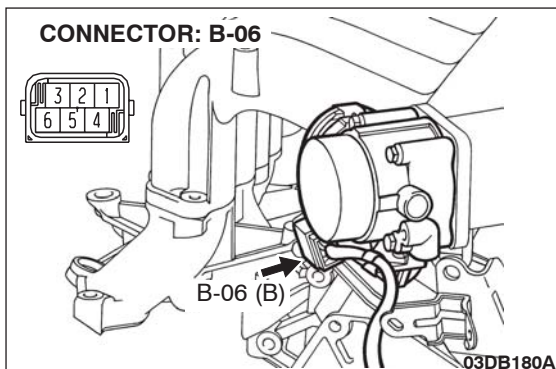
**YES :** Go to Step 2.

**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.



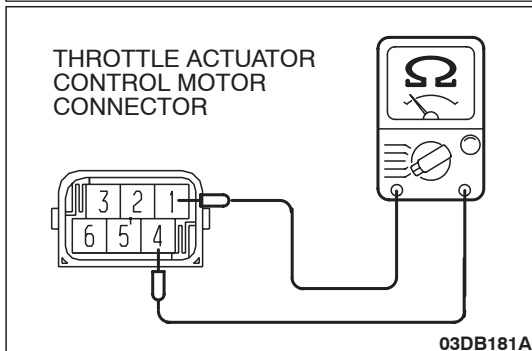
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 4.

**Standard value:  $1.5 \pm 0.3$  ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between standard value?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 7.

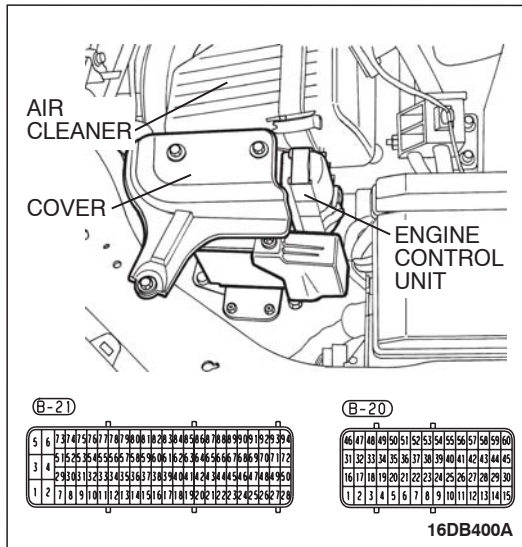


**STEP 3. Check harness connector B-20 at ENGINE-ECU for damage**

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

**YES :** Go to Step 4.

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

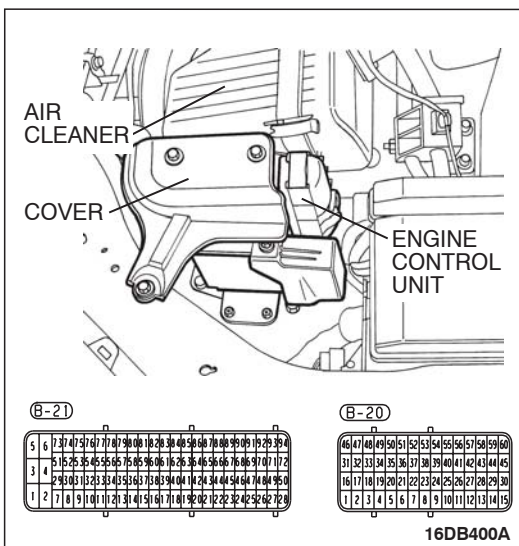
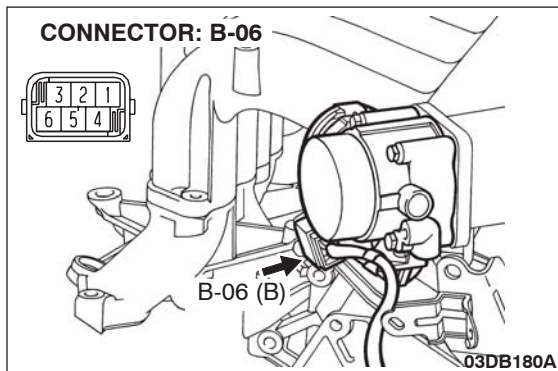


**STEP 4. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 4) and ENGINE-ECU connector B-20 (terminal No. 50).**

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

**YES :** Go to Step 5.

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

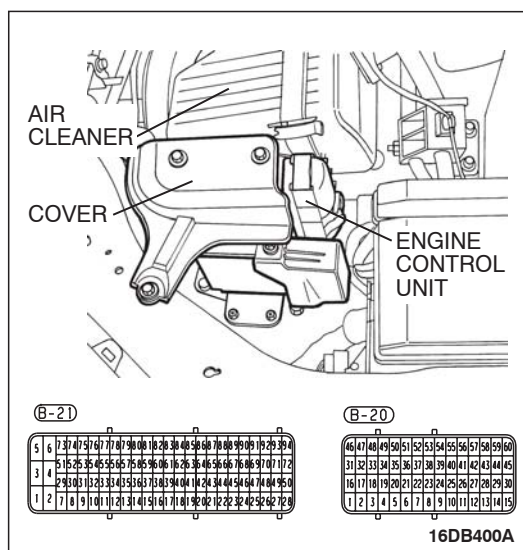
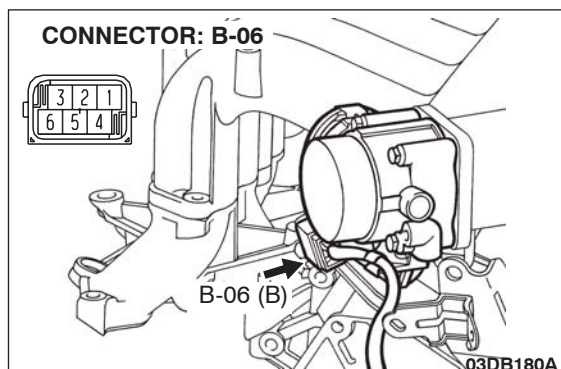


**STEP 5.** Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ENGINE-ECU connector B-20 (terminal No. 49).

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

**YES :** Go to Step 6.

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



**STEP 6. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

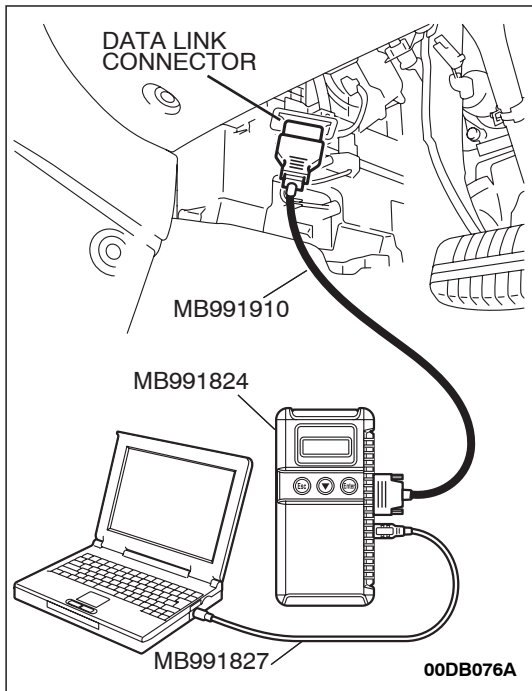
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 P2102 set?**

**YES :** 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](#).



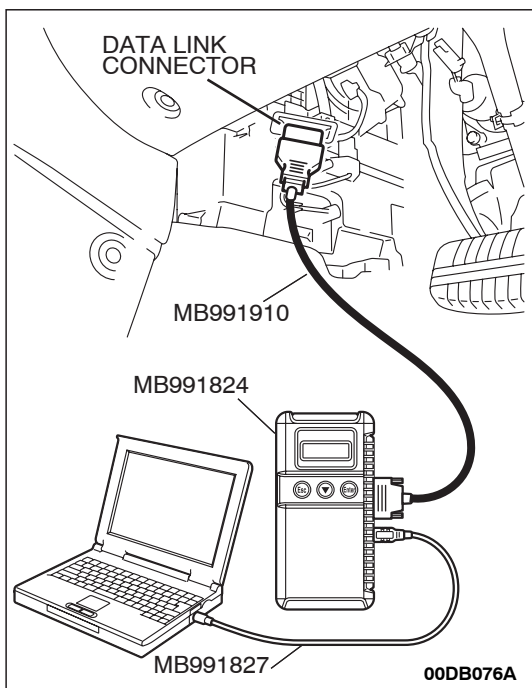
**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.

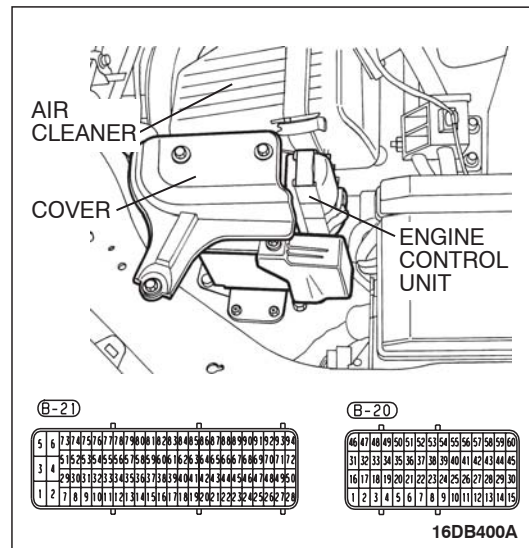
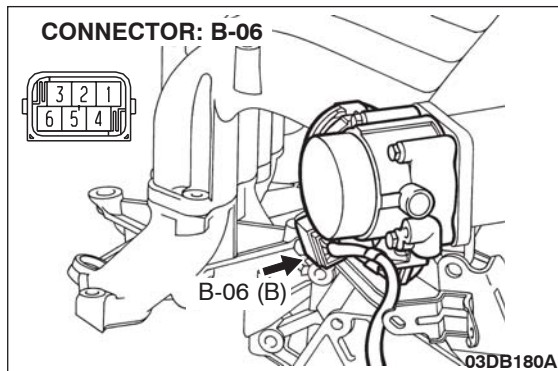
**Q: Is DTC P2102 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P2103: Throttle Actuator Control Motor Circuit (Shorted High).**



**CIRCUIT OPERATION**

- Controls the current that is applied from the ENGINE-ECU (terminals No. 49, No. 50) to the throttle actuator control motor (terminals No. 1, No. 4).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU 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.

**DTC SET CONDITIONS**

**Check Condition**

- Battery positive voltage is higher than 6.5 volts.

**Judgement Criteria**

- Maximum permissible PWM pulse duty factor is above 80% for 0.6 sec.gement Criteria.
- MIL activated immediately.
- Fuel cut and engine speed limited.

**EOBD 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.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

**DIAGNOSIS**

**Required Special Tools:**

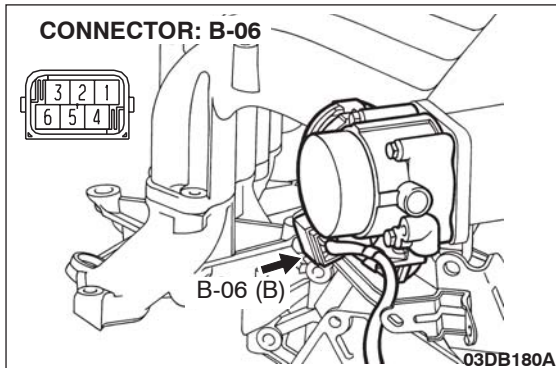
- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector B-06 at throttle actuator control motor for damage.**

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

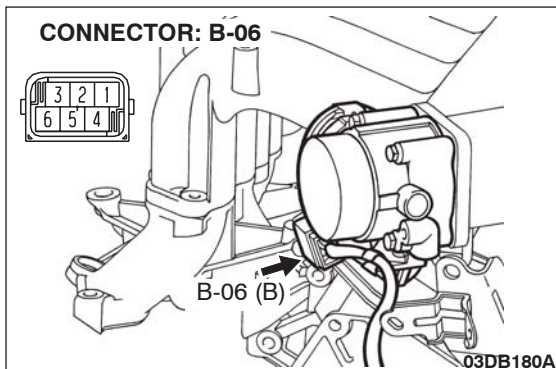
**YES :** Go to Step 2.

**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.



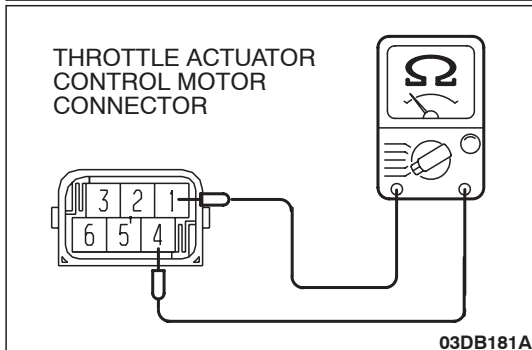
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 4.

**Standard value:  $1.5 \pm 0.3$  ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between standard value?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 7.



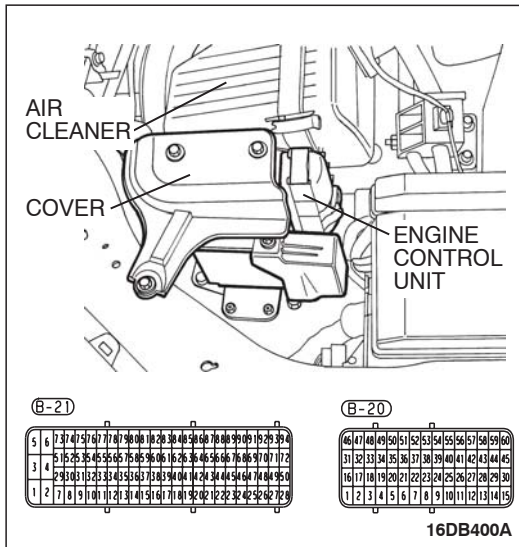


**STEP 3. Check harness connector B-20 at ENGINE-ECU for damage**

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

**YES :** Go to Step 4.

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

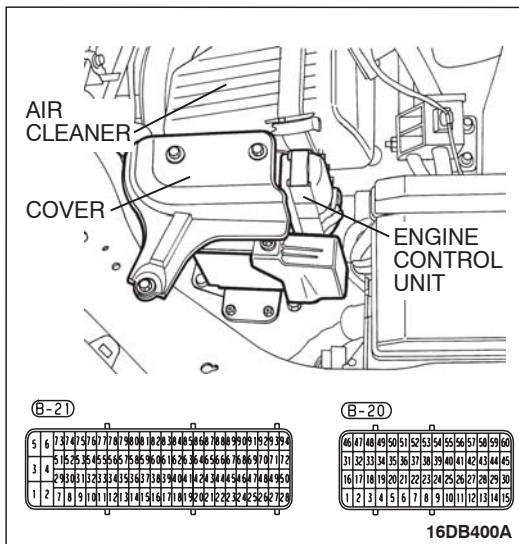
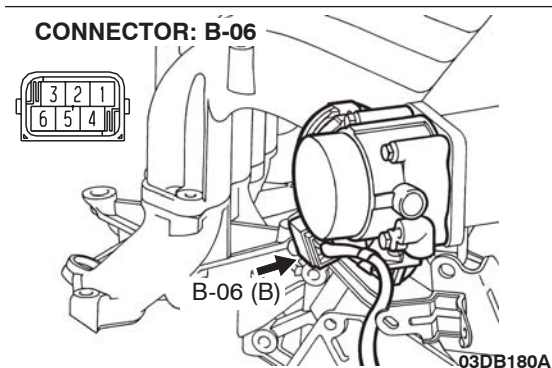


**STEP 4. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 4) and ENGINE-ECU connector B-20 (terminal No. 50).**

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

**YES :** Go to Step 5.

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

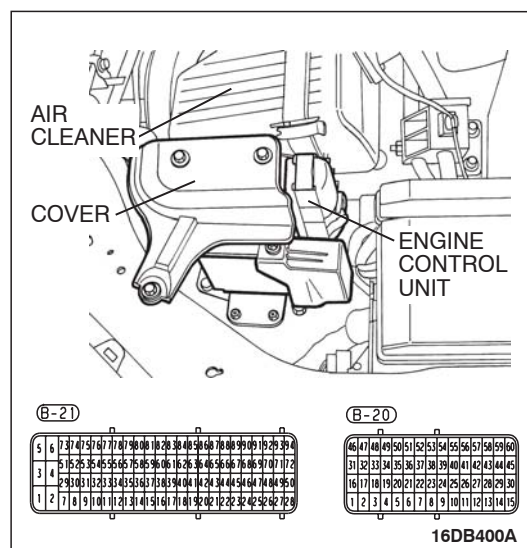
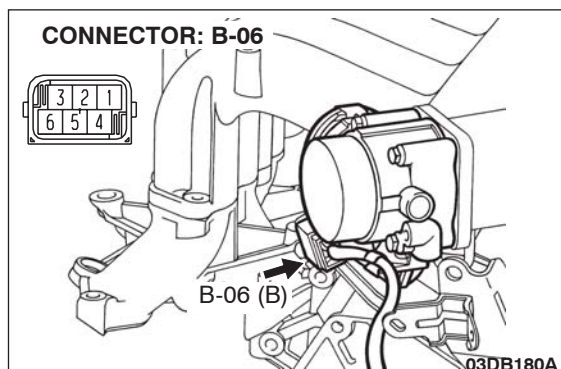


**STEP 5. Check for short circuit to ground and harness damage between throttle actuator control motor connector B-06 (terminal No. 1) and ENGINE-ECU connector B-20 (terminal No. 49).**

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

**YES :** Go to Step 6.

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





**STEP 6. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

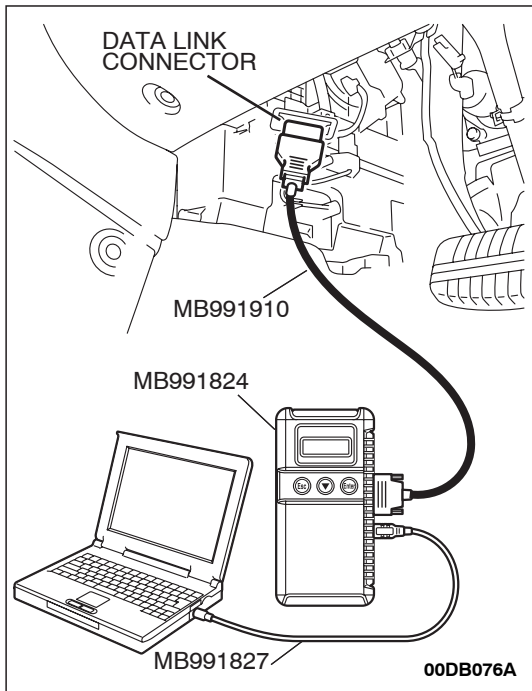
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 P2103 set?**

**YES :** Replace the ENGINE-ECU. 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](#).



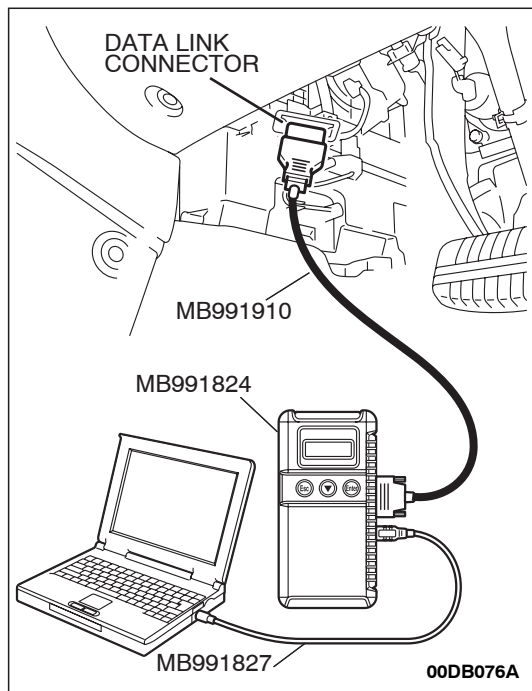
**STEP 7. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.

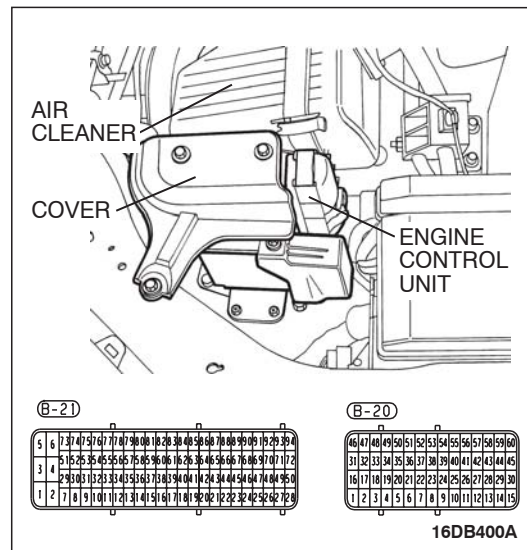
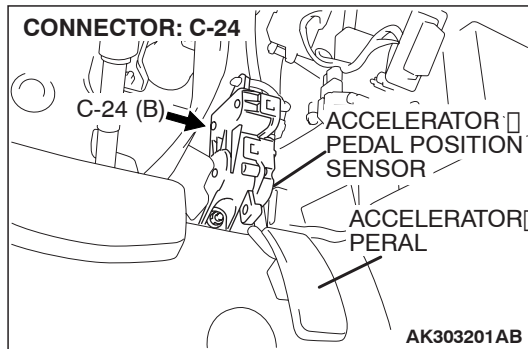
**Q: Is DTC P2103 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input.**



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No.5) from the ENGINE-ECU (terminal No. 75).
- The ground terminal (terminal No. 4) is grounded with ENGINE-ECU (terminal No. 13).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ENGINE-ECU checks whether the voltage is within a specified range.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition switch is "ON" position.
- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Accelerator pedal position sensor (main) output voltage is below 0.859 volt for 0.2 second.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**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.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**EOBD DRIVE CYCLE PATTERN**

None.

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 11:  
Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

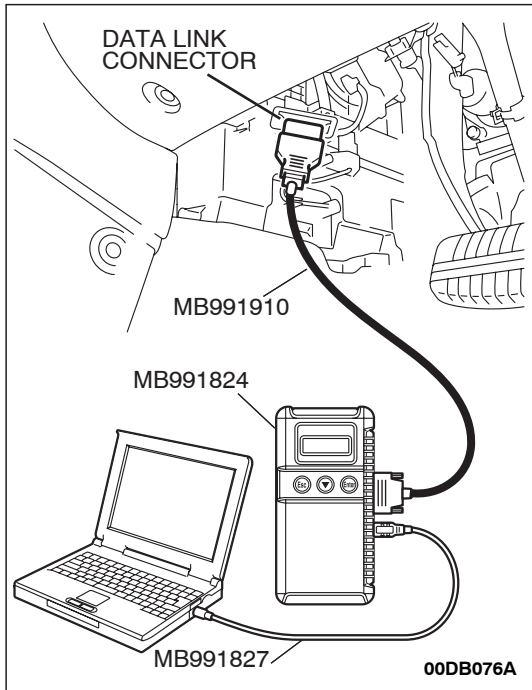
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage is between 435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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.

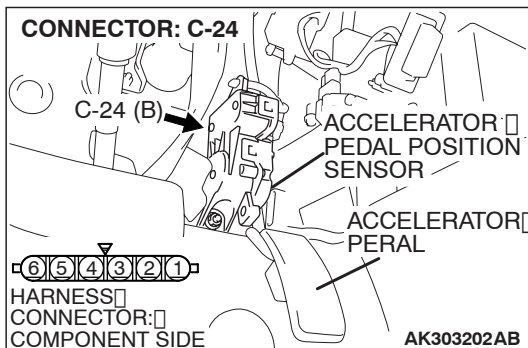


**STEP 2. Check harness connector C-24 at accelerator pedal position sensor for damage.**

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

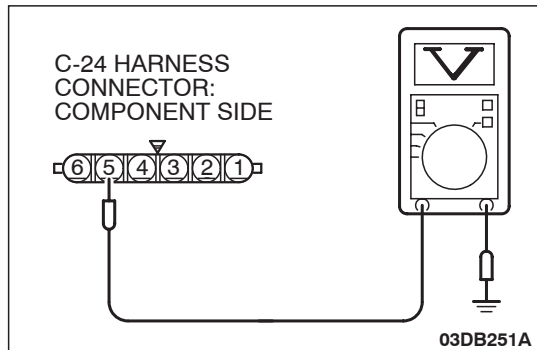
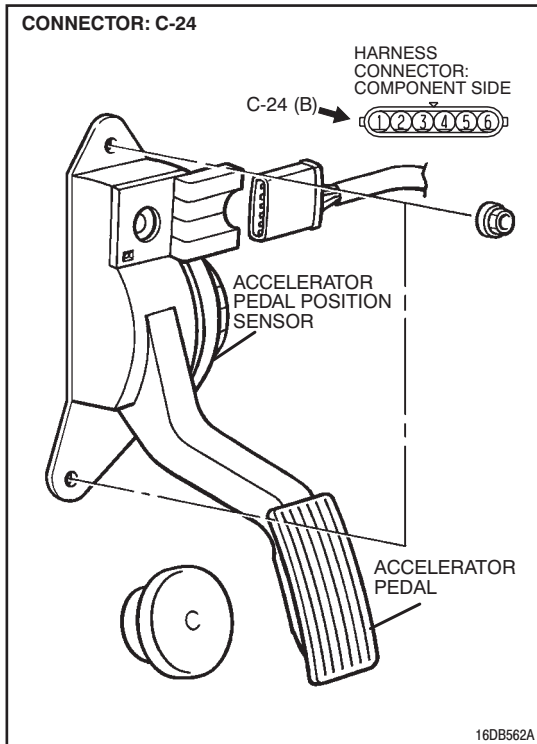
**YES :** Go to Step 3.

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



**STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-24.**

- (1) Disconnect the connector C-24 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

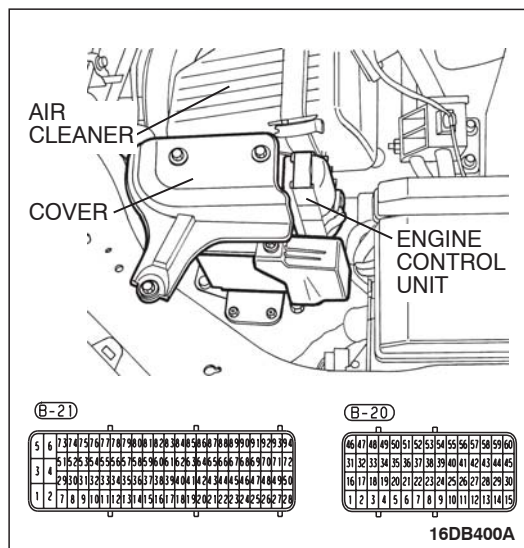


- (3) Measure the voltage between terminal No. 5 and ground.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

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

**YES :** Go to Step 7.

**NO :** Go to Step 4.



**STEP 4. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Go to Step 5.

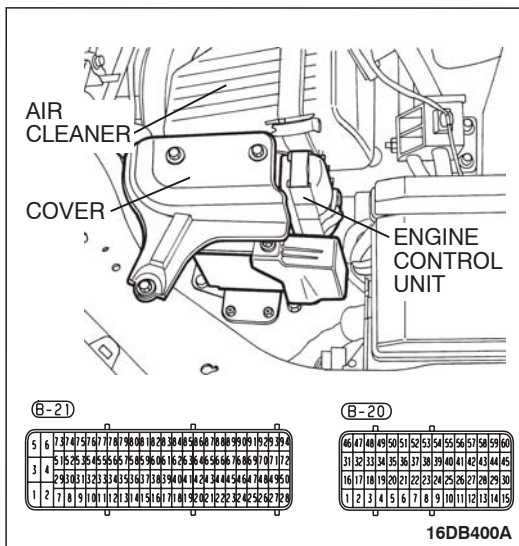
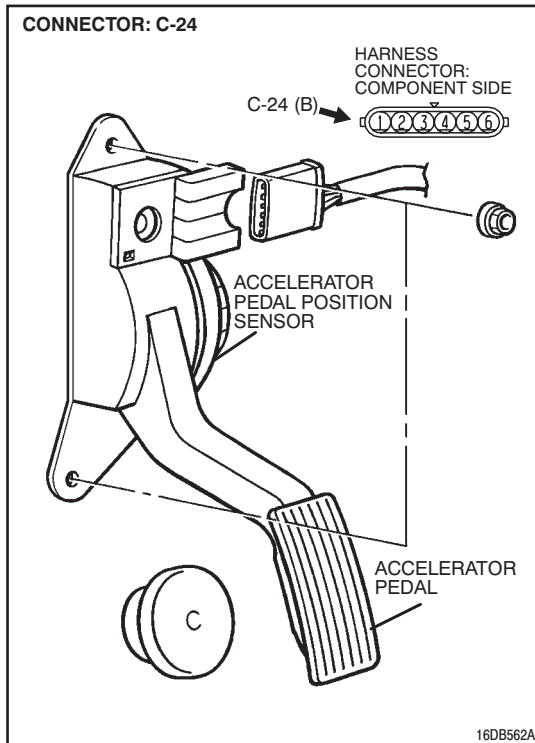
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.

**STEP 5. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-24 (terminal No. 5) and ENGINE-ECU connector B-21 (terminal No. 75).**

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

**YES :** Go to Step 6.

**NO :** Repair it. Then go to Step 10.

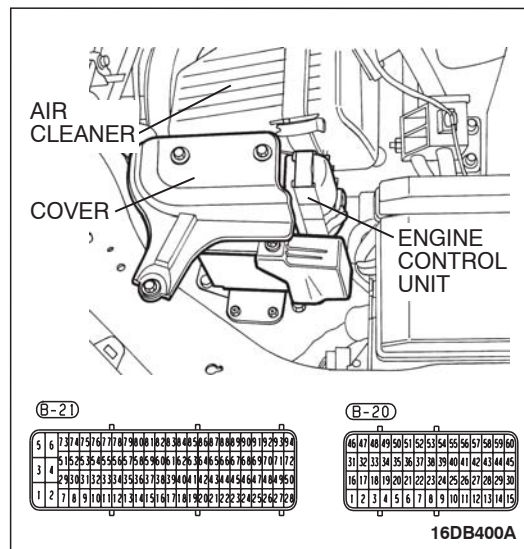
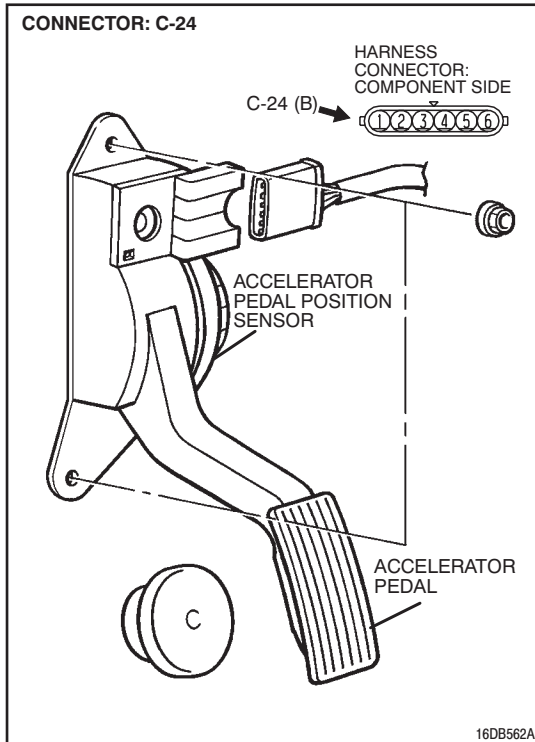


**STEP 6. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 5) and ENGINE-ECU connector B-21 (terminal No. 75).**

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

**YES :** Go to Step 7.

**NO :** Repair it. Then go to Step 10.

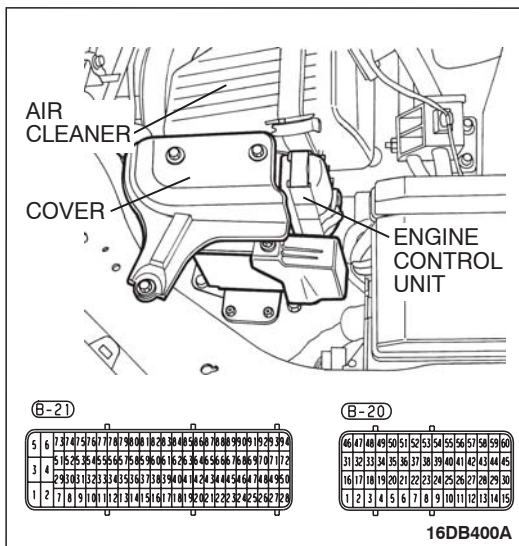
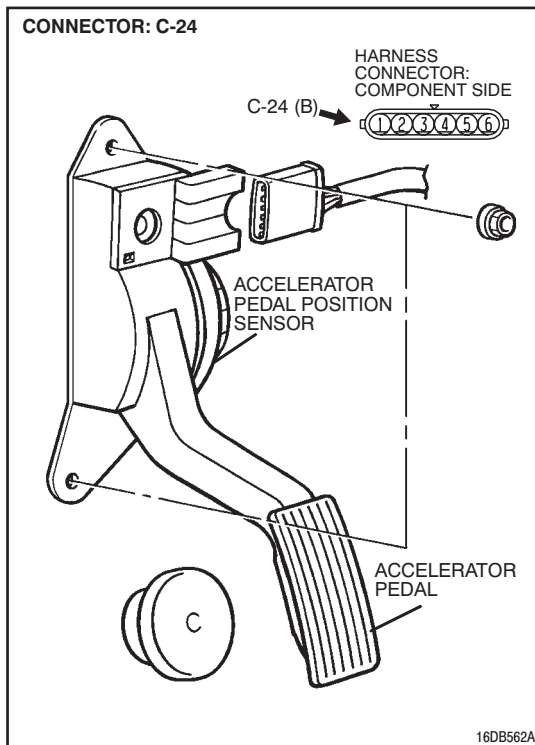


**STEP 7. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-24 (terminal No. 3) and ENGINE-ECU connector B-21 (terminal No. 59).**

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

**YES :** Go to Step 8.

**NO :** Repair or replace it. Then go to Step 10.



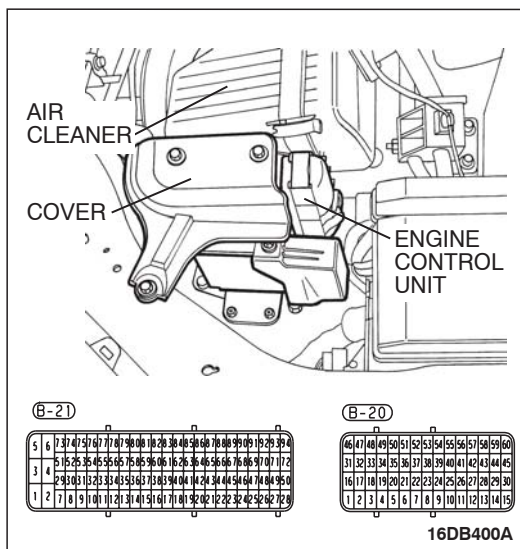
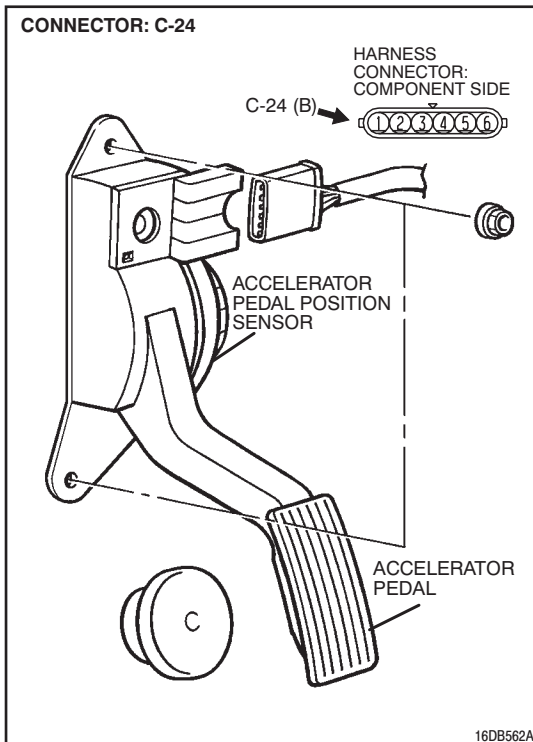


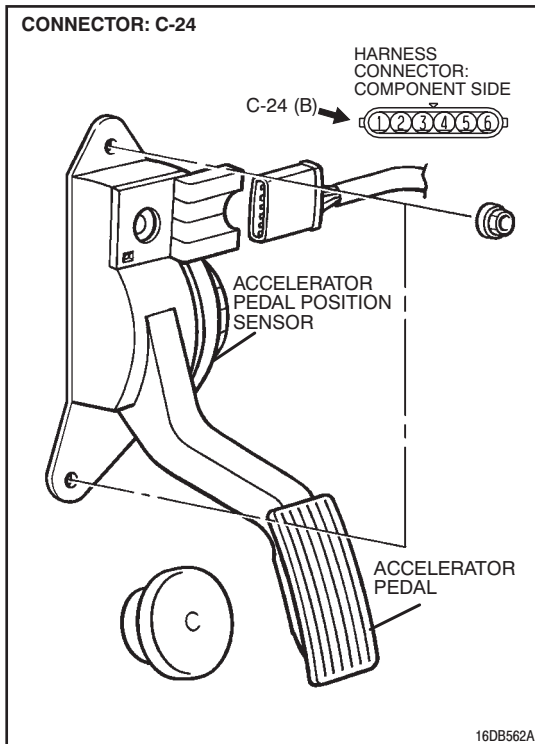
**STEP 8. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 3) and ENGINE-ECU connector B-21 (terminal No. 59).**

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

**YES :** Go to Step 9.

**NO :** Repair or replace it. Then go to Step 10.





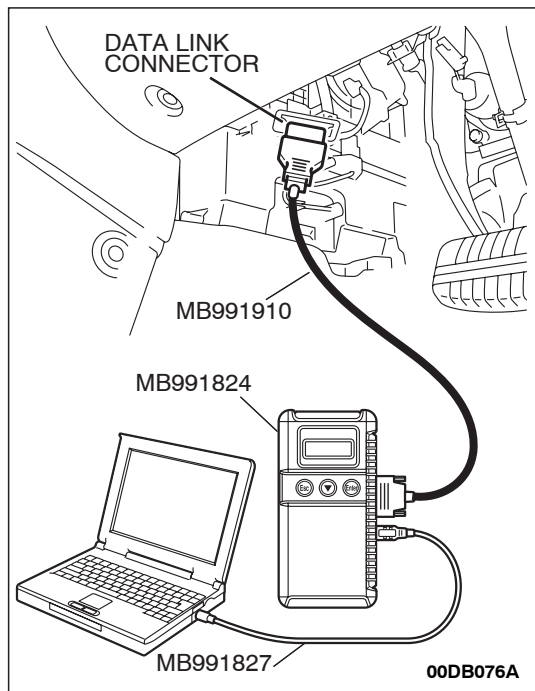
**STEP 9. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2122 set?**

**YES :** Then go to Step 10.

**NO :** The inspection is complete.



**STEP 10. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

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

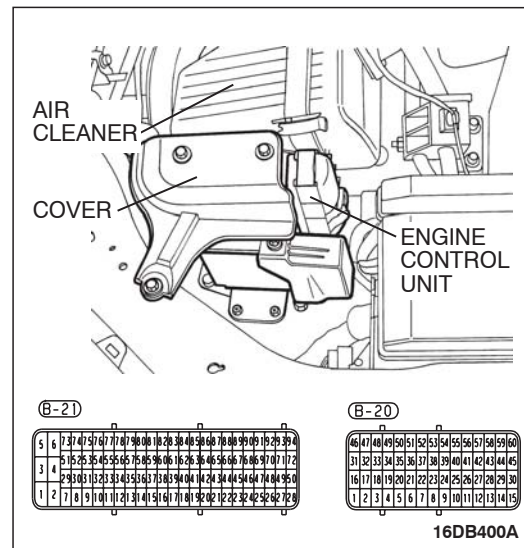
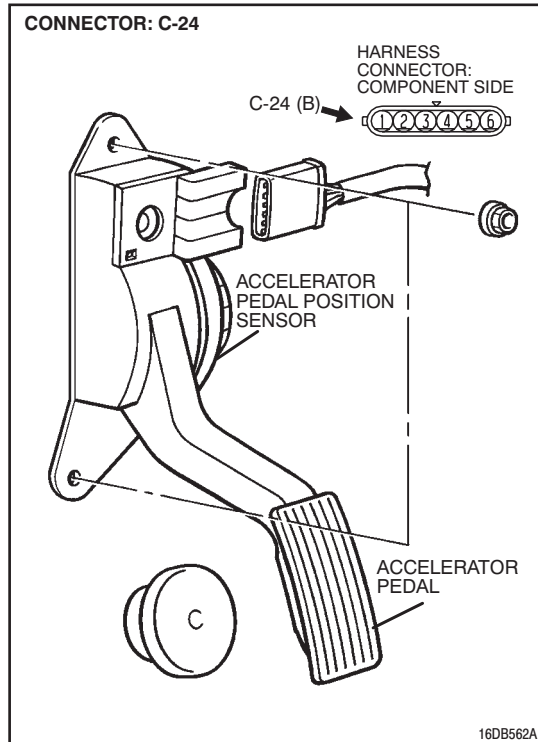
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) After the DTC has been deleted, read the DTC again.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is DTC P2122 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P2123: Accelerator Pedal Position Sensor (main) Circuit High Input.**



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No. 5) from the ENGINE-ECU (terminal No. 75).
- The ground terminal (terminal No. 4) is grounded with ENGINE-ECU (terminal No. 13).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ENGINE-ECU checks whether the voltage is within a specified range.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition switch is "ON" position.
- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Accelerator pedal position sensor (main) output voltage is above 0.43 volts for 0.2 second.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**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.
- Short circuit to 5 volt.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**EOBD DRIVE CYCLE PATTERN**

None.

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
- MB991824: V.C.I.

- MB991827: USB Cable
- MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 11: Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

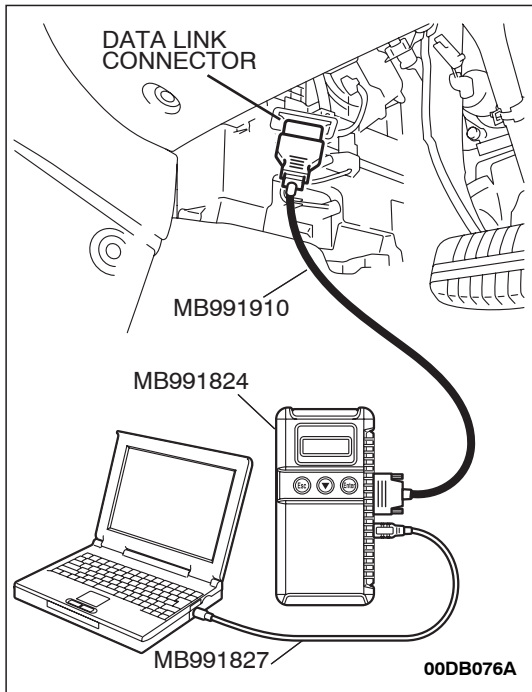
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage is between 435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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.

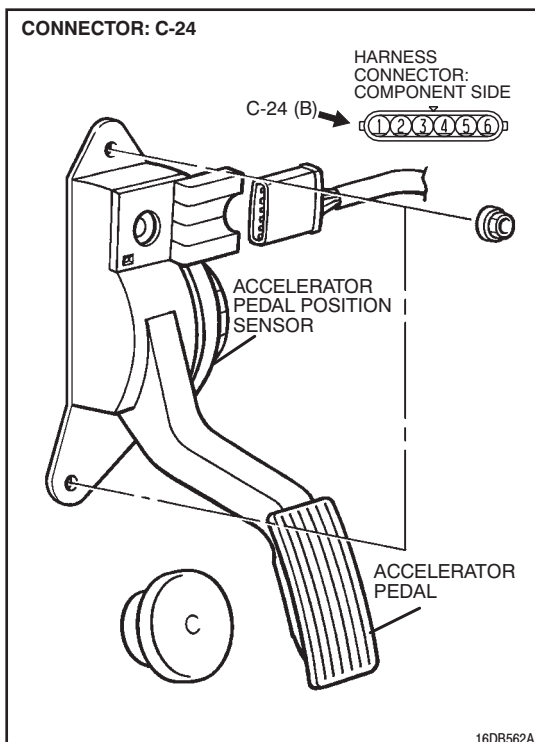


**STEP 2. Check harness connector C-24 at accelerator pedal position sensor for damage.**

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

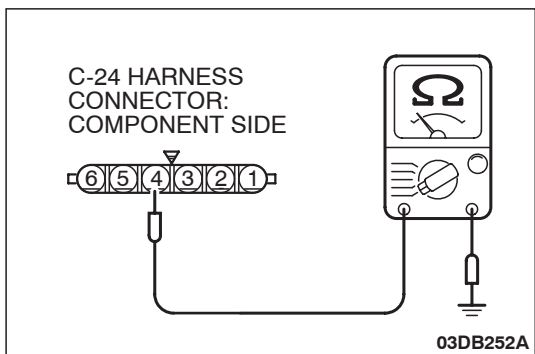
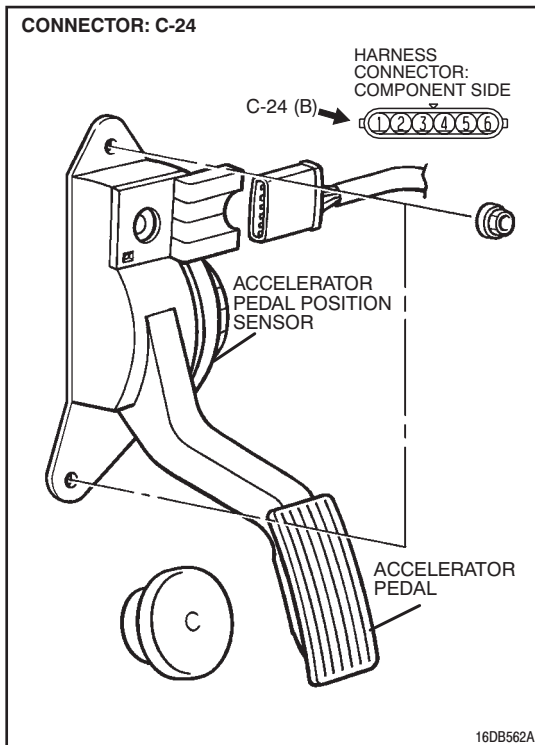
**YES :** Go to Step 3.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.



**STEP 3. Check the continuity at accelerator pedal position sensor harness side connector C-24.**

(1) Disconnect the connector C-24 and measure at the harness side.



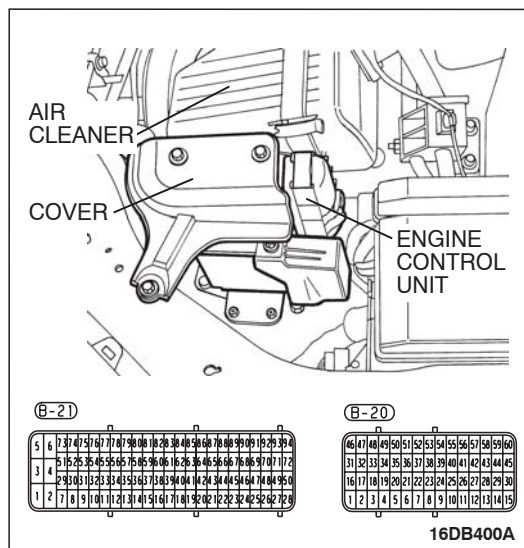
(2) Measure the continuity between terminal No. 4 and ground.

- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Go to Step 6.

**NO :** Go to Step 4.



**STEP 4. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Go to Step 5.

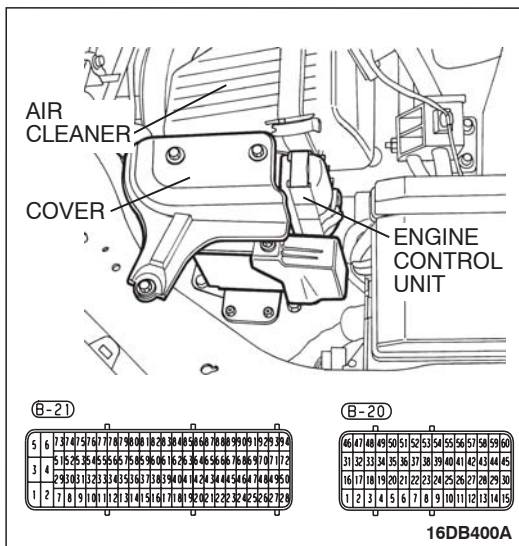
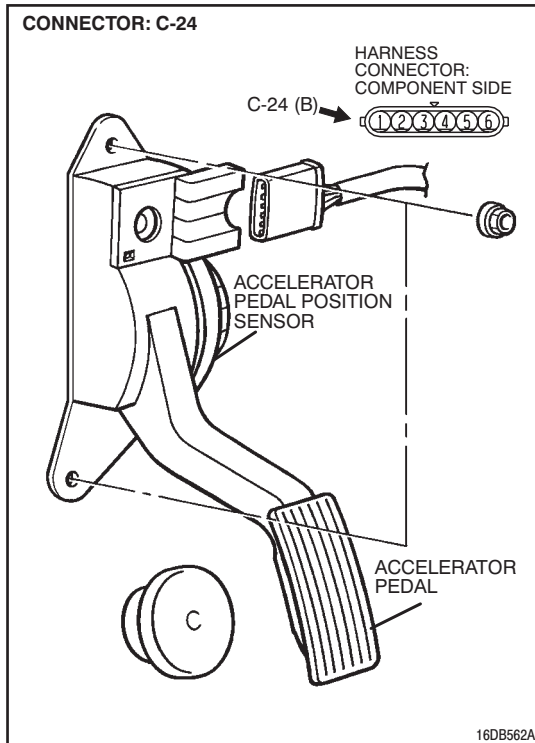
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.

**STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-24 (terminal No. 4) and ENGINE-ECU connector B-21 (terminal No. 13).**

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

**YES :** Go to Step 6.

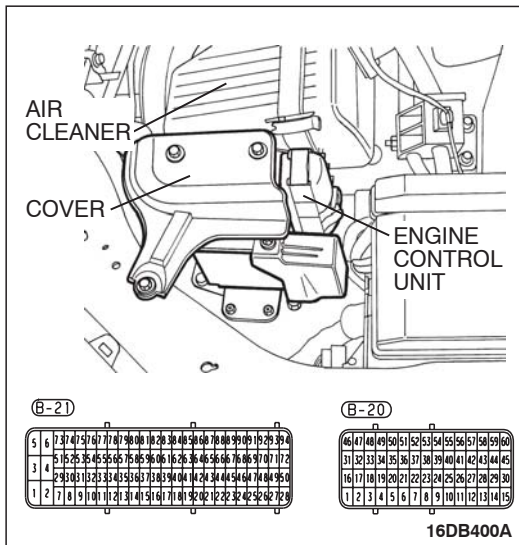
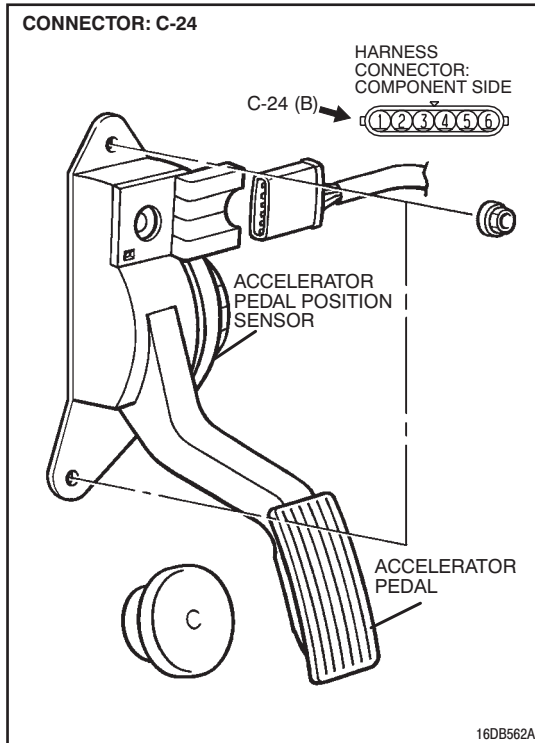
**NO :** Repair or replace it. Then go to Step 9.



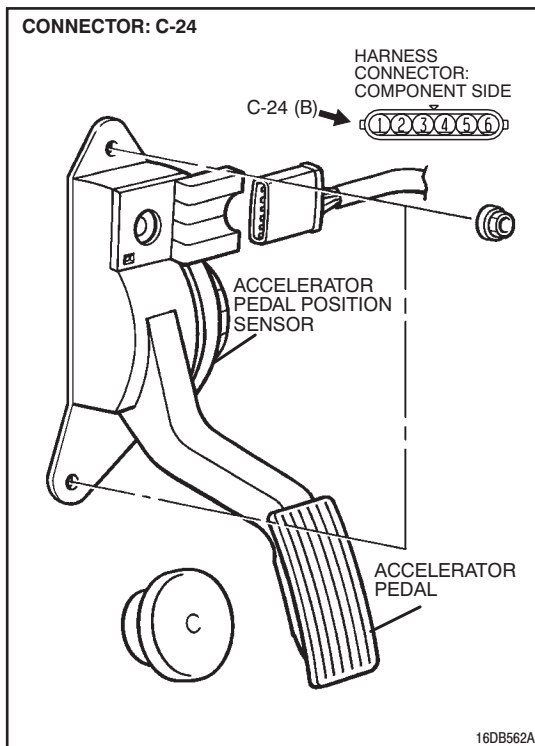
**STEP 6. Check for short circuit to 5-Volts and harness damage between throttle position sensor connector C-24 (terminal No. 4) and ECU connector B-21 (terminal No. 13).**  
**Q: Is the harness wire in good condition?**

**YES :** Go to Step 7.

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







**STEP 7. 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 :** Then go to Step 8.

**NO :** The inspection is complete.

**STEP 8. Using diagnostic tool , check data list item 11: Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

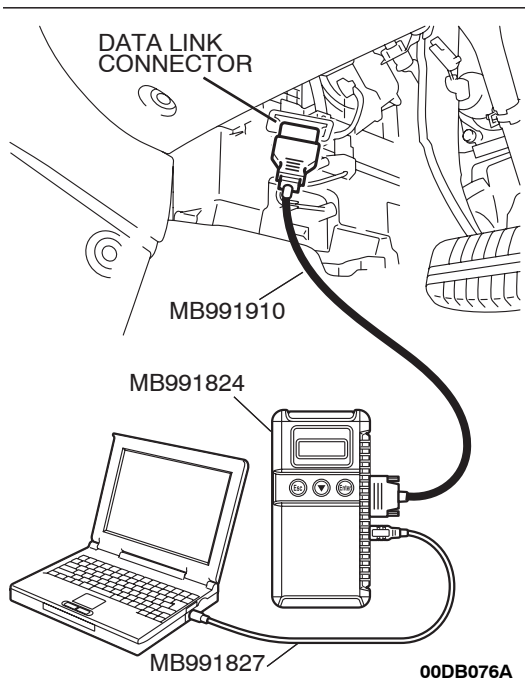
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

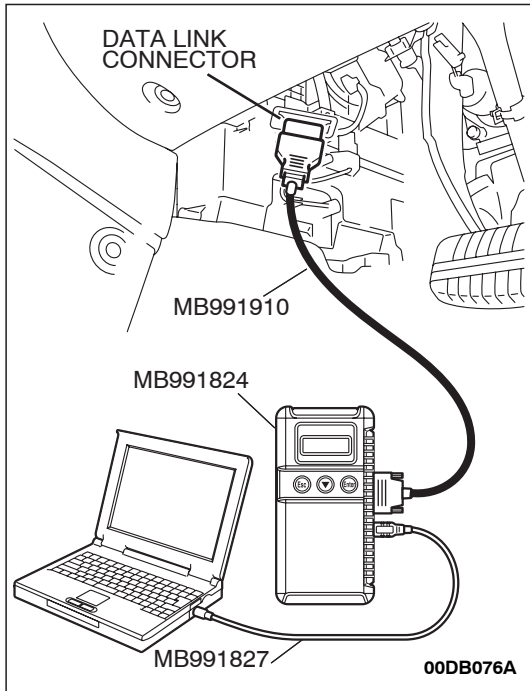
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage is between 435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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 :** Then go to Step 9.





**STEP 9. Using diagnostic tool , read the diagnostic trouble code (DTC).**

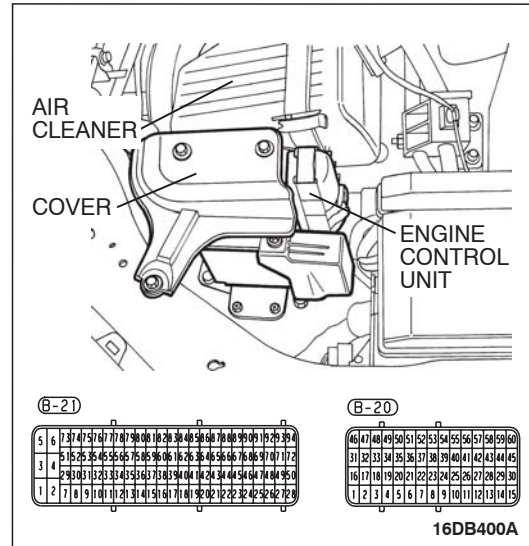
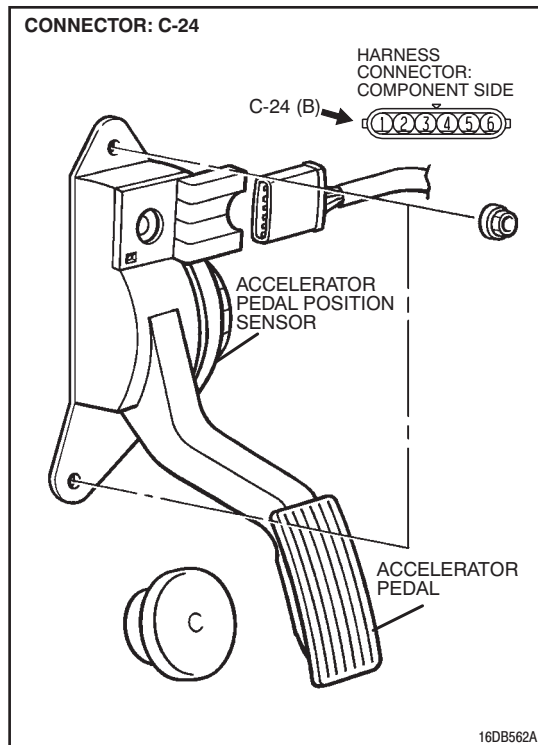
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) After the DTC has been deleted, read the DTC again.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is DTC P2123 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input.**



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 6) from the ENGINE-ECU (terminal No. 76).
- The ground terminal (terminal No. 2) is grounded with ENGINE-ECU (terminal No. 35).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ENGINE-ECU checks whether the voltage is within a specified range.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition switch is "ON" position.
- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Accelerator pedal position sensor (sub) output voltage is below 0.43 volts for 0.2 second.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**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 or connector damage.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**EOBD DRIVE CYCLE PATTERN**

None.

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable

- MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 12:  
Accelerator Pedal Position Sensor (sub).**

**⚠ CAUTION**

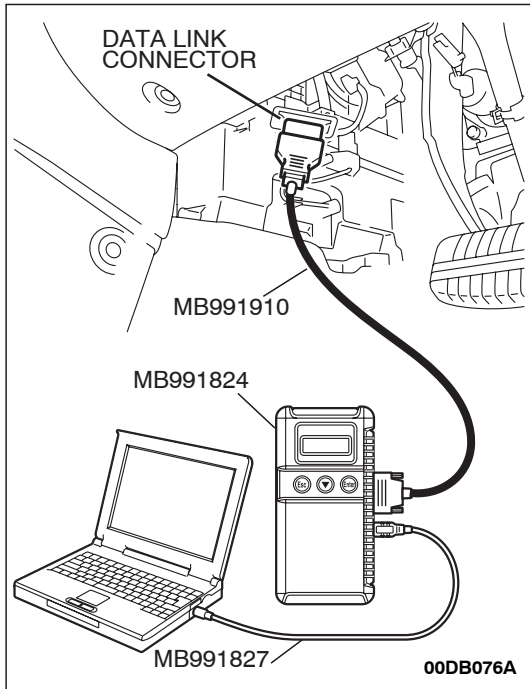
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage is between 0435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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.

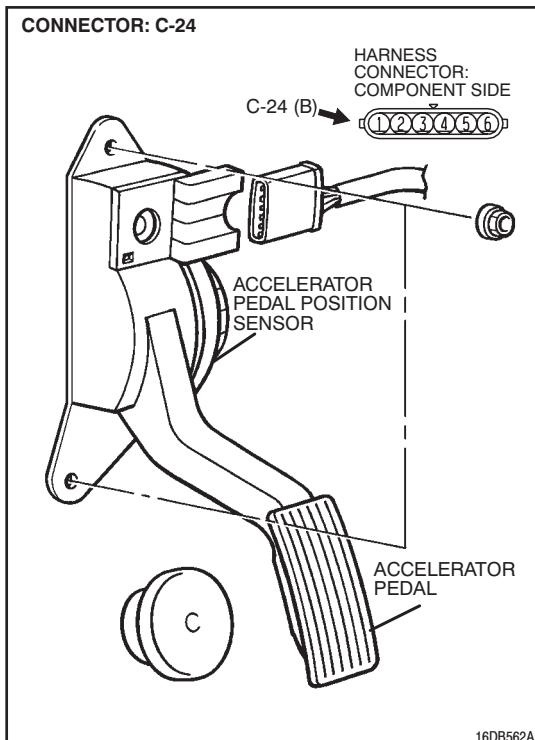


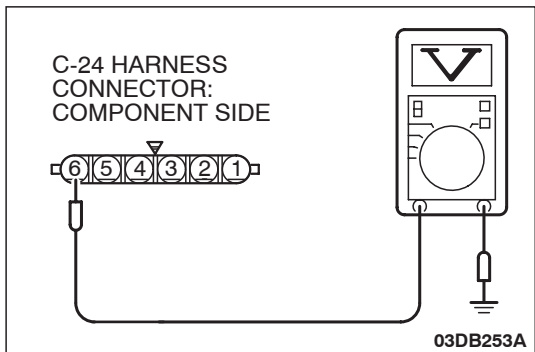
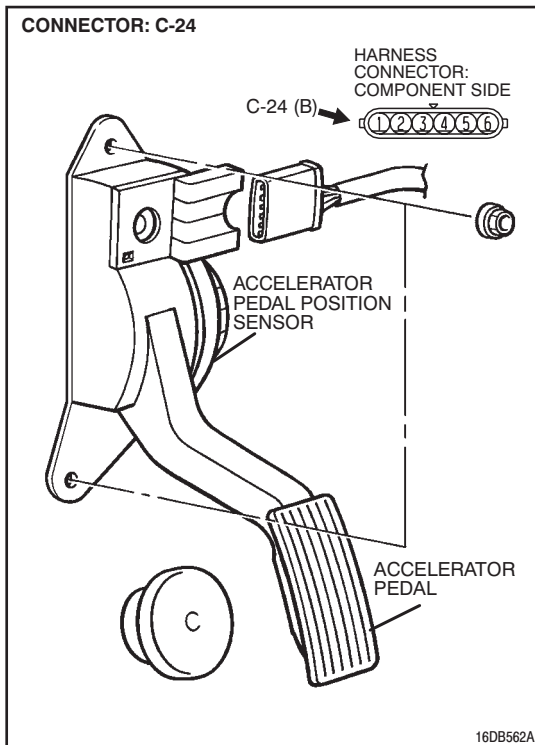
**STEP 2. Check harness connector C-24 at accelerator pedal position sensor for damage.**

**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 10.





**STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-24.**

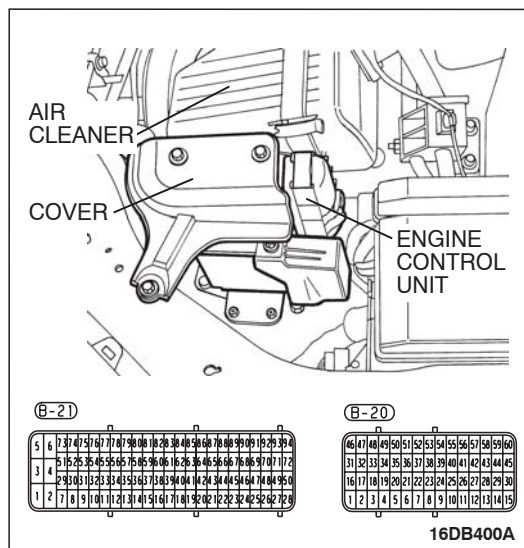
- (1) Disconnect the connector C-24 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 6 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-21 at ENGINE-ECU 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 10.

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

**NO :** Repair it. Then go to Step 10.

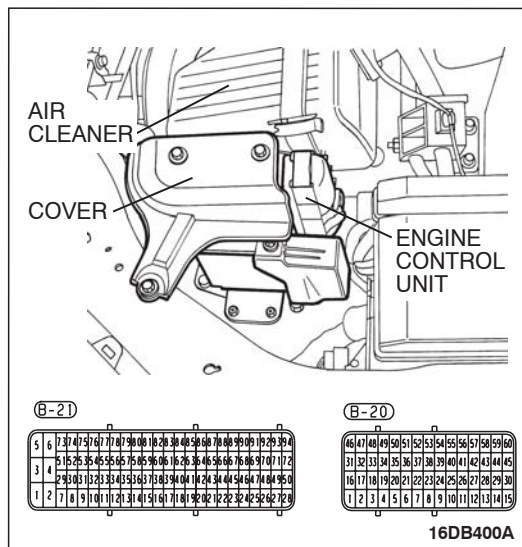
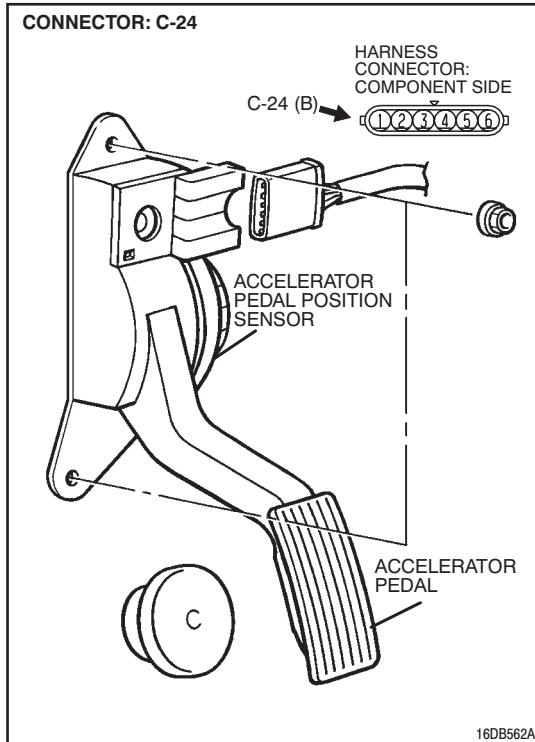


**STEP 6. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 6) and ENGINE-ECU connector B-21 (terminal No. 76).**

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

**YES :** Go to Step 7.

**NO :** Repair or replace it. Then go to Step 10.



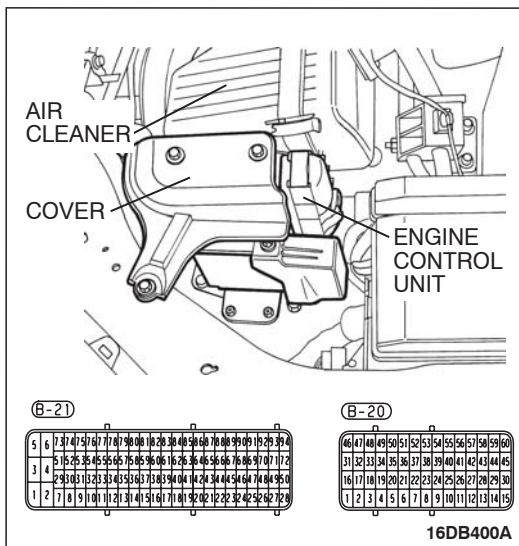
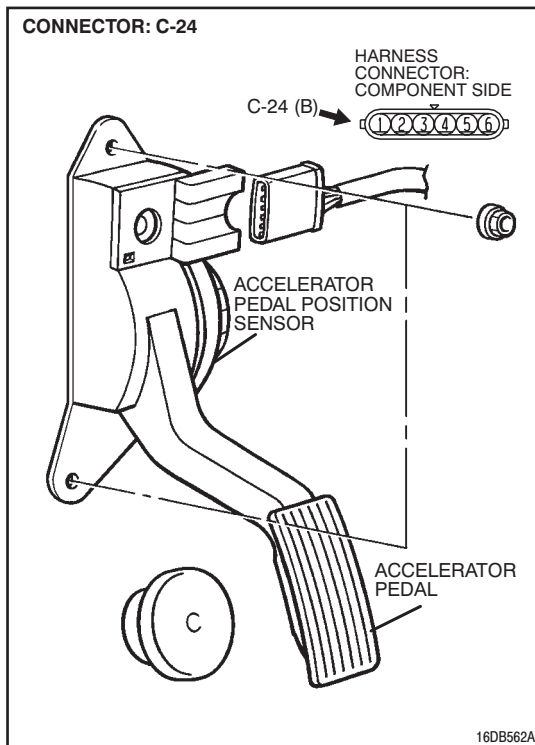


**STEP 7. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-24 (terminal No. 1) and ENGINE-ECU connector B-21 (terminal No.81).**

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

**YES :** Go to Step 8.

**NO :** Repair or replace it. Then go to Step 10.

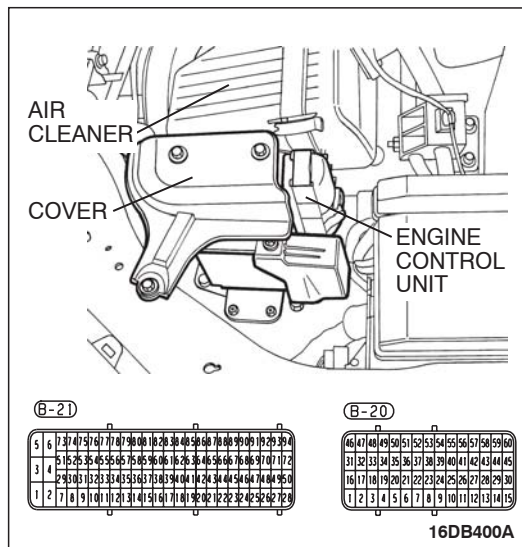
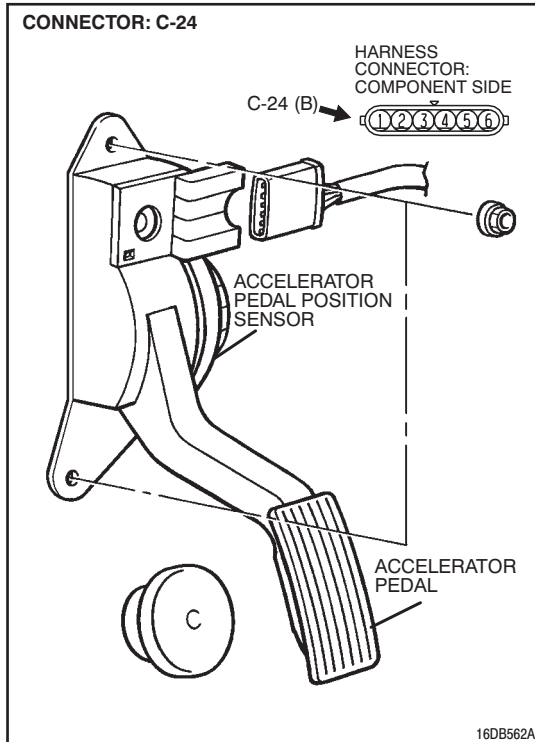


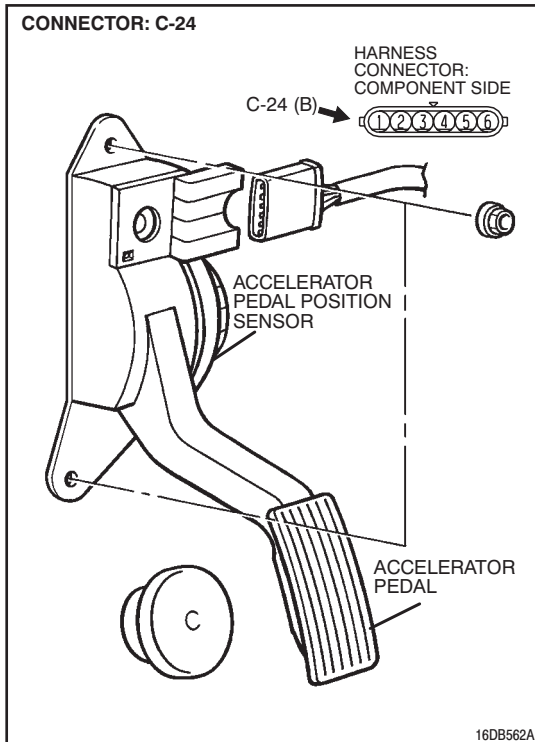
**STEP 8. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 1) and ENGINE-ECU connector B-21 (terminal No. 81)**

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

**YES :** Go to Step 9.

**NO :** Repair or replace it. Then go to Step 10.





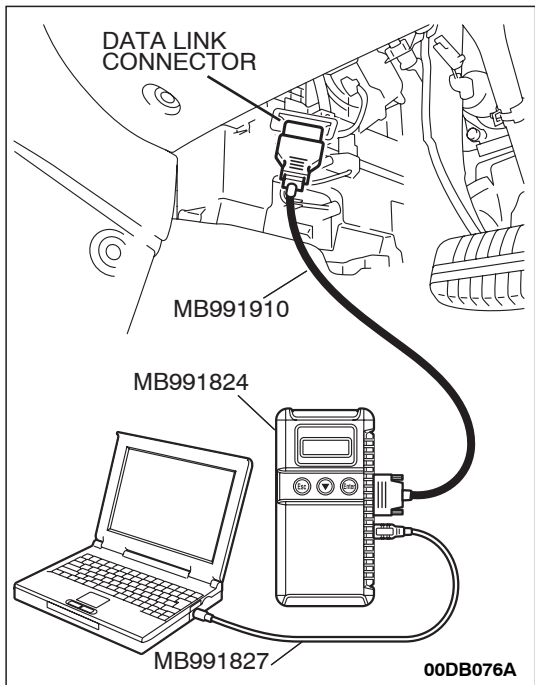
**STEP 9. Replace the accelerator pedal position sensor.**

- (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 :** Then go to Step 10.

**NO :** The inspection is complete.



**STEP 10. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

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

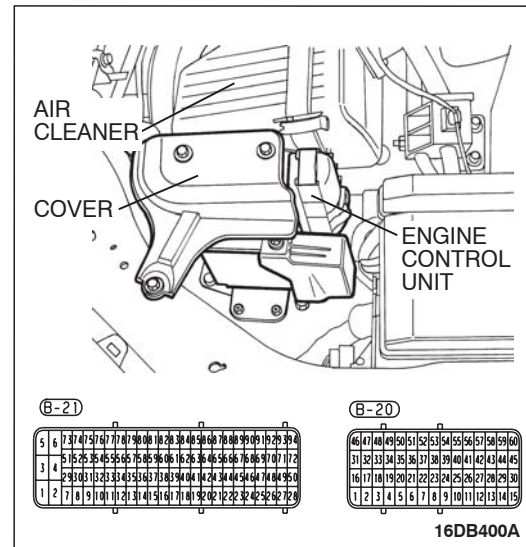
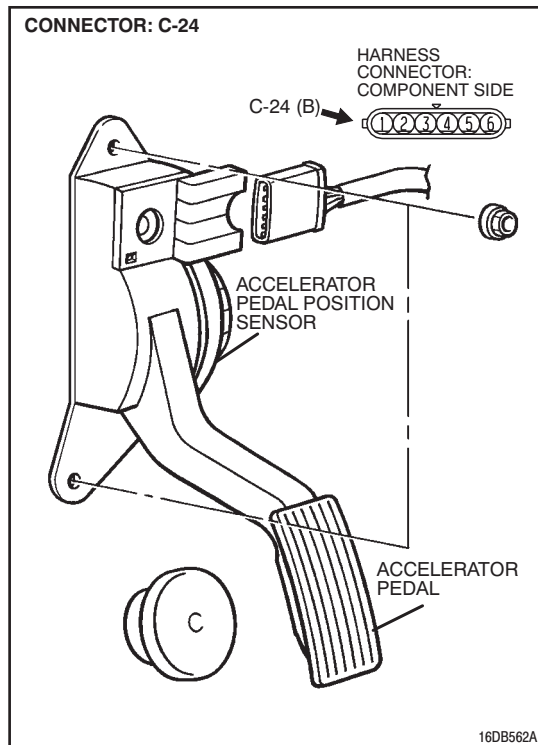
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) After the DTC has been deleted, read the DTC again.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is DTC P2127 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P2128: Accelerator Pedal Position Sensor (Sub) Circuit High Input.**



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 6) from the ENGINE-ECU (terminal No. 76).
- The ground terminal (terminal No. 2) is grounded with ENGINE-ECU (terminal No. 35).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ENGINE-ECU checks whether the voltage is within a specified range.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition switch is "ON" position.
- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Accelerator pedal position sensor (sub) output voltage is above 4.824 volts for 0.2 second.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**EOBD 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.
- Short circuit to 5 volt.
- Harness or connector damage.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable

- MB991910: Main Harness A

**STEP 1. Using diagnostic tool , check data list item 12:  
Accelerator Pedal Position Sensor (sub).**

**⚠ CAUTION**

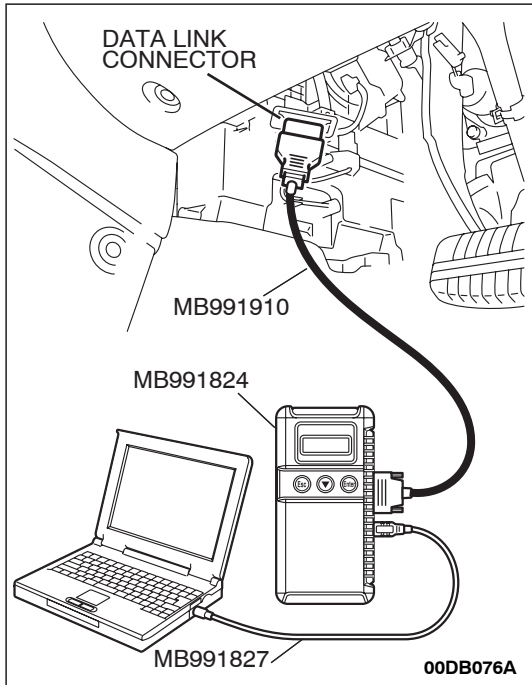
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage is between 0435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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.

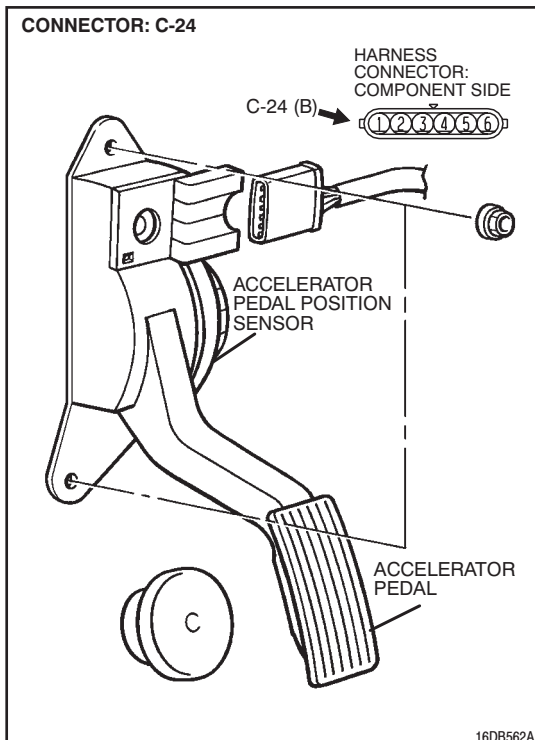


**STEP 2. Check harness connector C-24 at accelerator pedal position sensor for damage.**

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

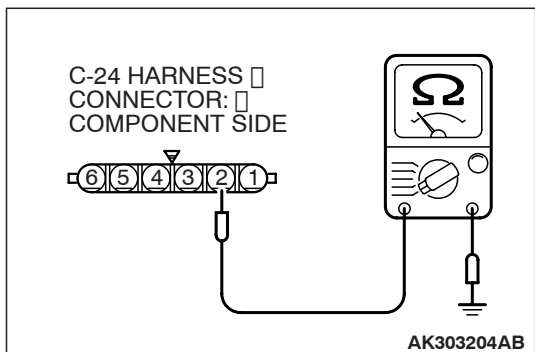
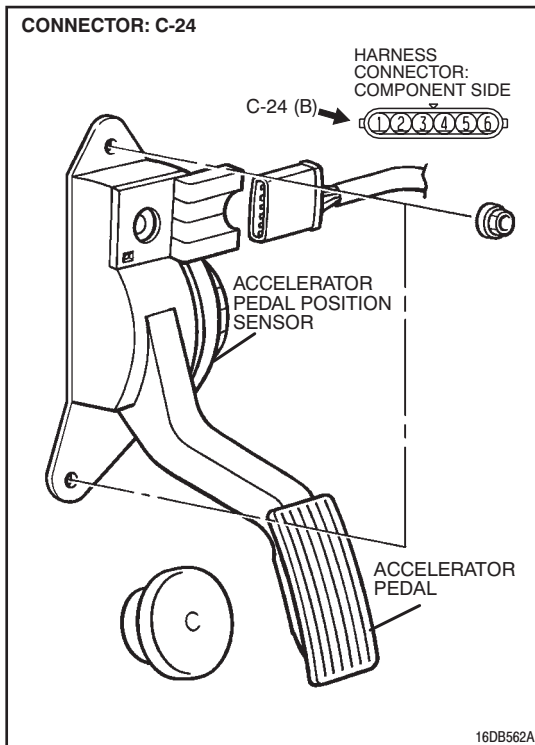
**YES :** Go to Step 3.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.



**STEP 3. Check the continuity at accelerator pedal position sensor harness side connector C-24.**

(1) Disconnect the connector C-24 and measure at the harness side.



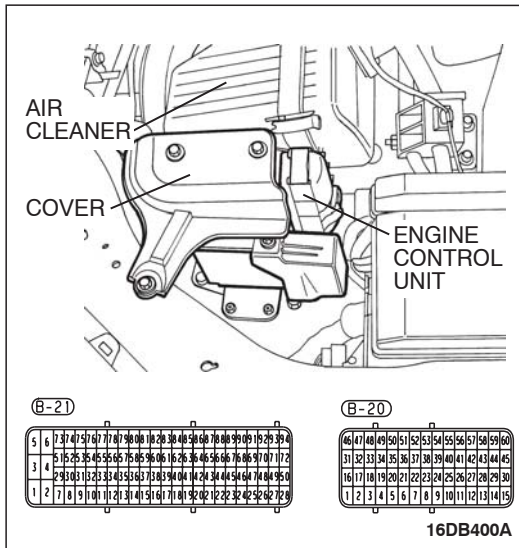
(2) Measure the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Go to Step 6.

**NO :** Go to Step 4.



**STEP 4. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Go to Step 5.

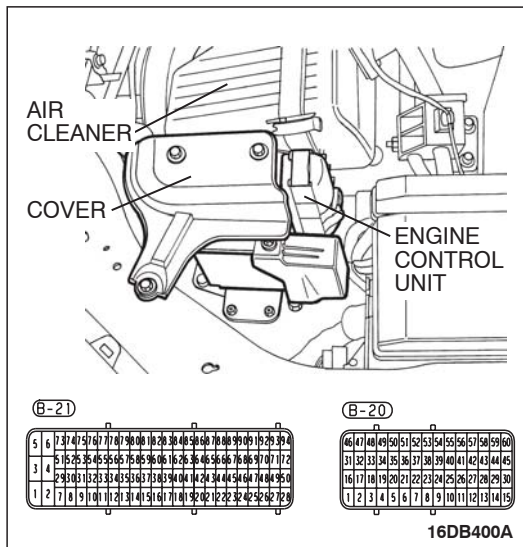
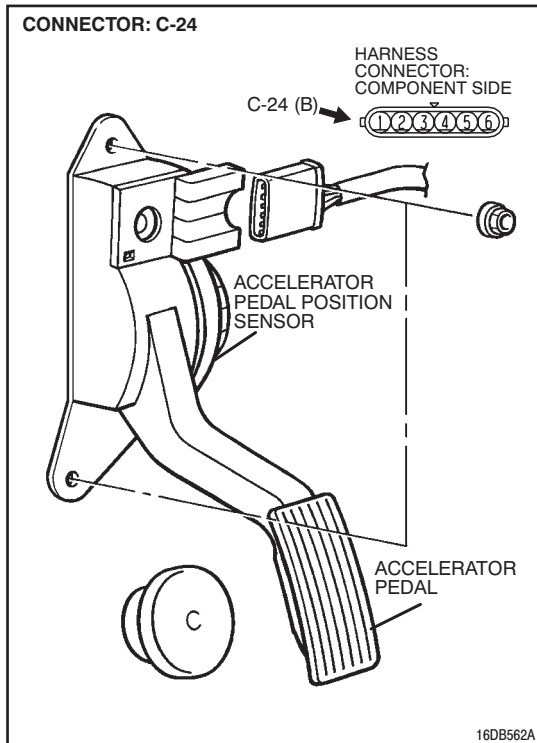
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.

**STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-24 (terminal No. 2) and ENGINE-ECU connector B-21 (terminal No. 35).**

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

**YES :** Go to Step 7.

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

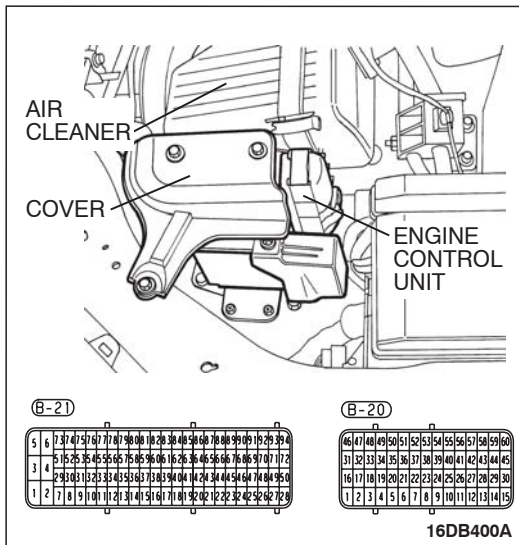
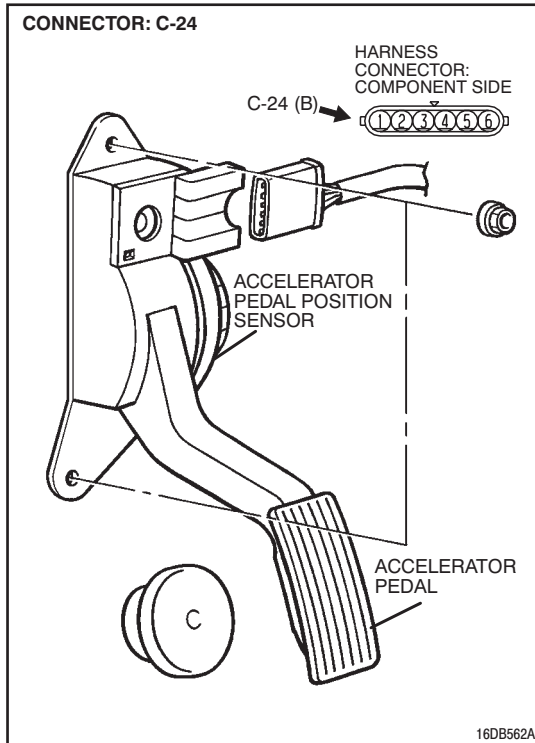


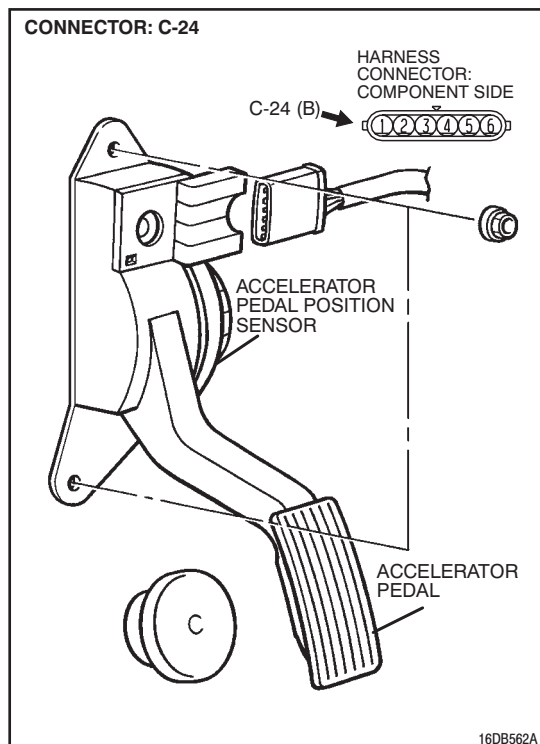


**STEP 6. Check for short circuit to 5-Volts and harness damage between throttle position sensor connector C-24 (terminal No. 2) and ECU connector B-21 (terminal No. 35).**  
**Q: Is the harness wire in good condition?**

**YES :** Go to Step 7.

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





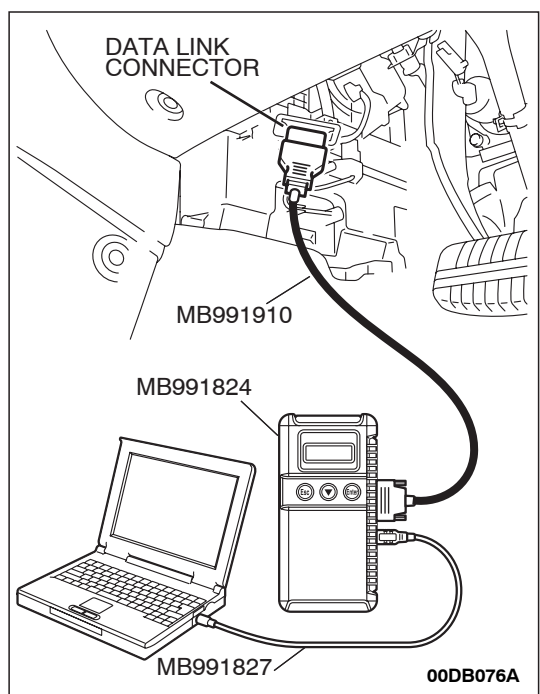
### STEP 7. Replace the accelerator pedal position sensor.

- (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** : Then go to Step 8.

**NO** : The inspection is complete.



### STEP 8. Using diagnostic tool , check data list item 12: Accelerator Pedal Position Sensor (sub).

#### ⚠ CAUTION

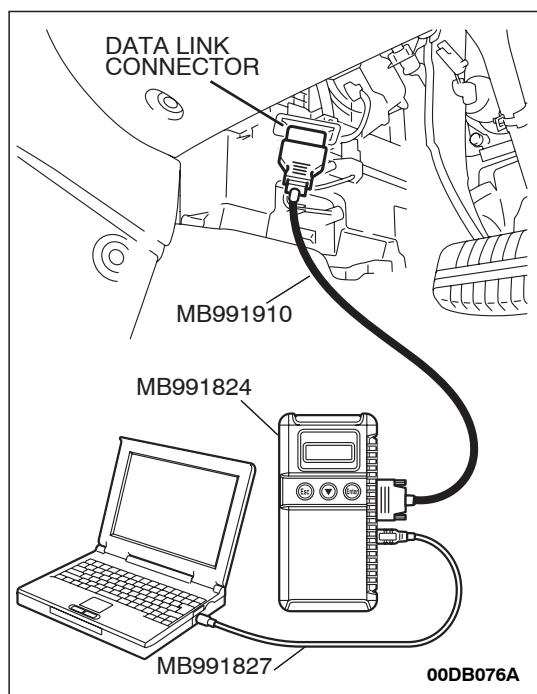
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage is between 0435 and 1035 mV when foot is released from accelerator pedal.
  - Output voltage is between 4000 - 4824 mV 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** : Then go to Step 9.



**STEP 9. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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**

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**THROTTLE POSITION SENSOR (MAIN AND SUB) RANGE/PERFORMANCE PROBLEM CIRCUIT**

- Refer to DTC P0122 – Throttle Position Sensor (Main) Circuit [P.13A-148](#).
- Refer to DTC P0222 – Throttle Position Sensor (Sub) Circuit [P.13A-318](#).

**CIRCUIT OPERATION**

- Refer to DTC P0122 – Throttle Position Sensor (Main) Circuit [P.13A-148](#).
- Refer to DTC P0222 – Throttle Position Sensor (Sub) Circuit [P.13A-318](#).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU checks the throttle position sensor output signal characteristics for abnormal conditions.

**Check Conditions**

- Ignition switch is "ON" position.
- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Throttle angle variances are outside specifications.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**EOBD 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.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

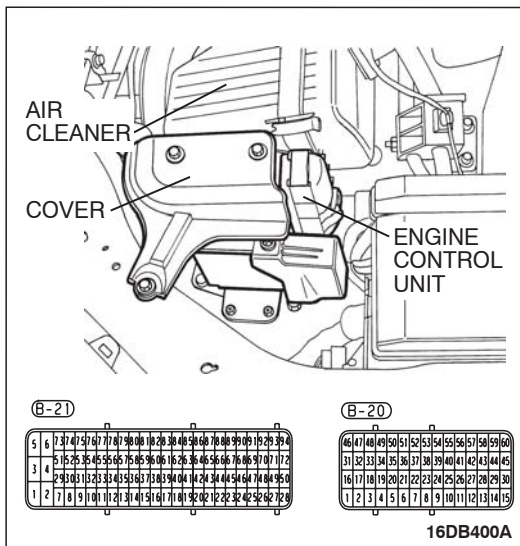
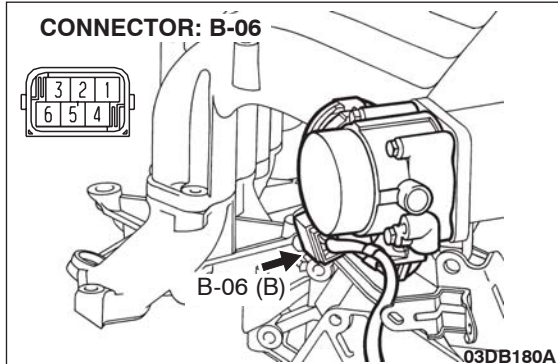
- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector B-06 at throttle position sensor and harness connector B-20 at ENGINE-ECU 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.

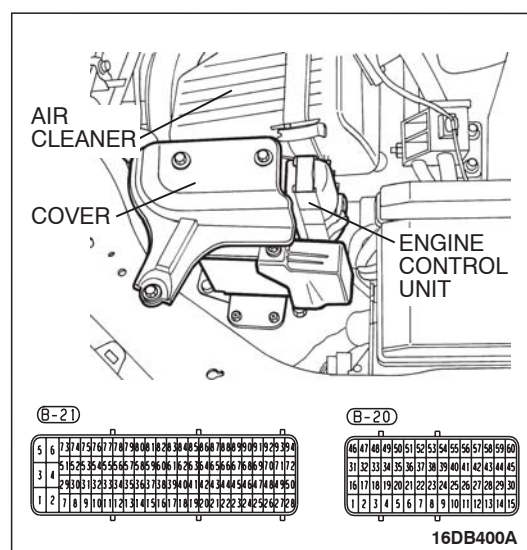
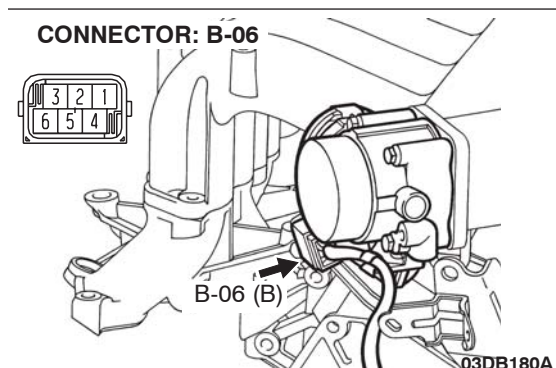


**STEP 2.** Check for short circuit to ground between throttle position sensor connector B-06 (terminal No. 6) and ENGINE-ECU connector B-20 (terminal No. 42).

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

**YES :** Go to Step 3.

**NO :** Repair it. Then go to Step 5.

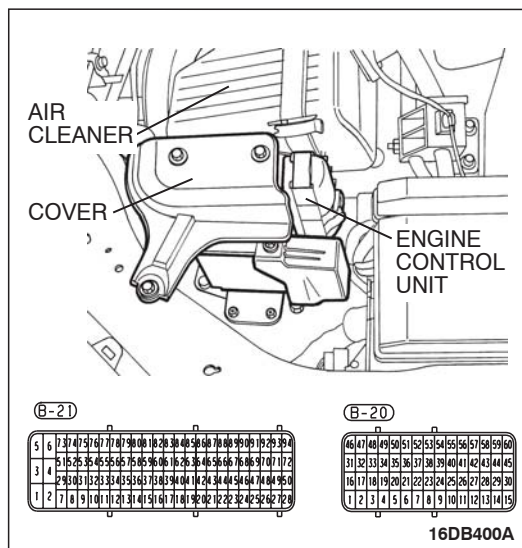
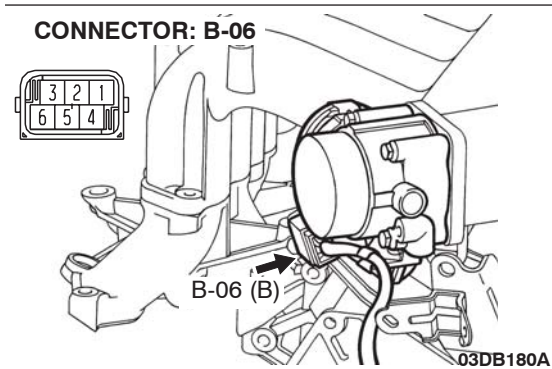


**STEP 3. Check for short circuit to ground between throttle position sensor connector B-06 (terminal No. 5) and ENGINE-ECU connector B-20 (terminal No. 57).**

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

**YES :** Go to Step 4.

**NO :** Repair it. Then go to Step 5.



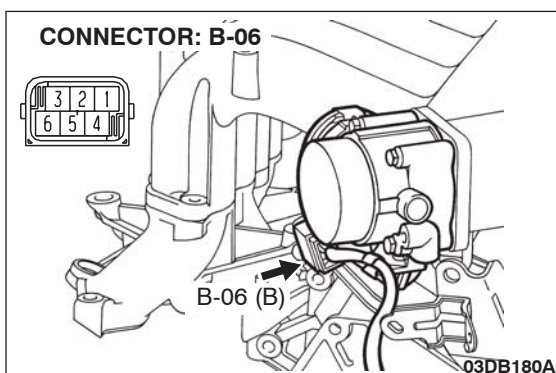
**STEP 4. Replace the throttle body assembly.**

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

**Q: Is DTC P2135 set?**

**YES :** Then go to Step 5.

**NO :** The inspection is complete.



**STEP 5. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

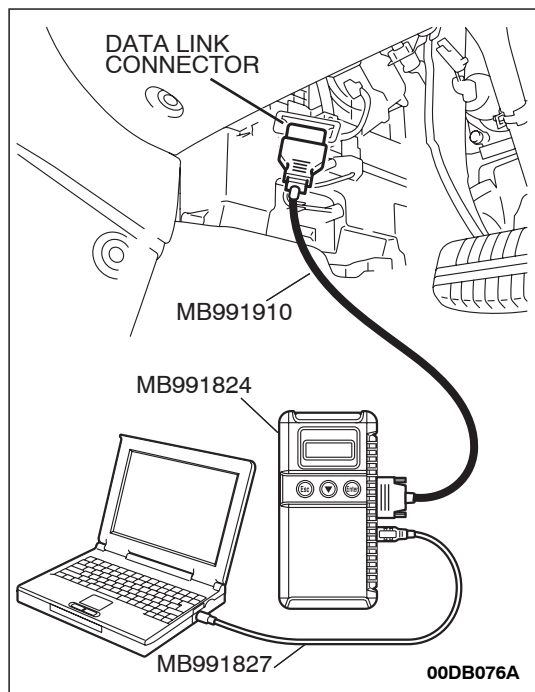
**To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting diagnostic tool .**

- (1) Connect diagnostic tool 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 P2135 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.





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**DTC P2138: Accelerator Pedal Position Sensor (main and sub) Circuit Range/Performance Problem**

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**⚠ CAUTION**

If DTC P2138 has been set, 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.13A-476](#).
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (Sub) Circuit [P.13A-493](#).

**CIRCUIT OPERATION**

- Refer to DTC P2122 – Accelerator Pedal Position Sensor (Main) Circuit [P.13A-476](#).
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (Sub) Circuit [P.13A-493](#).

**TECHNICAL DESCRIPTION**

- ENGINE-ECU checks the accelerator pedal position sensor output signal characteristics for abnormal conditions.

**Check Condition**

- Ignition switch is "ON" position.

- Battery voltage is above 6.5 volt.

**Judgement Criteria**

- Difference in voltage between APS(main) and APS(sub) is above 0.215 volt for 0.24 sec.  
or
- Difference in voltage between APS(main) and APS(sub) is above 0.273 volt for 0.24 sec.  
or
- Difference in voltage between APS(main) and APS(sub) is above 1.133 volt for 0.24 sec.
- MIL activated immediately.
- Engine speed limited to 1200rpm and power restricted.

**EOBD 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.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

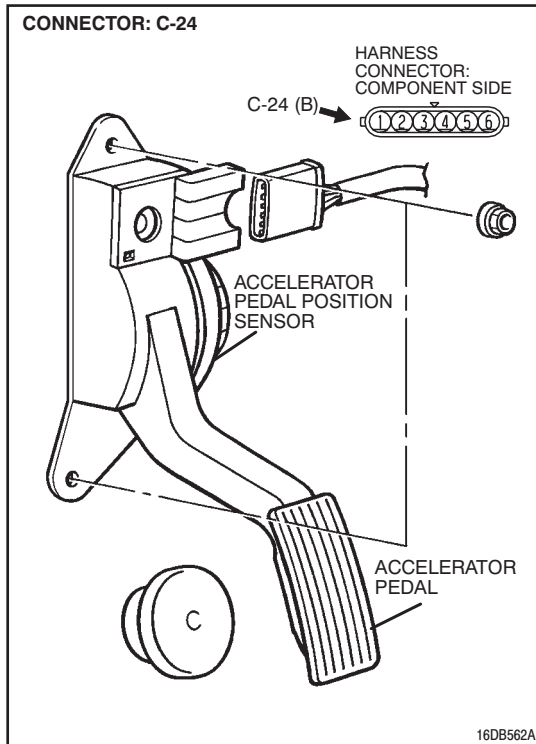
- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector C-24 at accelerator pedal position sensor for damage.**

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

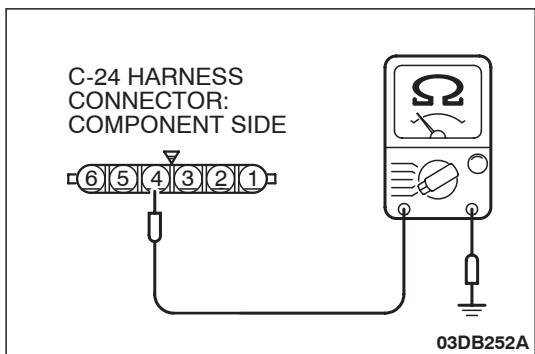
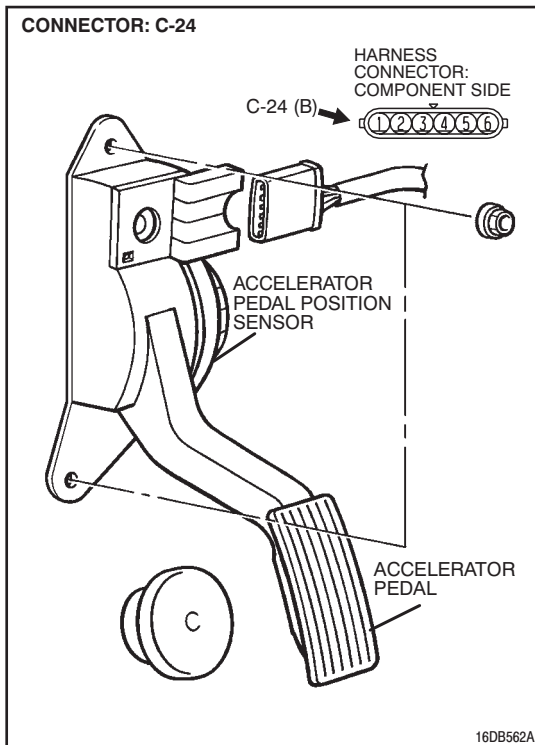
**YES :** Go to Step 2.

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



**STEP 2. Check the continuity at accelerator pedal position sensor harness side connector C-24.**

(1) Disconnect the connector C-24 and measure at the harness side.



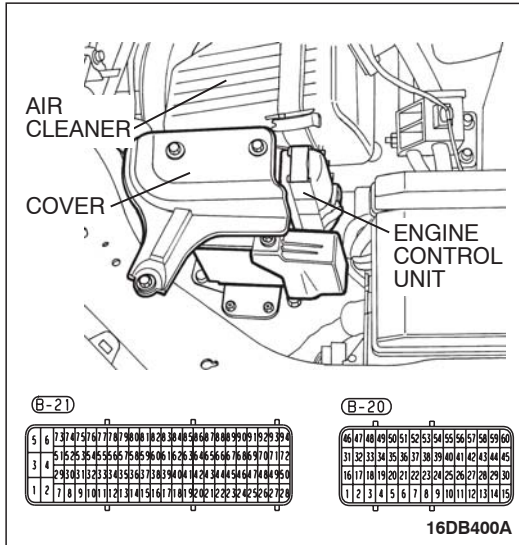
(2) Measure the continuity between terminal No. 4 and ground.

- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Go to Step 5.

**NO :** Go to Step 3.



**STEP 3. Check harness connector B-21 at ENGINE-ECU for damage.**

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

**YES :** Go to Step 4.

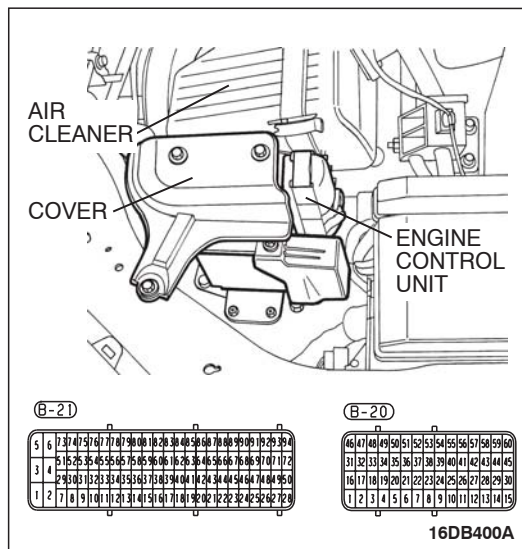
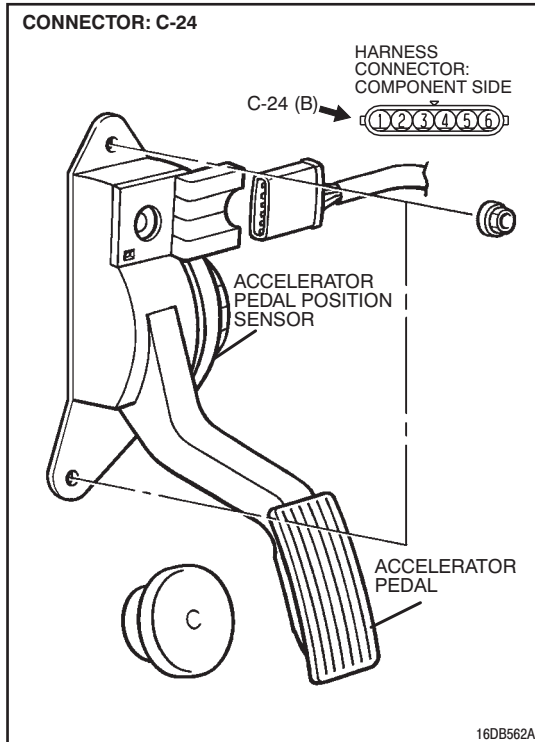
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

**STEP 4. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 4) and ENGINE-ECU connector B-21 (terminal No. 13).**

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

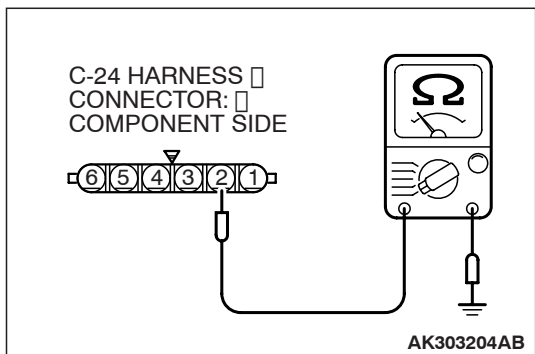
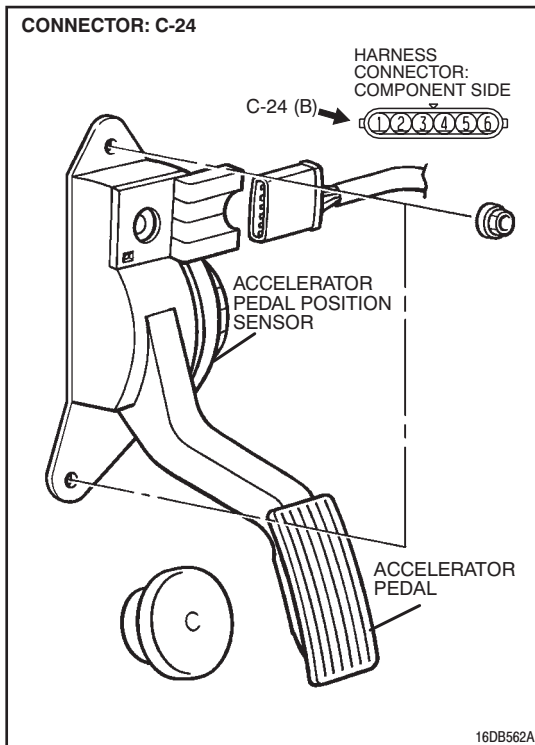
**YES :** Go to Step 5.

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



**STEP 5. Check the continuity at accelerator pedal position sensor harness side connector C-24.**

(1) Disconnect the connector C-24 and measure at the harness side.



(2) Measure the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Go to Step 7.

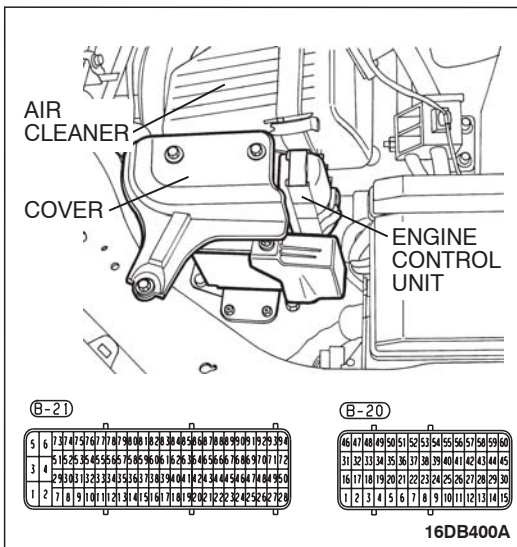
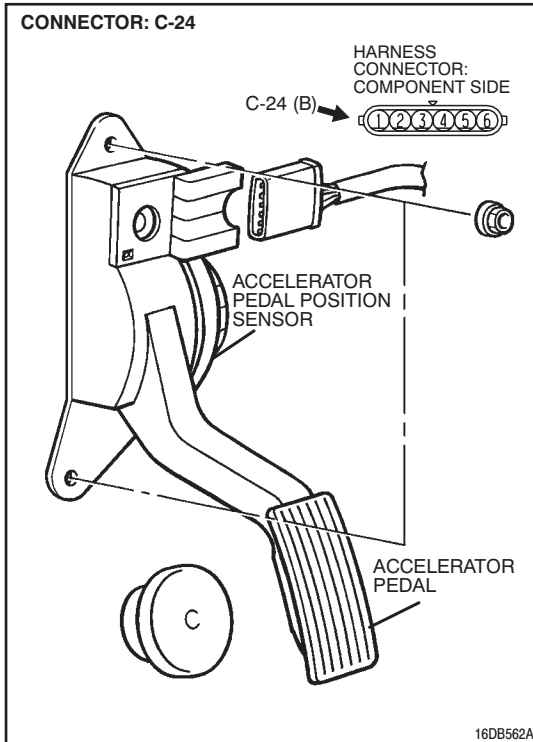
**NO :** Go to Step 6.

**STEP 6. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 2) and ENGINE-ECU connector B-21 (terminal No. 35).**

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

**YES :** Go to Step 7.

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

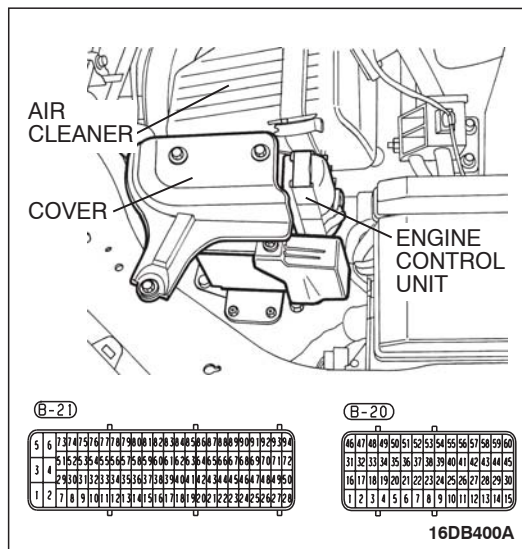
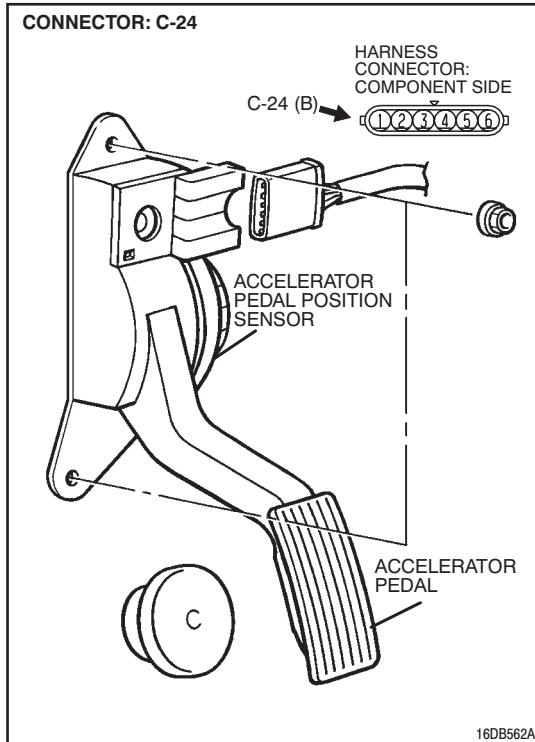


**STEP 7. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 5) and ENGINE-ECU connector B-21 (terminal No. 75).**

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

**YES :** Go to Step 8.

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



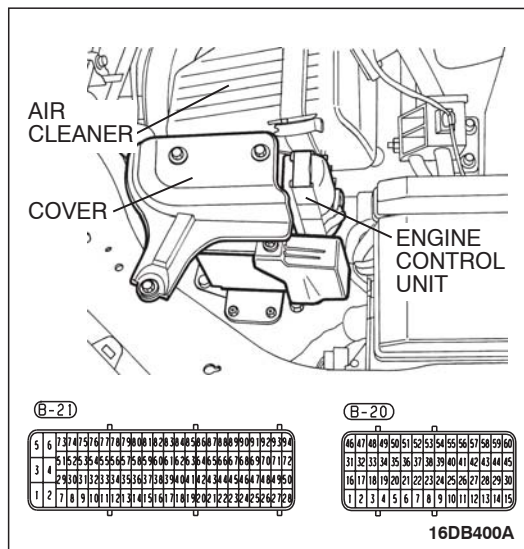
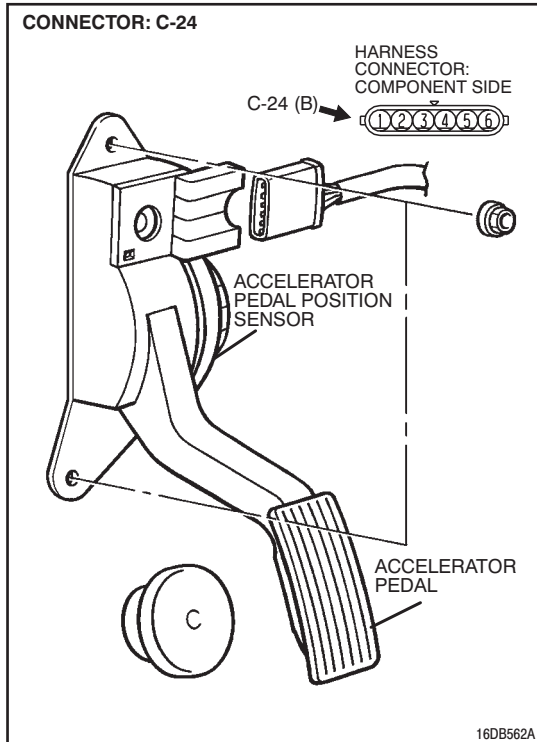


**STEP 8. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 6) and ENGINE-ECU connector B-21 (terminal No. 76).**

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

**YES :** Go to Step 9.

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

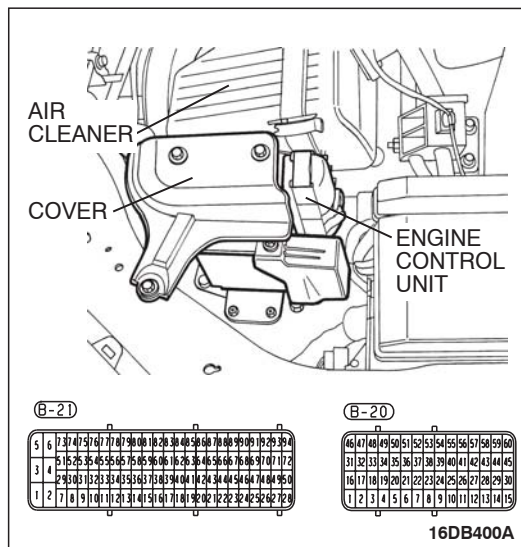
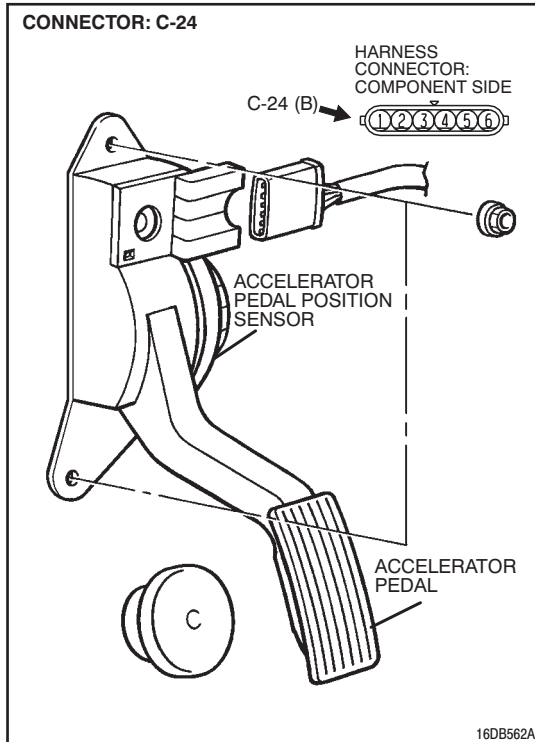


**STEP 9. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 3) and ENGINE-ECU connector B-21 (terminal No. 59).**

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

**YES :** Go to Step 10.

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

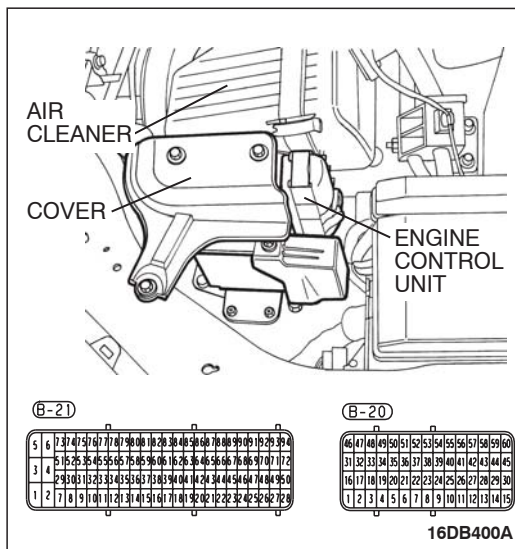
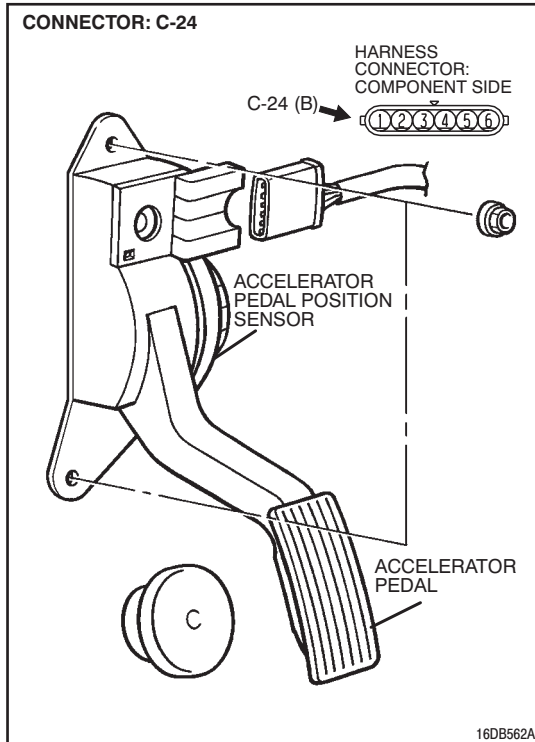


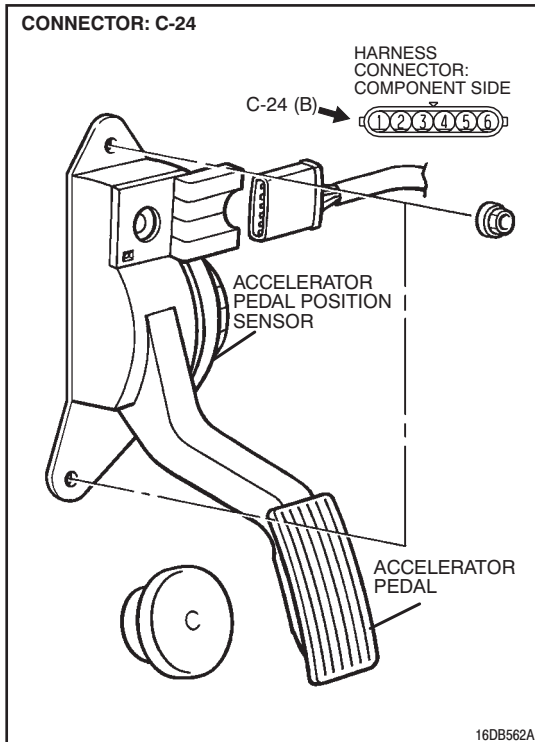
**STEP 10. Check for harness damage between accelerator pedal position sensor connector C-24 (terminal No. 1) and ENGINE-ECU connector B-21 (terminal No. 81).**

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

**YES :** Go to Step 11.

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





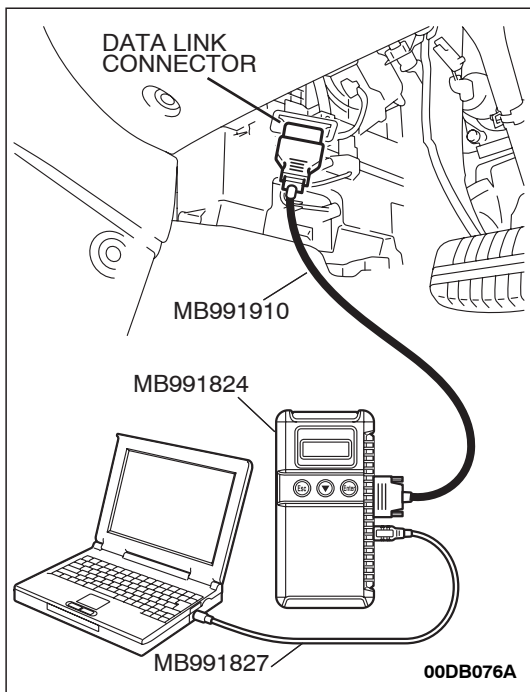
**STEP 11. Replace the accelerator pedal position sensor.**

- (1) Replace the asserty 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 :** Then go to Step 12.

**NO :** The inspection is complete.



**STEP 12. Using diagnostic tool , read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

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

- (1) Connect diagnostic tool 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 U1100: ENGINE CAN TIME-OUT/Not equipped**

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**⚠ CAUTION**

- If the ENGINE-ECU outputs DTC U1102, make sure to diagnose the CAN bus line.
- Before replacing the ENGINE-ECU, make sure that the communication circuit is operating normally.

**DTC SET CONDITIONS**

**Check Conditions**

- Battery positive voltage is 10 volts or higher.

**Judgement Criteria**

- Unable to receive combination meter signals through the CAN bus line.
- No MIL.

**COMMENT**

**Current Trouble**

- Some of the possible causes are a harness or connector damage between the ENGINE-ECU 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 ENGINE-ECU.

**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ENGINE-ECU 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 MUT – 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-6](#)).*

**EOBD 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.
- ENGINE-ECU failed.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Using diagnostic tool , diagnose CAN bus line.**

**⚠ CAUTION**

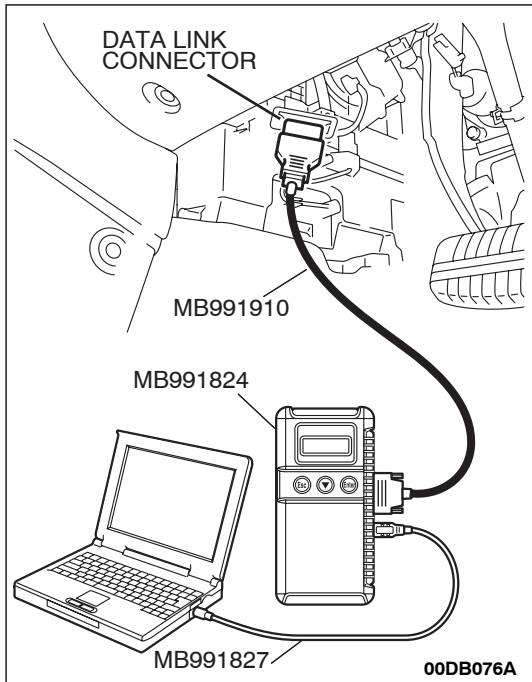
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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-15](#). Then go to Step 6.



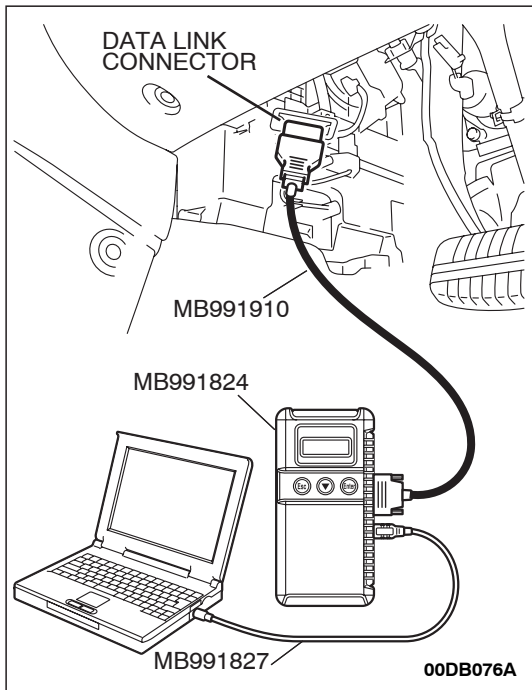
**STEP 2. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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-Diagnostic Trouble Code Chart [P.54A-13](#).

**NO :** Go to Step 3.



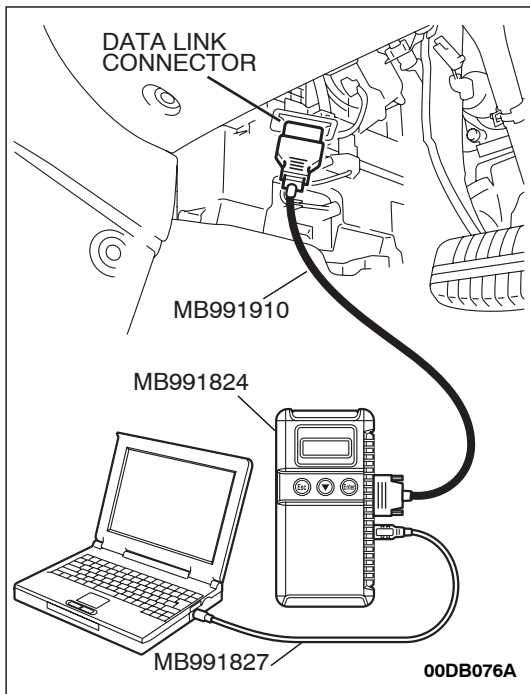
**STEP 3. Using diagnostic tool , read the diagnostic trouble code (DTC).**

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

**Q: Is DTC 013 set?**

**YES :** Go to Step 4.

**NO :** Go to Step 5.



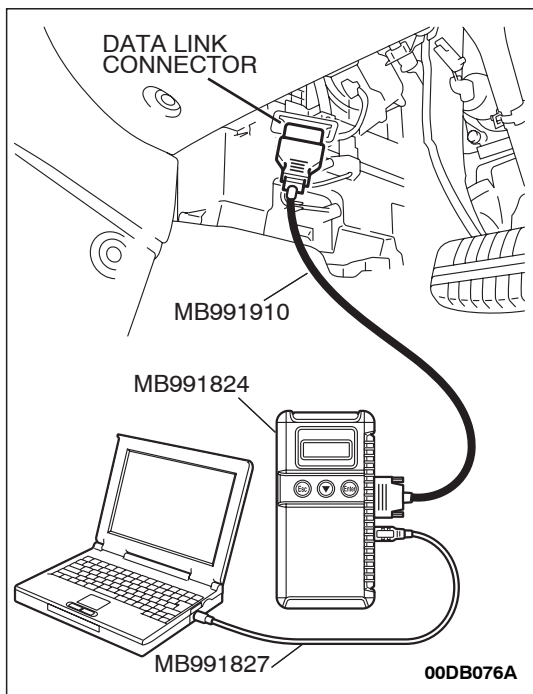
**STEP 4. Using diagnostic tool , read the diagnostic trouble code (DTC).**

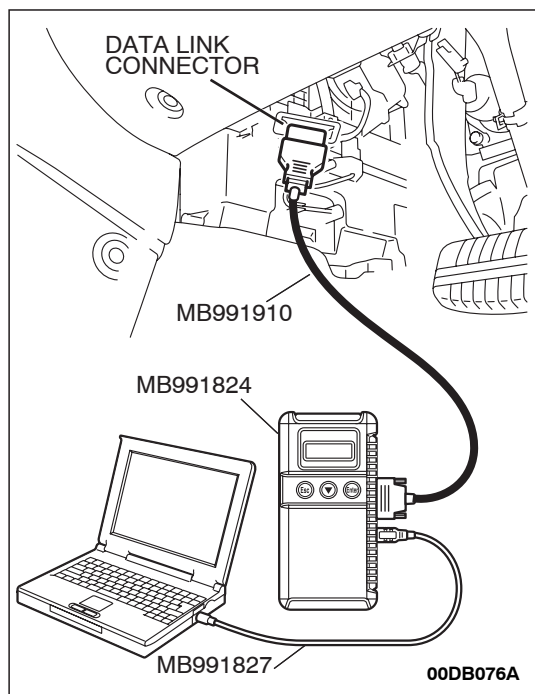
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) After the MPI-DTC has been deleted, read the MPI-DTC again.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U1100 set?**

**YES :** Replace the combination meter. Then go to Step 5.

**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ENGINE-ECU 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 diagnostic tool , read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U1100 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## DTC U1102: ABS-ECU TIME-OUT

### ⚠ CAUTION

- If the ENGINE-ECU output the DTC U1102, make sure to diagnose the CAN bus line.
- Before replacing the ENGINE-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 Criteria

- Unable to receive ABS-ECU signals through the CAN bus line.

## COMMENT

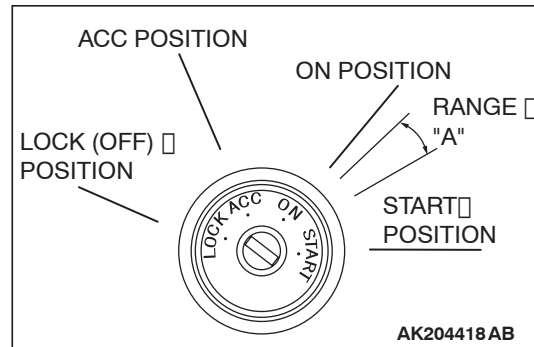
### Current Trouble

- Some of the possible causes are a harness or connector damage between the ENGINE-ECU and the ABS-ECU on the CAN bus line, a failure in the ABS-ECU power supply system, a failure in the ABS-ECU, or a failure in the ENGINE-ECU.

### Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ENGINE-ECU and ABS-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, ENGINE-ECU stores DTC U1102 (the past trouble).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the 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-6).*

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

- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90
- CAN line harness damage or connector damage.
- ABS-ECU failed.
- ENGINE-ECU failed.

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

### STEP 1. Using diagnostic tool , diagnose CAN bus line.

#### **CAUTION**

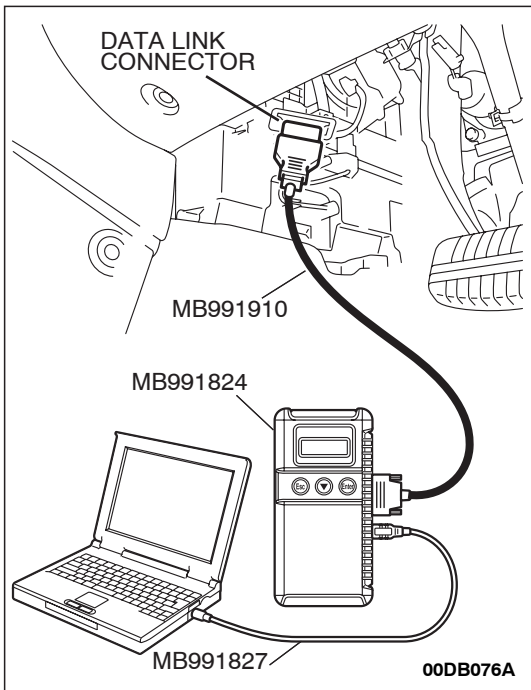
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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-15](#). Then go to Step 6.



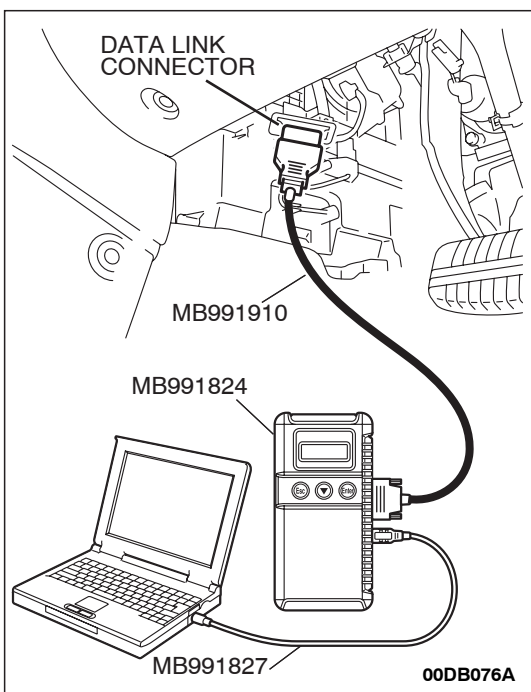
### STEP 2. Using diagnostic tool , read the diagnostic trouble code (DTC).

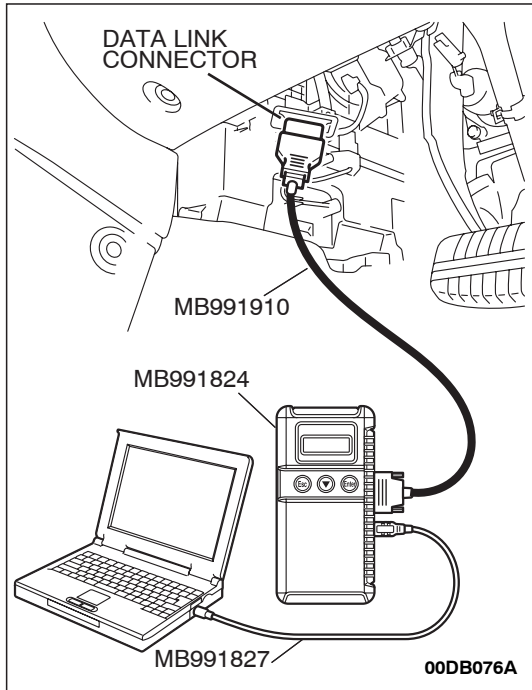
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the ABS-DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

#### Q: Is the ABS-DTC set?

**YES** : Refer to GROUP 35B, Anti-Lock Braking System-Diagnostic Trouble Code Chart [P.35B-9](#).

**NO** : Go to Step 3.





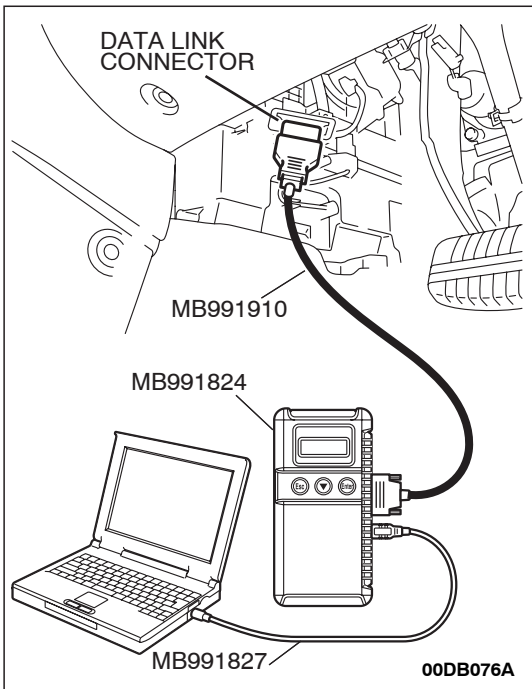
**STEP 3. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool 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.



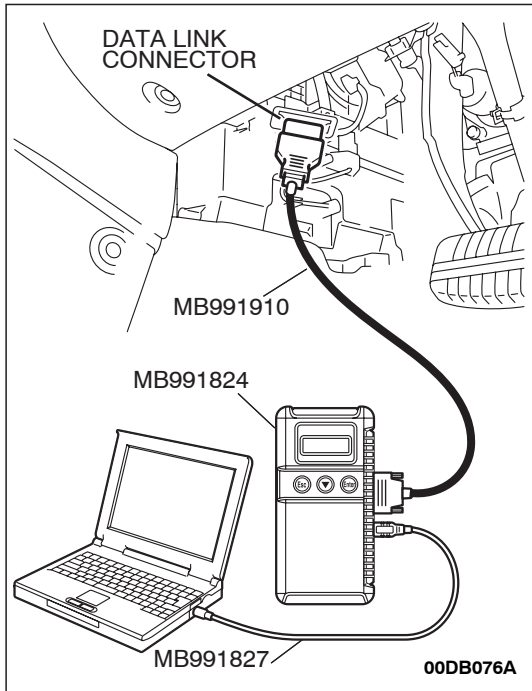
**STEP 4. Using diagnostic tool , read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U1102 set?**

**YES :** Replace the ABS-ECU. Then go to Step 6.

**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ENGINE-ECU and ABS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions [P.00-14](#).



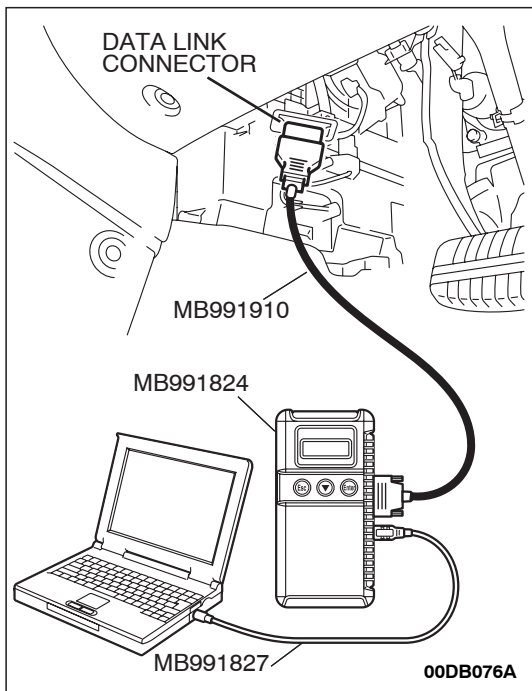
**STEP 5. Using diagnostic tool , read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U1102 set?**

**YES :** Replace the ENGINE-ECU. Then go to Step 6.

**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ENGINE-ECU and ABS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions [P.00-14](#).



**STEP 6. Using diagnostic tool , read the diagnostic trouble code (DTC).**

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) After the MPI-DTC has been deleted, read the MPI-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 U1120: Engine CAN Message

### **CAUTION**

- Before replacing the ENGINE-ECU, make sure that the communication circuit is operating normally.

### DTC SET CONDITIONS

#### Check Conditions

- None.

#### Judgement Criteria

- No MIL.

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

- CAN line harness damage or connector damage.
- ECU.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

### DIAGNOSIS

#### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

#### STEP 1. Using diagnostic tool , diagnose CAN bus line.

### **CAUTION**

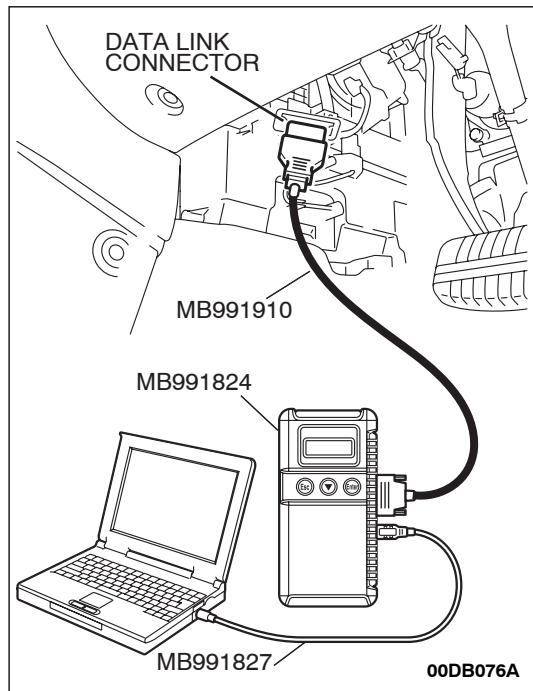
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

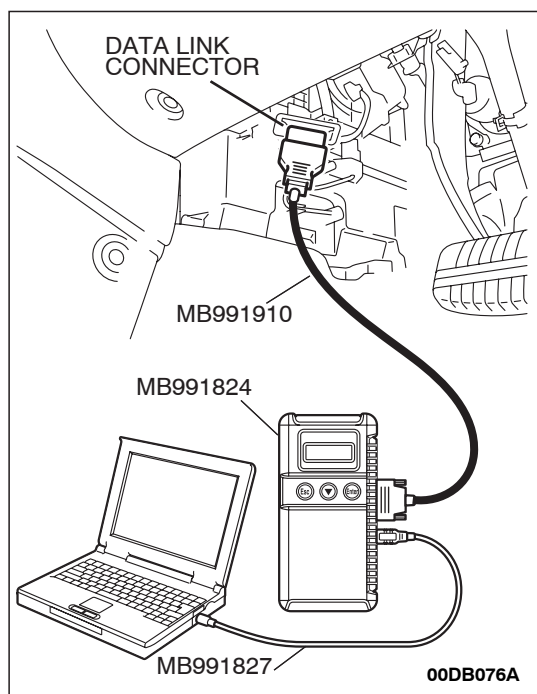
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose CAN bus line.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

#### 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-15](#). Then go to Step 2.





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

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

**Q: Is DTC U1120 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC U1121: T/M CAN Message

### **CAUTION**

- Before replacing the ENGINE-ECU, make sure that the communication circuit is operating normally.

## DTC SET CONDITIONS

### Check Conditions

- None.

### Judgement Criteria

- MIL activated after 2 drive cycles.

- Limp home - locked in 3rd gear and engine speed limited.

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

- CAN line harness damage or connector damage.
- TCU or transmission
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

### STEP 1. Using diagnostic tool , diagnose CAN bus line.

#### **CAUTION**

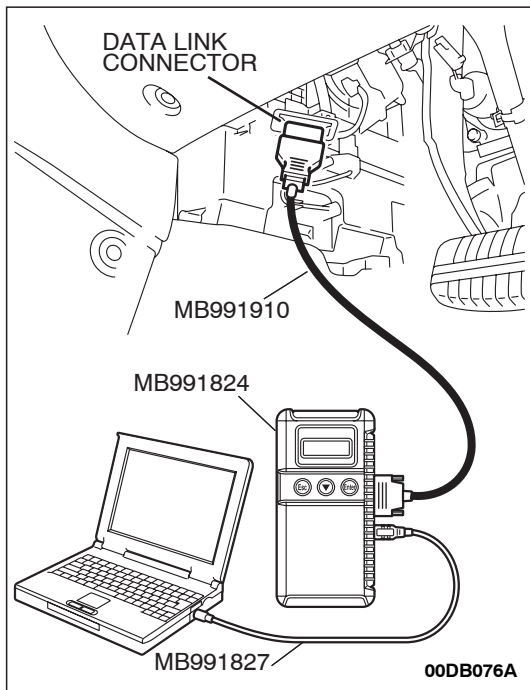
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

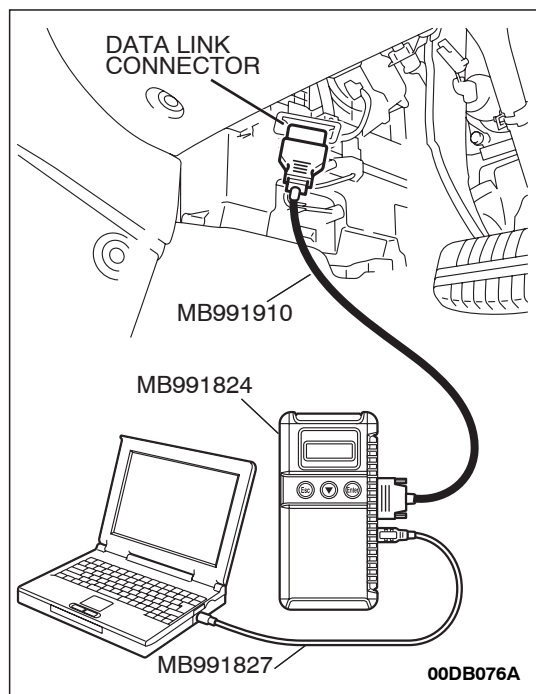
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Diagnose CAN bus line.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

### 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-15. Then go to Step 6.





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

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

**Q: Is DTC U1121 set?**

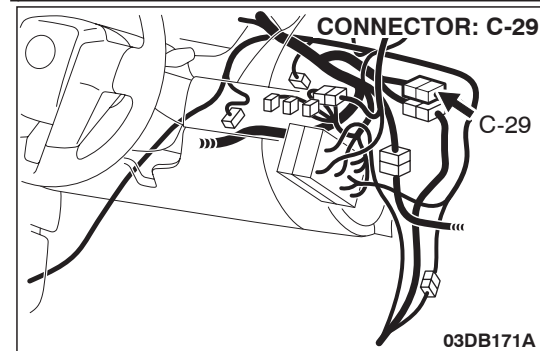
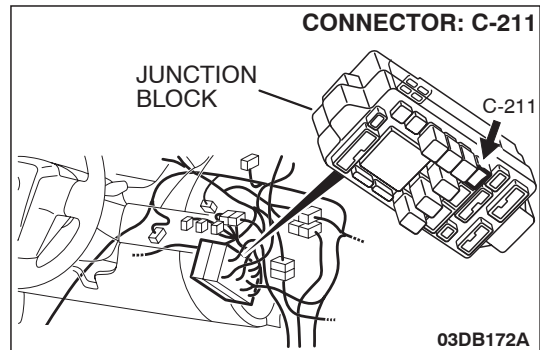
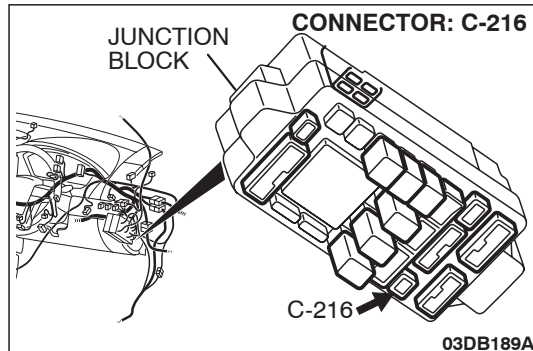
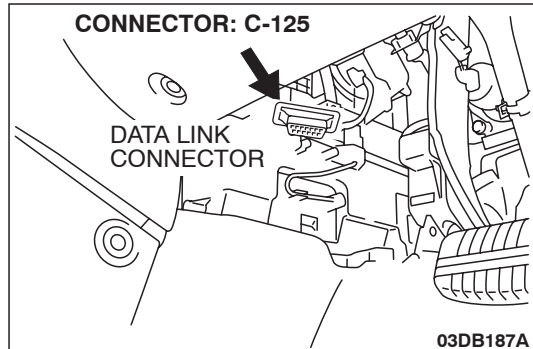
**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## SYMPTOM PROCEDURES

### INSPECTION PROCEDURE 1: Communication with Diagnostic Tool Is Not Possible. (Communication with All Systems Is Not Possible.)



### CIRCUIT OPERATION

- A battery positive voltage is applied on the data link connector power terminal (terminal No. 16). The ground terminals (terminal No. 4, No. 5) are grounded to the vehicle body.

### COMMENT

- The cause is probably a defect in power supply system (including ground) for the on-board diagnostic test mode line.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the data link connector.
- Damaged harness wire.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

## DIAGNOSIS

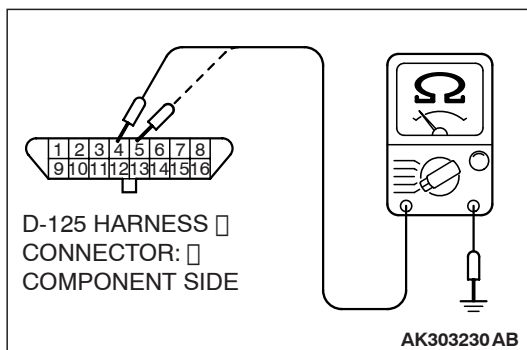
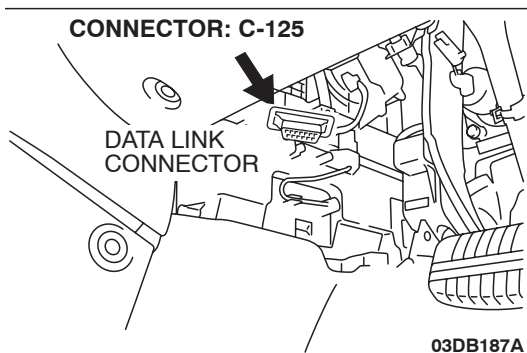
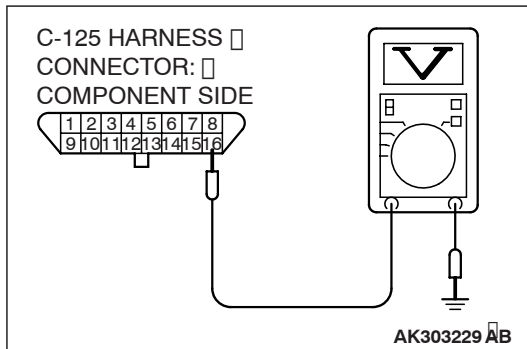
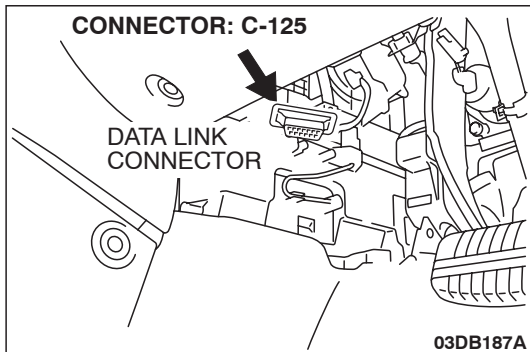
### STEP 1. Measure the power supply voltage at data link connector C-125.

- (1) Measure voltage between terminal No. 16 and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to step 2.

**NO :** Check harness connectors C-211, C-216 and C-29 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector C-211, C-216 and C-29 are in good condition, repair an open circuit between fusible link (1) and data link connector C-125 (terminal No. 16). Then confirm that the malfunction symptom is eliminated.



### STEP 2. Check the continuity at data link connector C-125.

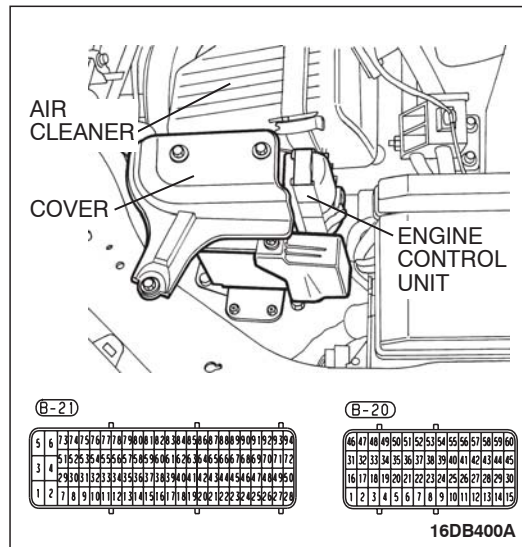
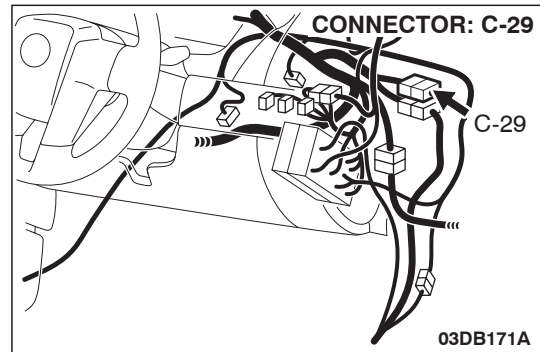
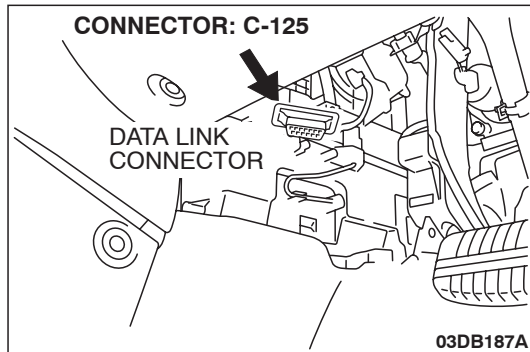
- (1) Check for the continuity between terminal No. 4, No. 5 and ground.
- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Replace the diagnostic tool. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair an open circuit or harness damage between data link connector C-125 (terminal No. 4, No. 5) and ground. Then confirm that the malfunction symptom is eliminated.

**INSPECTION PROCEDURE 2: Diagnostic Tool Communication with ENGINE-ECU Is Not Possible.**



**CIRCUIT OPERATION**

- A diagnostic output is made from the ENGINE-ECU (terminal No. 44) to the diagnostic output terminal (terminal No. 7) of the data link connector.

**COMMENT**

- No power supply to ENGINE-ECU.
- Defective ground circuit of ENGINE-ECU.
- Defective ENGINE-ECU.
- Improper communication line between ENGINE-ECU and diagnostic tool.

**TROUBLESHOOTING HINTS (The most likely causes for this case:)**

- Malfunction of ENGINE-ECU power supply circuit.
- Malfunction of the ENGINE-ECU.
- Open circuit between ENGINE-ECU and data link connector.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

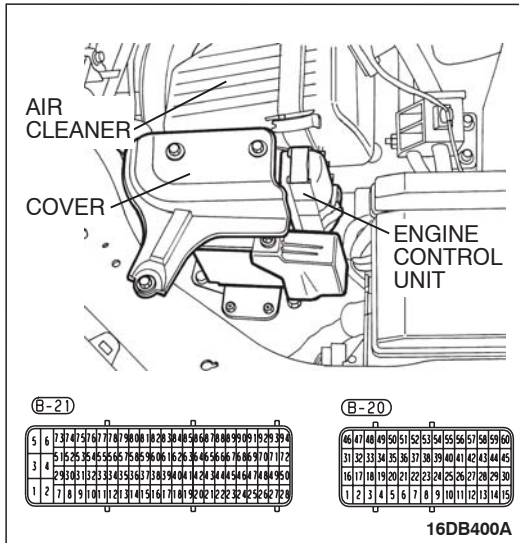
## DIAGNOSIS

**STEP 1.** Check harness connector B-21 at ENGINE-ECU for damage.

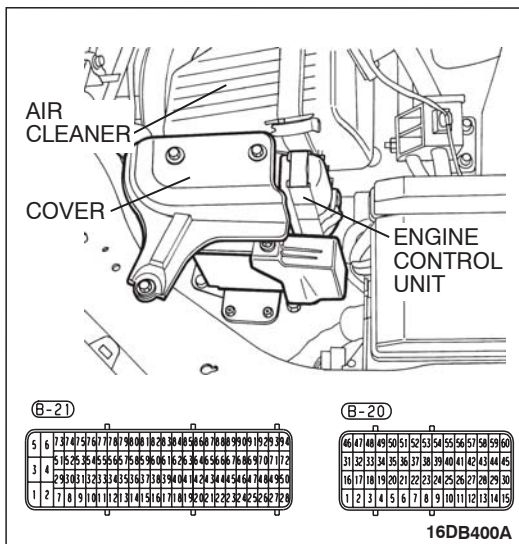
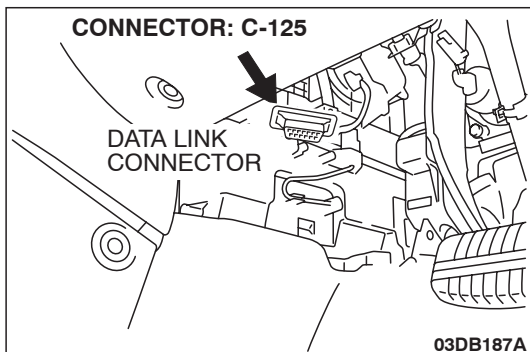
**Q:** Is the harness connector in good condition?

**YES :** Go to Step 2.

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



**STEP2.** Check for open circuit, short circuit to ground and harness damage between data link connector C-125 (terminal No. 7) and ENGINE-ECU connector B-21 (terminal No. 44).



*NOTE: Check harness after checking intermediate connector C-29. If intermediate connector C-29 is damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.*

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

**YES :** Refer to INSPECTION PROCEDURE 24 – Power Supply System and Ignition Switch-IG System [P.13A-604](#).

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

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**INSPECTION PROCEDURE 3: The Malfunction Indicator Lamp (Check Engine Lamp) Does Not Illuminate Right after the Ignition Switch Is Turned to the "ON" Position.**

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**COMMENT**

- The combination meter causes the malfunction indicator lamp (Check Engine Lamp) to illuminate for 20 seconds immediately after the ignition switch is turned to the "ON" position occurred.

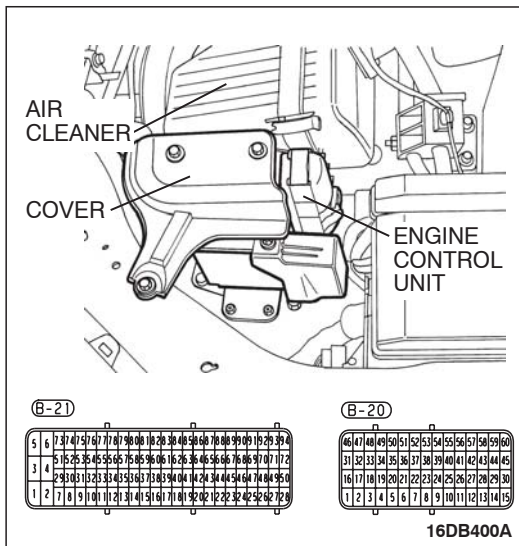
**TROUBLESHOOTING HINTS (The most likely causes for this case:)**

- Malfunction of the malfunction indicator lamp (Check Engine Lamp).
- Open or shorted malfunction indicator lamp (Check Engine Lamp) circuit.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

**⚠ CAUTION**

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

- (1) Connect diagnostic tool 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 set?**

**YES :** Refer to Diagnostic Trouble Code Chart.

**NO :** Go to step 2.

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

- (1) Turn the ignition switch to the "ON" position.
  - The malfunction indicator lamp (Check Engine Lamp) should illuminate immediately after the ignition switch is turned to the "ON" position.
- (2) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Does the malfunction indicator lamp (Check Engine Lamp) illuminate?**

**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 combination meter.

**INSPECTION PROCEDURE 4: The Malfunction Indicator Lamp (Check Engine Lamp) Remains Illuminated and Never Goes Out.**

**COMMENT**

- In cases such as the above, the cause is probably that the ENGINE-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at next has probably occurred.

**TROUBLESHOOTING HINTS (The most likely causes for this case:)**

- Shorted the malfunction indicator lamp (Check Engine Lamp) circuit.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- Diagnostic Tool (MUT-III Sub Assembly)
- MB991824: V.C.I.

- MB991827: USB Cable
- MB991910: Main Harness A

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

**⚠ CAUTION**

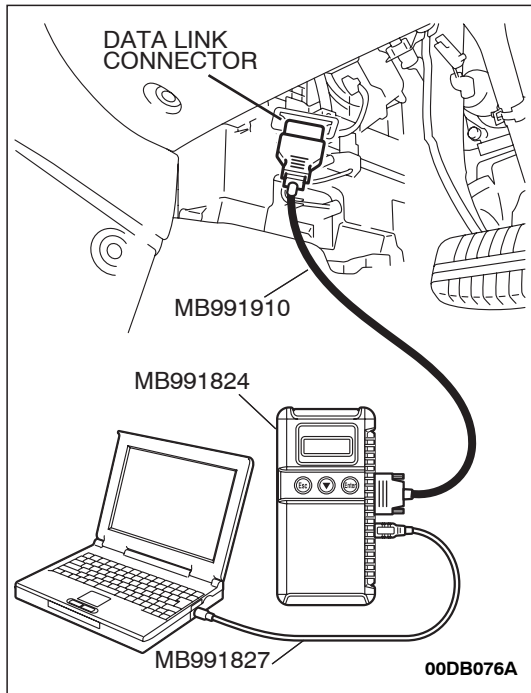
**To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .**

- (1) Connect diagnostic tool 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 set?**

**YES :** Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**NO :** Go to Step. 2.



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

- (1) Turn the ignition switch to the "ON" position.
  - The malfunction indicator lamp (Check Engine Lamp) should go out when 30 seconds have passed after the ignition switch was turned to the "ON" position.
- (2) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Does the malfunction indicator lamp (Check Engine Lamp) go out?**

**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 combination meter.



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**INSPECTION PROCEDURE 5: Cranks, Won't Start**

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**Cranks, Won't Start Circuit**

- Refer to Ignition circuit [P.13A-628](#).

**CIRCUIT OPERATION**

- Refer to Ignition circuit [P.13A-628](#).

**COMMENT**

- In cases such as the above, the cause is probably no spark, fuel delivery, or fuel quality problems. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.

**TROUBLESHOOTING HINTS (The most likely causes for this case:)**

- Malfunction of the ignition system.
- Malfunction of the fuel pump system.
- Malfunction of the injector system.
- Malfunction of the ENGINE-ECU.
- Contaminated fuel.
- Malfunction of the immobilizer system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

- : Diagnostic Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991348: Test Harness Set

---

**STEP 1. Measure the battery positive voltage.**

- (1) Measure the battery positive voltage during cranking.
- The voltage should be 8 volts or more.

**Q: Is the measured voltage 8 volts or more?**

**YES :** Go to Step 2.

**NO :** Check the battery. Refer to [GROUP 54A](#), Battery – Battery Check [P.54A-5](#). Then confirm that the malfunction symptom is eliminated.

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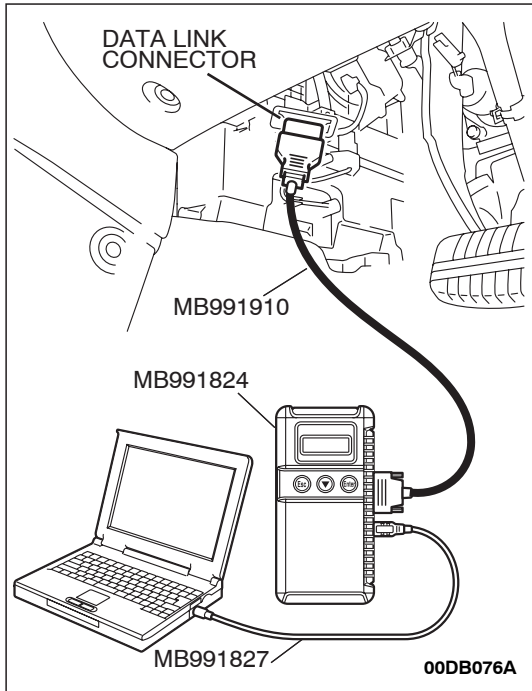
**STEP 2. Check the timing belt for breaks.**

**Q: Is the timing belt good condition?**

**YES :** Go to Step 3.

**NO :** Replace timing belt. Then confirm that the malfunction symptom is eliminated.





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

**⚠ CAUTION**

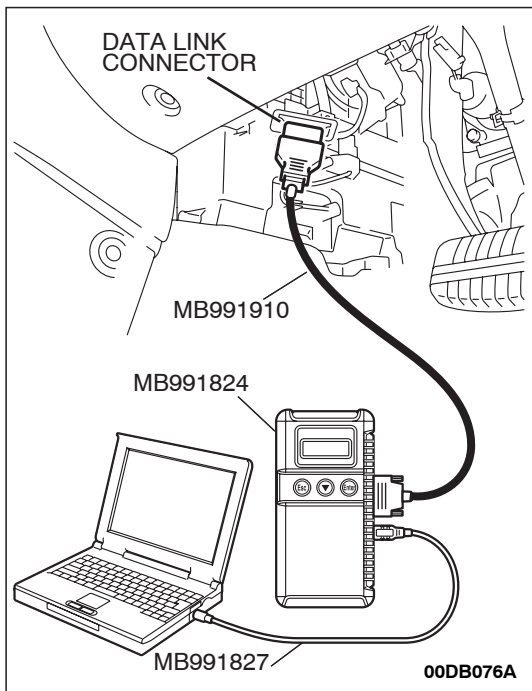
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool 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 set?**

**YES** : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**NO** : Go to Step 4.



**STEP 4. Using diagnostic tool , check data list.**

**⚠ CAUTION**

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

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following items in the data List. Refer to Data List Reference Table [P.13A-637](#).
  - a. Item 1: Power Supply Voltage.
  - b. Item 2: Crankshaft Position Sensor.
  - c. Item 6: Engine Coolant Temperature Sensor.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES** : Go to Step 5.

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

### STEP 5. Check for Fuel Pump operation.

(1) Refer to Fuel Pump Operation Check [P.13A-664](#).

#### Q: Is the actuator operating properly?

**YES** : Go to Step 6.

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

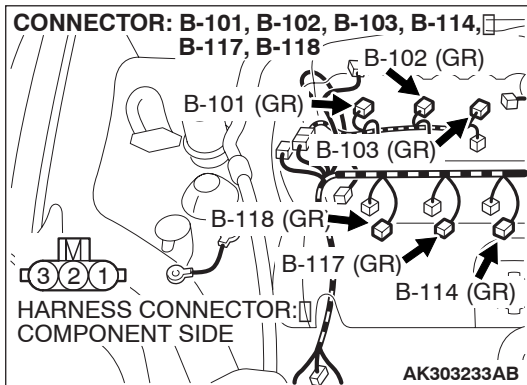
### STEP 6. Check the ignition system.

(1) Refer to INSPECTION PROCEDURE 27 – Ignition Circuit System [P.13A-628](#).

#### Q: Is the ignition system operating correctly?

**YES** : Go to Step 7.

**NO** : Repair or replace required components. Then confirm that the malfunction symptom is eliminated.



### STEP 7. Using diagnostic tool , check data list.

#### ⚠ CAUTION

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

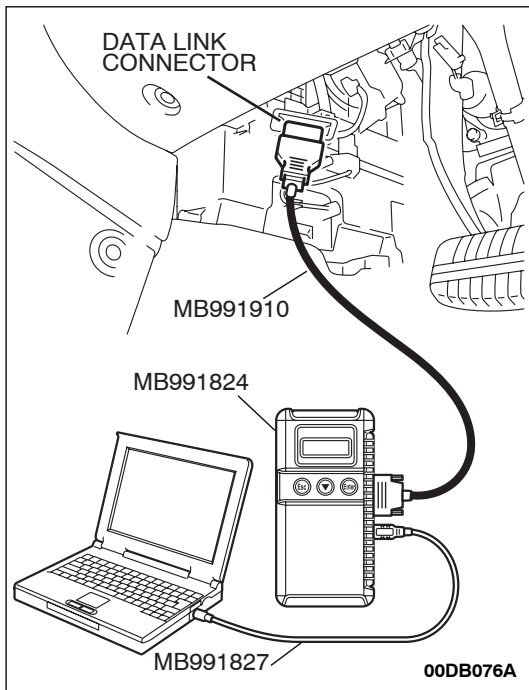
(1) Check Data list item No. 16 while cranking engine.

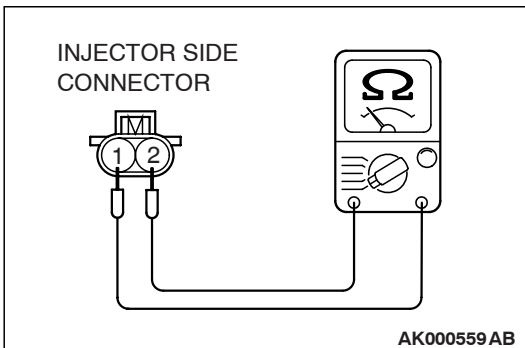
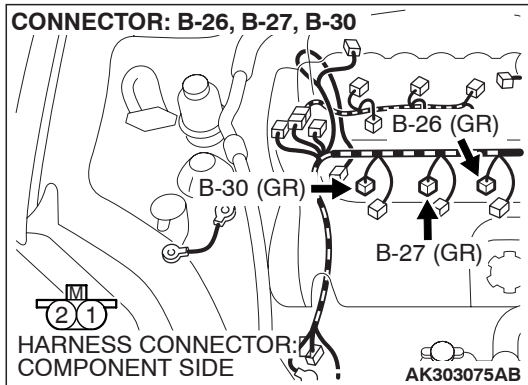
**Approximate value: - 3° to BTDC ± 3°**

#### Q: Is the advance ignition timing normal?

**YES** : Go to Step 8.

**NO** : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.





**STEP 8. Check the left bank injector.**

- (1) Disconnect the left bank injector connector B-27, B-26, B-30.

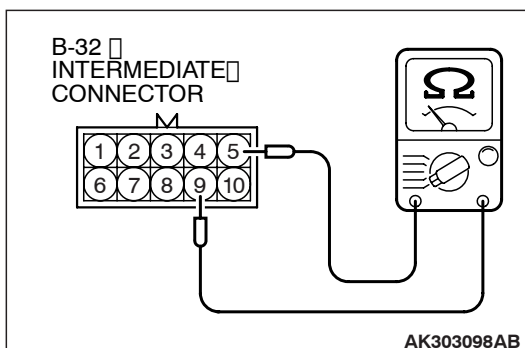
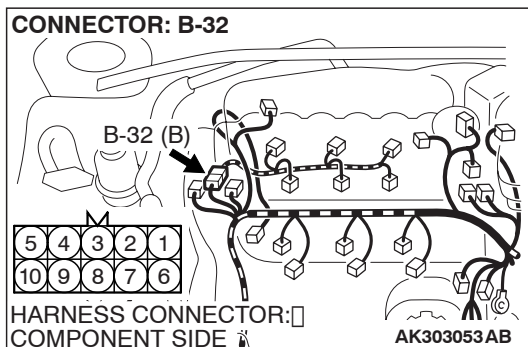
- (2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

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

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

**YES :** Go to Step 9.

**NO :** Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.



**STEP 9. Check the right bank injector resistance at intermediate connector B-32.**

- (1) Disconnect the intermediate connector B-32.

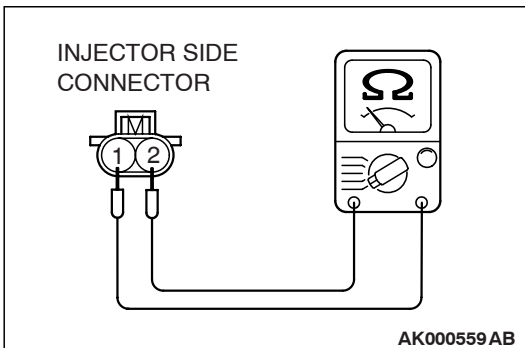
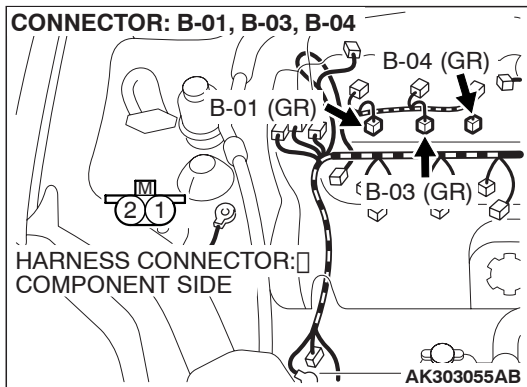
- (2) Measure the resistance between each male connector side terminal.

- a. Measure the resistance between terminal No. 5 and No. 9 at No. 1 cylinder injector.
- b. Measure the resistance between terminal No. 10 and No. 9 at No. 3 cylinder injector.
- c. Measure the resistance between terminal No. 4 and No. 9 at No. 05 cylinder injector.
  - Resistance should be between 10.5 and 13.5 ohms [at 20°C (68°F)].

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

**YES :** Go to Step 12.

**NO :** Go to Step 10.



**STEP 10. Check the right bank injector.**

- (1) Remove the intake manifold.
- (2) Disconnect the right bank injector connector, which deviates from the standard value at Step 8.

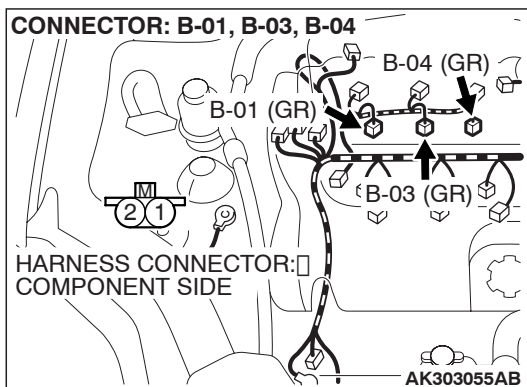
- (3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

**YES :** Go to Step 11.

**NO :** Replace the injector. Then confirm that the malfunction symptom is eliminated.



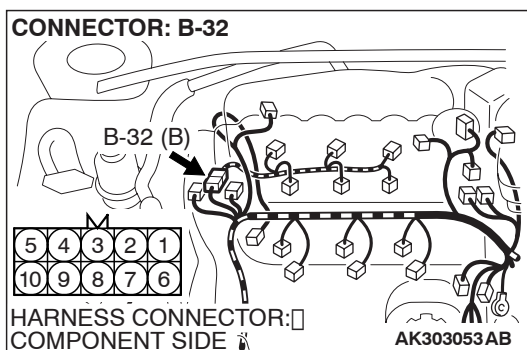
**STEP 11. Check harness connector B-03 or B-04 or B-01 at right bank injector for damage.**

- (1) Check the injector connector, which deviates from the standard value at Step 9.

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

**YES :** Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

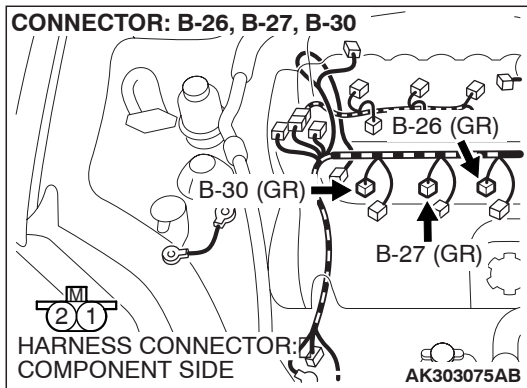


**STEP 12. Check harness connector B-32 at intermediate connector for damage.**

**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 confirm that the malfunction symptom is eliminated.

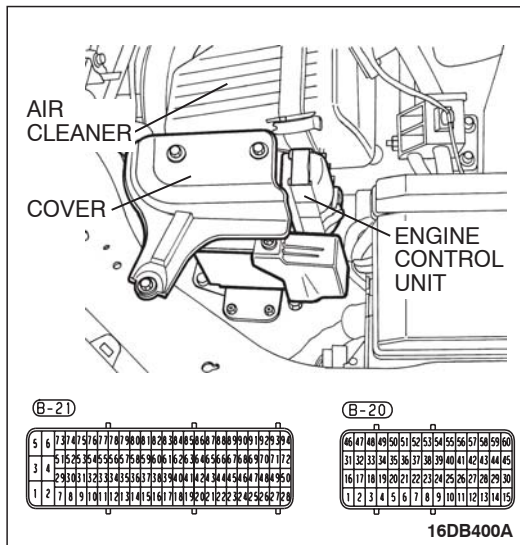


**STEP 13. Check harness connector B-27, B-26, B-30 at left bank injector for damage.**

**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 confirm that the malfunction symptom is eliminated.

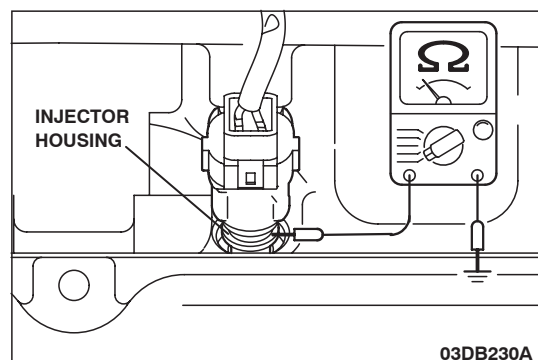
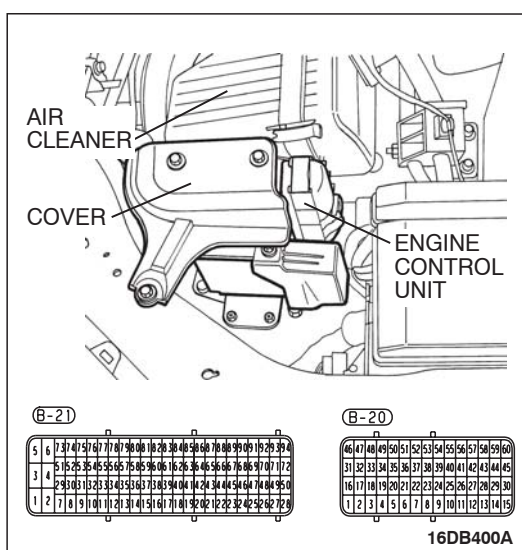
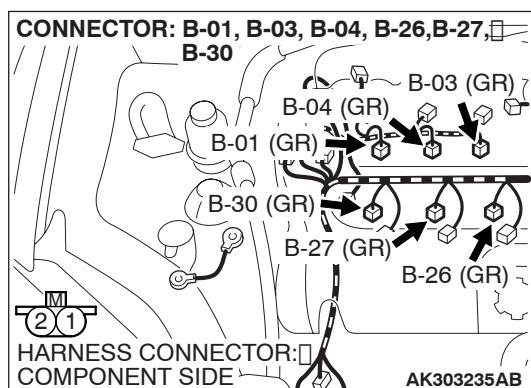


**STEP 14. Check harness connector B-20 at ENGINE-ECU for damage.**

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

**YES :** Go to Step 15.

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



**STEP 15. Check for harness damage between injector connector and ENGINE-ECU connector.**

- Check the harness wire between injector connector B-01 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 03) at No. 1 cylinder injector.
- Check the harness wire between injector connector B-30 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 04) at No. 2 cylinder injector.
- Check the harness wire between injector connector B-03 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 34) at No. 3 cylinder injector.
- Check the harness wire between injector connector B-27 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 35) at No. 4 cylinder injector.
- Check the harness wire between injector connector B-04 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 16) at No. 5 cylinder injector.
- Check the harness wire between injector connector B-26 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 17) at No. 6 cylinder injector.

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

**YES :** Check the following items, and repair or replace the defective items.

- Check the ignition coil and spark plugs.
- Check if the injectors are clogged.
- Check if fuel is contaminated.
- Check compression.

Then confirm that the malfunction symptom is eliminated.

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

**STEP 16. Check injector is insulated from earth.**

- Measure the resistance between each injector housing and earth.

**Q: Is there no continuity?**

**YES :** ok.

**NO :** Repair or replace injector. Then confirm that the malfunction symptom is eliminated.



## INSPECTION PROCEDURE 6: Starts Up and Dies.

### COMMENT

- In such cases as the above, the cause is usually improper air/fuel mixture. It is possible, though less likely, that the spark plugs are generating sparks but the sparks are weak.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

- Malfunction of the injector system.
- Contaminated fuel.
- Poor compression.
- Dirtiness around throttle valve.
- Malfunction of the ENGINE-ECU.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

### DIAGNOSIS

#### Required Special Tools:

- : Diagnostic Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

#### STEP 1. Measure the battery positive voltage.

- (1) Measure the battery positive voltage during cranking.
  - The voltage should be 8 volts or more.

**Q: Does the voltage remain greater than 8 volts while the engine is cranked?**

**YES :** Go to Step 2.

**NO :** Refer to [GROUP 54A](#), Battery – Battery Check [P.54A-5](#).

#### STEP 2. Using diagnostic tool , read the diagnostic trouble code (DTC).

##### CAUTION

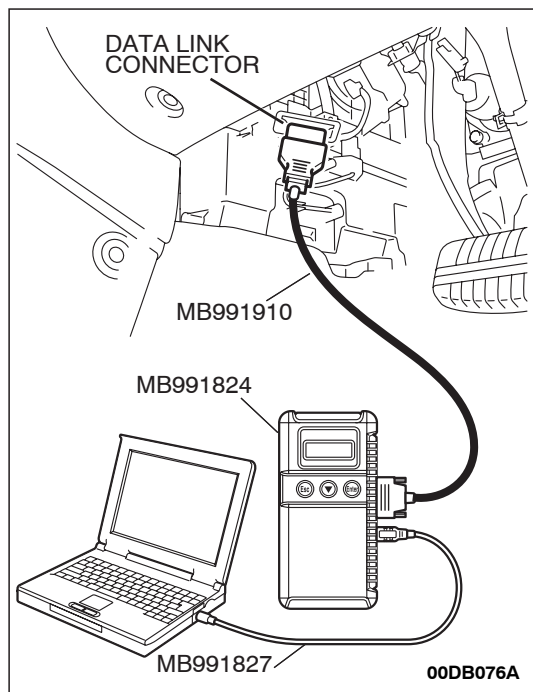
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

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

**Q: Is the DTC set?**

**YES :** Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**NO :** Go to Step 3.



---

**STEP 3. Check for Fuel Pump operation.**

(1) Refer to Fuel Pump Operation Check [P.13A-664](#).

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

**YES :** Go to Step 4.

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

---

**STEP 4. Using diagnostic tool , check data list.**

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

(2) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).

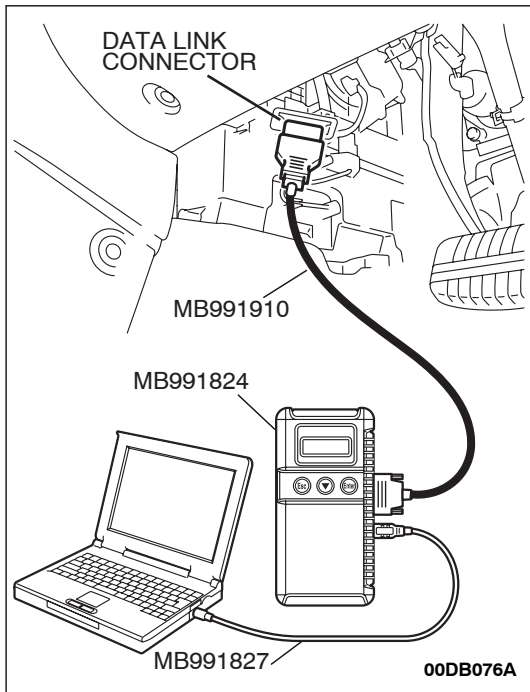
a. Item 06: Engine Coolant Temperature Sensor.

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

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

**YES :** Go to Step 5.

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





**STEP 5. Inspection of throttle body (throttle valve area) for dirtiness.**

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

**YES :** Refer to On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning. [P.13A-660](#).

**NO :** Go to Step 6.

**STEP 6. Check the advance ignition timing.**

(1) **Check the advance ignition timing at cranking.**

**Standard value: 5° BTDC ± 3°**

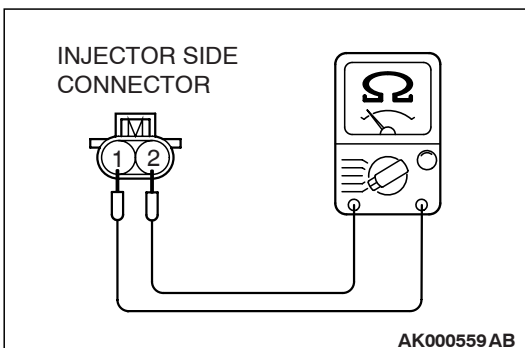
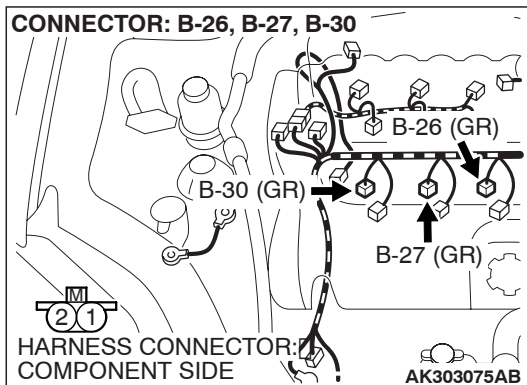
**Q: Is the ignition timing normal?**

**YES :** Go to Step 7.

**NO :** Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the left bank injector.**

(1) Disconnect the left bank injector connector B-27, B-26, B-30.



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

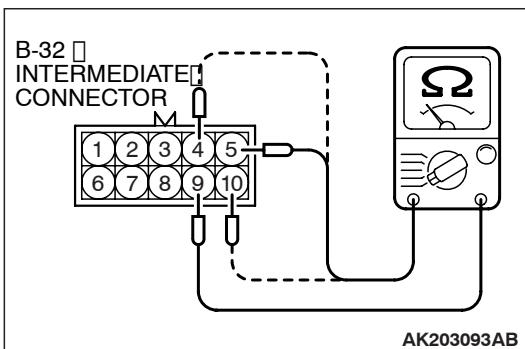
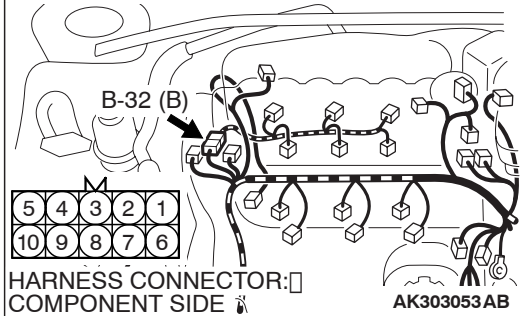
**Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]**

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

**YES :** Go to Step 8.

**NO :** Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.

**CONNECTOR: B-32**



**STEP 8. Check the right bank injector resistance at intermediate connector B-32.**

(1) Disconnect the intermediate connector B-32.

(2) Measure the resistance between each male connector side terminal.

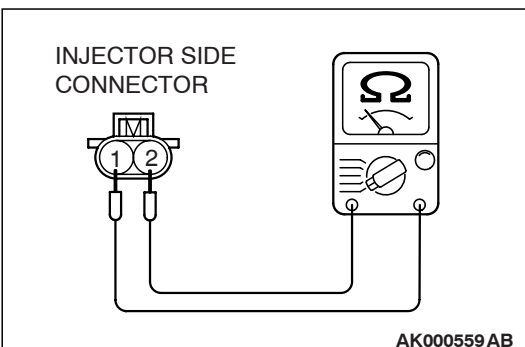
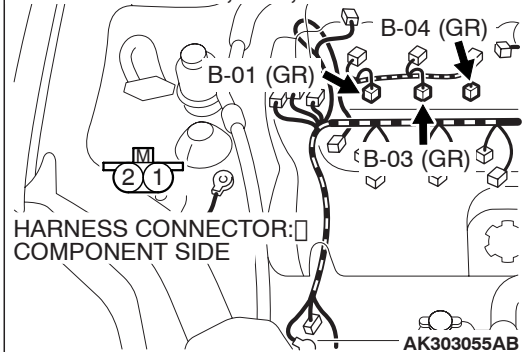
- Measure the resistance between terminal No. 9 and No. 5 at No. 1 cylinder injector.
  - Measure the resistance between terminal No. 9 and No. 10 at No. 3 cylinder injector.
  - Measure the resistance between terminal No. 9 and No. 4 at No. 5 cylinder injector.
- Resistance should be between 10.5 and 13.5 ohms [at 20°C (68°F)].

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

**YES :** Go to Step 11.

**NO :** Go to Step 9.

**CONNECTOR: B-01, B-03, B-04**



**STEP 9. Check the right bank injector.**

- Remove the intake manifold.
- Disconnect the right bank injector connector, which deviates from the standard value at Step 7.

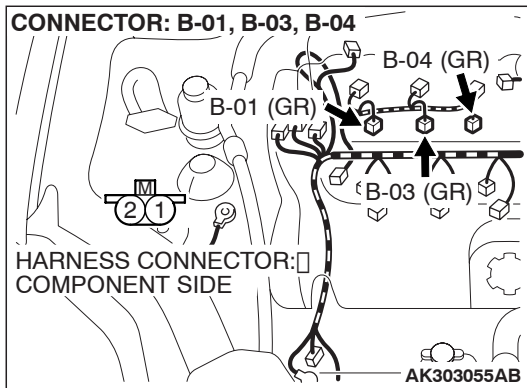
(3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

**YES :** Go to Step 10.

**NO :** Replace the injector. Then confirm that the malfunction symptom is eliminated.



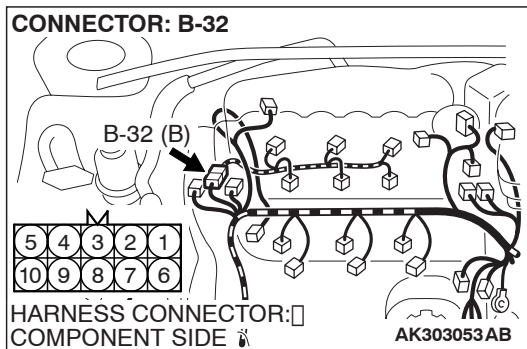
**STEP 10. Check harness connector B-03 or B-04 or B-01 at right bank injector for damage.**

(1) Check the injector connector, which deviates from the standard value at Step 9.

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

**YES :** Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

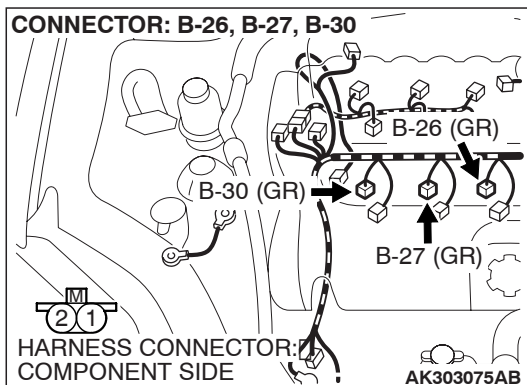


**STEP 11. Check harness connector B-32 at intermediate connector for damage.**

**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 confirm that the malfunction symptom is eliminated.

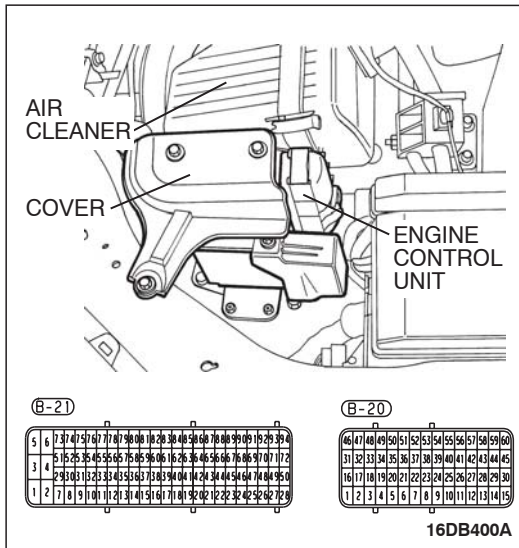


**STEP 12. Check harness connector B-27, B-26, B-30 at left bank injector for damage.**

**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 confirm that the malfunction symptom is eliminated.

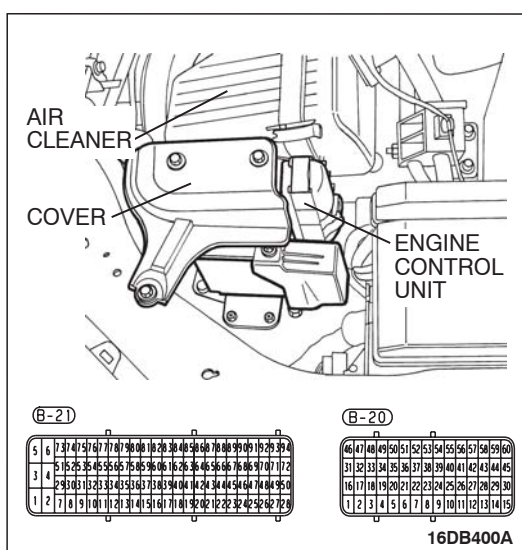
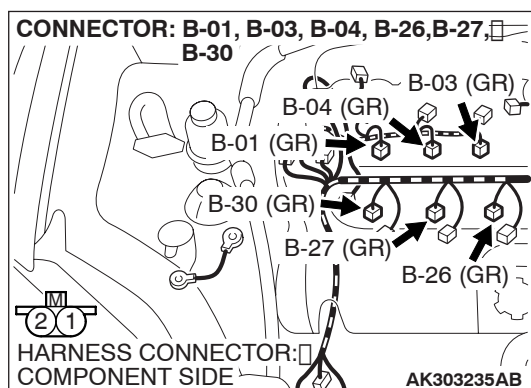


**STEP 13. Check harness connector B-20 at ENGINE-ECU for damage.**

**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 confirm that the malfunction symptom is eliminated.



**STEP 14. Check for harness damage between injector connector and ENGINE-ECU connector.**

- Check the harness wire between injector connector B-01 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 03) at No. 1 cylinder injector.
- Check the harness wire between injector connector B-30 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 04) at No. 2 cylinder injector.
- Check the harness wire between injector connector B-03 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 34) at No. 3 cylinder injector.
- Check the harness wire between injector connector B-27 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 35) at No. 4 cylinder injector.
- Check the harness wire between injector connector B-04 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 16) at No. 5 cylinder injector.
- Check the harness wire between injector connector B-26 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 17) at No. 6 cylinder injector.

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

**YES :** Check the following items, and repair or replace the defective items.

- Check the ignition coil and spark plugs.
- Check if the injectors are clogged.
- Check compression pressure.
- Check fuel lines for clogging.
- Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

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

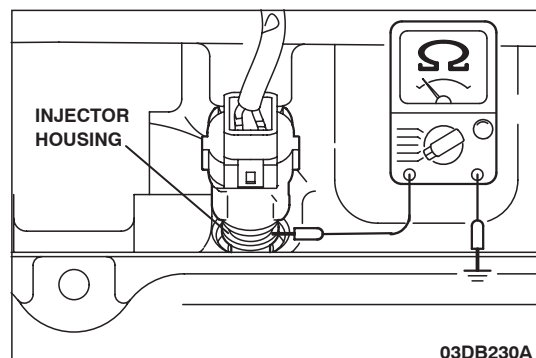
**STEP 15. Check injector is insulated from earth.**

- Measure the resistance between each injector housing and earth.

**Q: Is there no continuity?**

**YES :** ok.

**NO :** Repair or replace injector. Then confirm that the malfunction symptom is eliminated.



## INSPECTION PROCEDURE 7: Hard Starting

### COMMENT

- In cases such as the above, the cause is usually either weak spark, improper air-fuel mixture or low compression.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

- Malfunction of the injector system.
- Poor fuel quality. (Contamination)
- Poor compression.
- Dirtiness around throttle valve.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

## DIAGNOSIS

### Required Special Tools:

- : Diagnostic Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

### STEP 1. Measure the battery positive voltage.

- (1) Measure the battery positive voltage during cranking.
  - The voltage is 8 volts or more.

### Q: Does the voltage remain greater than 8 volts while the engine is cranked?

**YES :** Go to Step 2.

**NO :** Refer to [GROUP 54A](#), Battery – Battery check [P.54A-5](#).

### STEP 2. Using diagnostic tool , read the diagnostic trouble code (DTC).

#### CAUTION

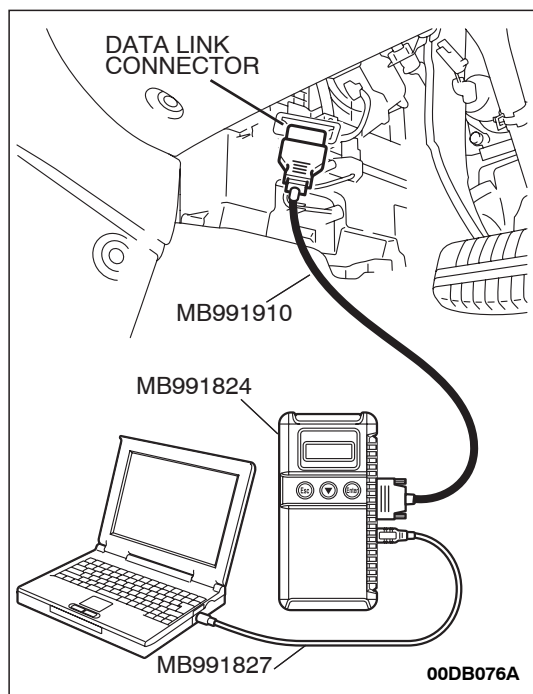
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

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

### Q: Is the DTC set?

**YES :** Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**NO :** Go to Step 3.



---

**STEP 3. Check for Fuel Pump operation.**

(1) Refer to Fuel Pump Operation Check [P.13A-664](#).

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

**YES :** Go to Step 4.

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

---

**STEP 4. Using diagnostic tool , check data list.**

(1) Turn the ignition switch the "ON" position.

(2) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).

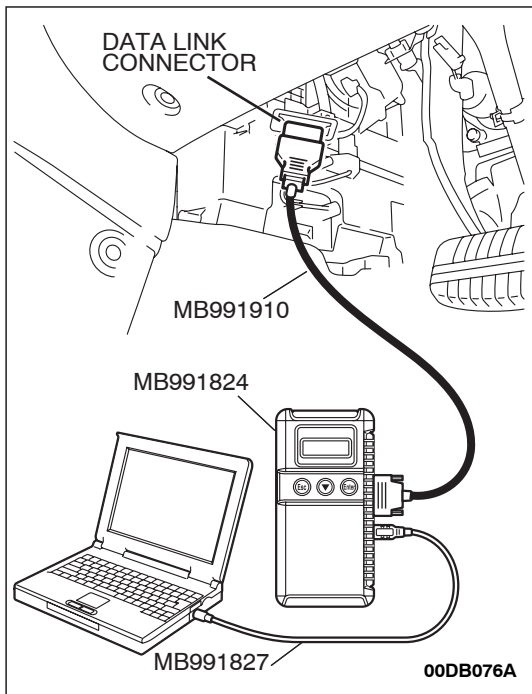
a. Item 6: Engine Coolant Temperature Sensor.

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

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

**YES :** Go to Step 5.

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



**STEP 5. Inspection of throttle body (throttle valve area) for dirtiness.**

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

**YES** : Refer to On-vehicle service – Clean the throttle valve area [P.13A-660](#).

**NO** : Go to Step 6.

**STEP 6. Check the advance ignition timing.**

**(1) Check the advance ignition timing at cranking.**

**Standard value: 5° BTDC ± 3°**

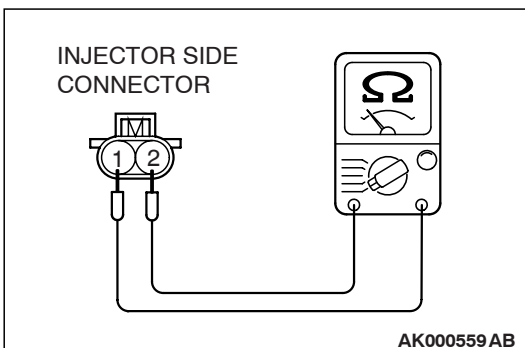
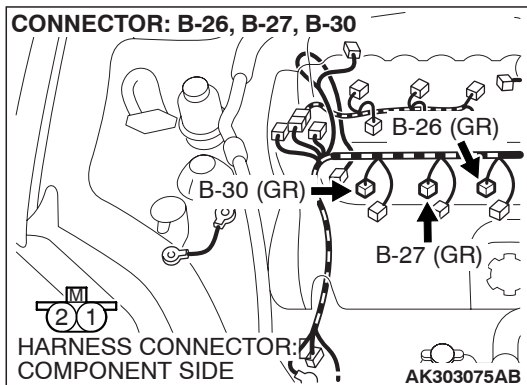
**Q: Is the ignition timing normal?**

**YES** : Go to Step 7.

**NO** : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the left bank injector.**

**(1) Disconnect the left bank injector connector B-27, B-26, B-30.**



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

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

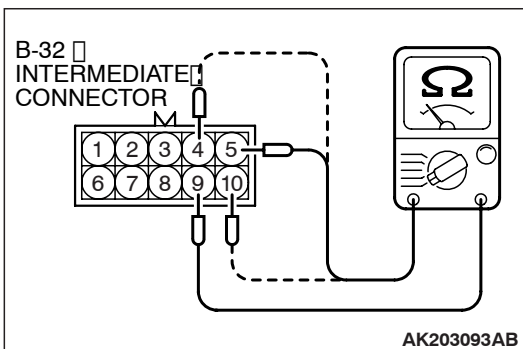
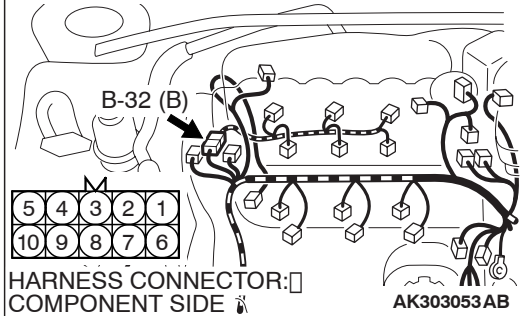
**Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20°C (68°F)]?**

**YES** : Go to Step 8.

**NO** : Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.



**CONNECTOR: B-32**



**STEP 8. Check the right bank injector resistance at intermediate connector B-32.**

(1) Disconnect the intermediate connector B-32.

(2) Measure the resistance between each male connector side terminal.

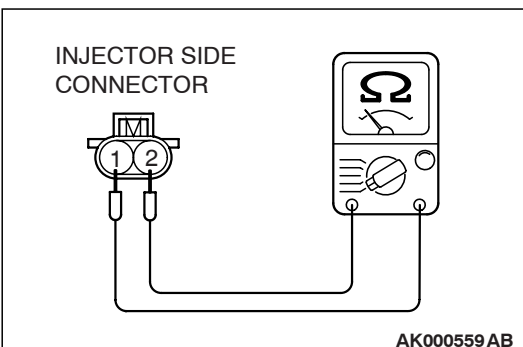
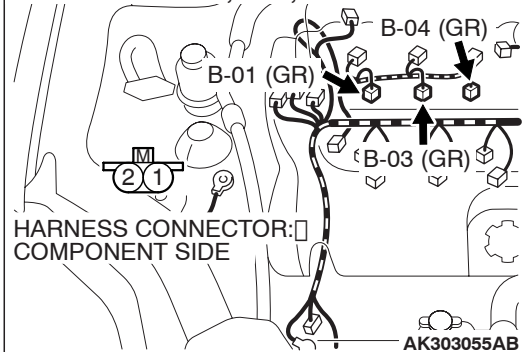
- Measure the resistance between terminal No. 9 and No. 5 at No. 1 cylinder injector.
  - Measure the resistance between terminal No. 9 and No. 10 at No. 3 cylinder injector.
  - Measure the resistance between terminal No. 9 and No. 4 at No. 5 cylinder injector.
- Resistance should be between 10.5 and 13.5 ohms [at 20°C (68°F)].

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

**YES :** Go to Step 11.

**NO :** Go to Step 9.

**CONNECTOR: B-01, B-03, B-04**



**STEP 9. Check the right bank injector.**

- Remove the intake manifold.
- Disconnect the right bank injector connector, which deviates from the standard value at Step 8.

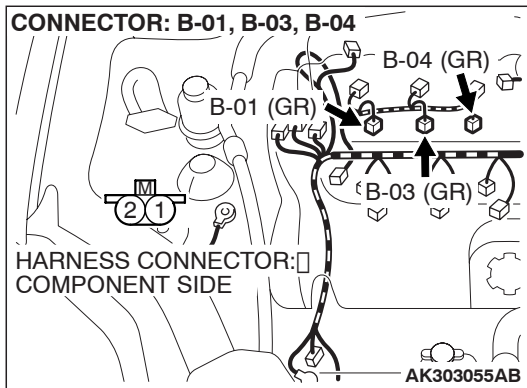
(3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

**YES :** Go to Step 10.

**NO :** Replace the injector. Then confirm that the malfunction symptom is eliminated.



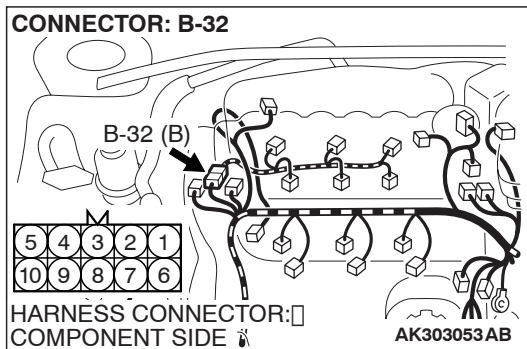
**STEP 10. Check harness connector B-03 or B-04 or B-01 at right bank injector for damage.**

(1) Check the injector connector, which deviated from the standard value listed in Step 8.

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

**YES :** Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

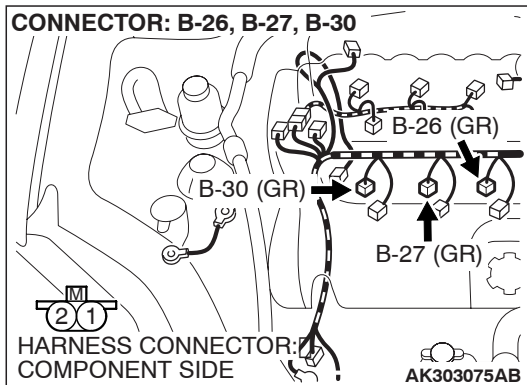


**STEP 11. Check harness connector B-32 at the intermediate connector for damage.**

**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 confirm that the malfunction symptom is eliminated.

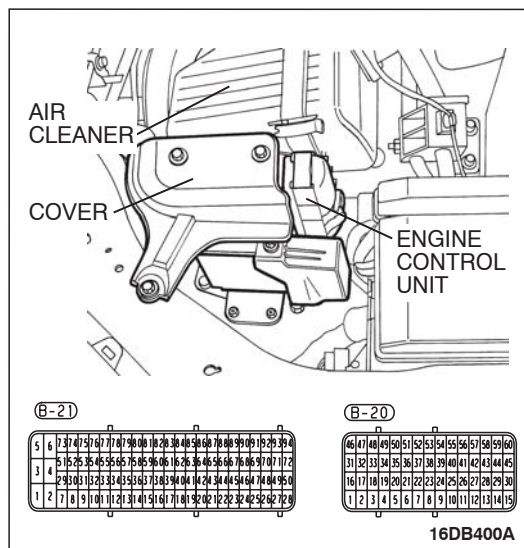


**STEP 12. Check harness connector B-27, B-26, B-30 at the left bank injector for damage.**

**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 confirm that the malfunction symptom is eliminated.

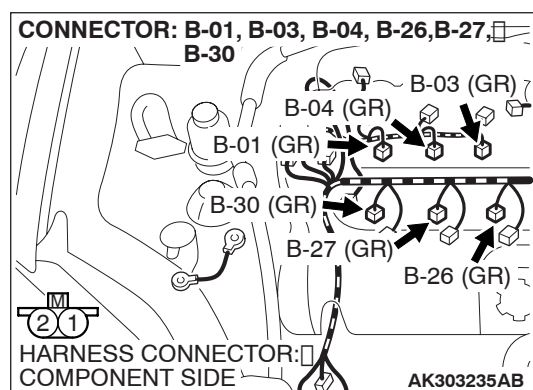


**STEP 13. Check the harness connector B-20 at the ENGINE-ECU for damage.**

**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 confirm that the malfunction symptom is eliminated.



**STEP 14. Check for harness damage between injector connector and ENGINE-ECU connector.**

- Check the harness wire between injector connector B-01 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 03) at No. 1 cylinder injector.
- Check the harness wire between injector connector B-30 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 04) at No. 2 cylinder injector.
- Check the harness wire between injector connector B-03 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 34) at No. 3 cylinder injector.
- Check the harness wire between injector connector B-27 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 35) at No. 4 cylinder injector.
- Check the harness wire between injector connector B-04 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 16) at No. 5 cylinder injector.
- Check the harness wire between injector connector B-26 (terminal No. 2) and ENGINE-ECU connector B-20 (terminal No. 17) at No. 6 cylinder injector.

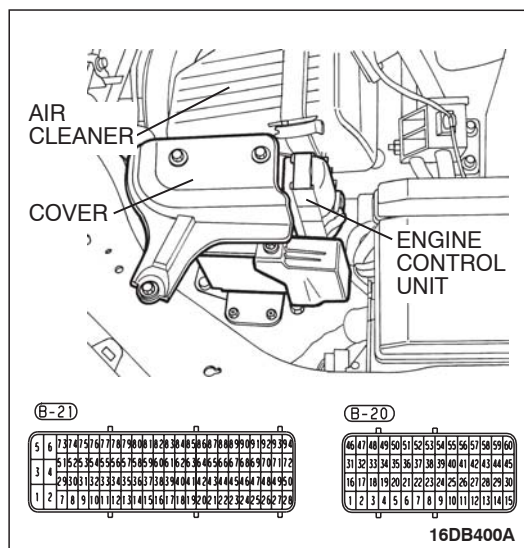
**Q: Is the harness wire in good condition?**

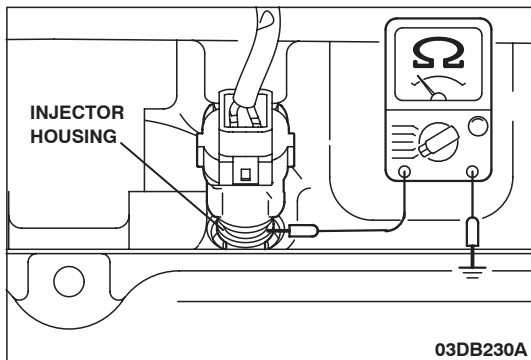
**YES :** Check the following items, and repair or replace the defective items.

- Check the ignition coil and spark plugs.
- Check if the injectors are clogged.
- Check the compression pressure.
- Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

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





**STEP 15. Check injector is insulated from earth.**

(1) Measure the resistance between each injector housing and earth.

**Q: Is there no continuity?**

**YES** : ok.

**NO** : Repair or replace injector. Then confirm that the malfunction symptom is eliminated.

**INSPECTION PROCEDURE 8: Unstable Idle (Rough Idle, Hunting).**

**COMMENT**

- In cases such as the above, the cause is probably the air/fuel mixture or electronic control throttle valve system. Other systems affecting idle quality include the ignition system and compression.

**TROUBLESHOOTING HINTS (The most likely causes for this case:)**

- Malfunction of the ignition system.

- Malfunction of air/fuel ratio control system.
- Malfunction of the electronic control throttle valve system.
- Malfunction of the evaporative emission purge solenoid system.
- Poor compression pressure.
- Vacuum leak.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

**DIAGNOSIS**

**Required Special Tools:**

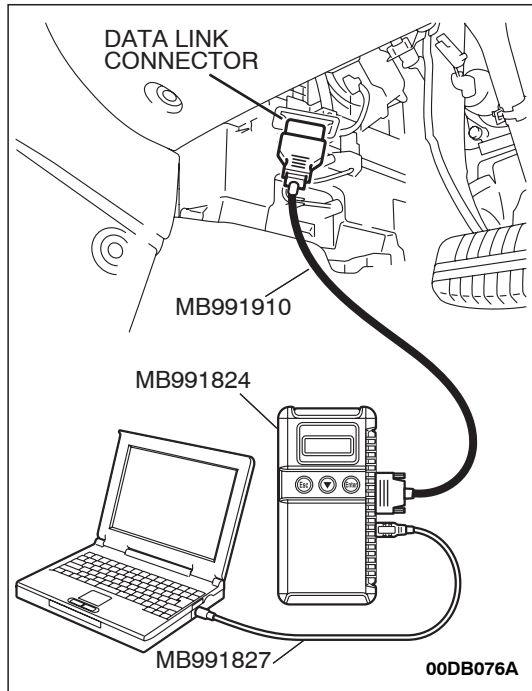
- : Diagnostic Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check if the battery terminal is disconnected**

**Q: Has the battery terminal been disconnected lately?**

**YES** : Start the engine and let it run at idle for approximate 10 minutes after engine warm up. Then, if a malfunction occurs, go to Step 2.

**NO** : Go to Step 2.



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

**⚠ CAUTION**

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

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

**Q: Is the DTC set?**

**YES :** Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

**NO :** Go to Step 3.

**STEP 3. Check the engine idling state.**

**Q: Is it noticeably hunting?**

**YES :** Go to Step 4.

**NO :** Go to Step 5.

**STEP 4. Check the following items.**

- (1) Carry out the following cleaning.
  - a. Refer to On-vehicle Service – Clean the throttle valve area [P.13A-660](#).
- (2) After cleaning, confirm that the malfunction symptom is eliminated.

**Q: Is the malfunction symptom resolved?**

**YES :** The check is completed.

**NO :** Check the following items, and repair or replace the defective items.

- a. Broken intake manifold gasket.
- b. Broken air intake hose.
- c. Broken vacuum hose.
- d. Positive crankcase ventilation valve does not operate.

Then confirm that the malfunction symptom is eliminated.

**STEP 5. Using diagnostic tool , check actuator test items 01, 02, 03, 04, 05, 06: Injector.**

**⚠ CAUTION**

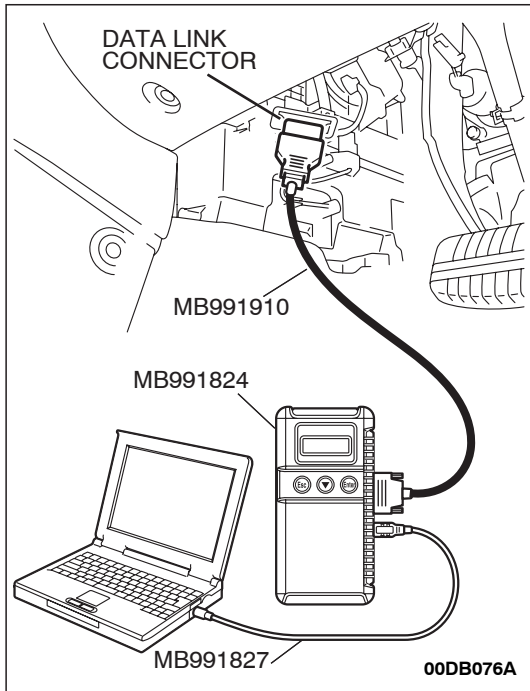
To prevent damage to diagnostic tool , always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool .

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
  - a. Item 01, 02, 03, 04, 05, 06: Injector.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 6.

**NO :** Refer to DTC P0201 [P.13A-272](#), P0202 [P.13A-280](#), P0203 [P.13A-287](#), DTC P0204 [P.13A-295](#), P0205 [P.13A-302](#), P0206 [P.13A-310](#) – Injector Circuit .



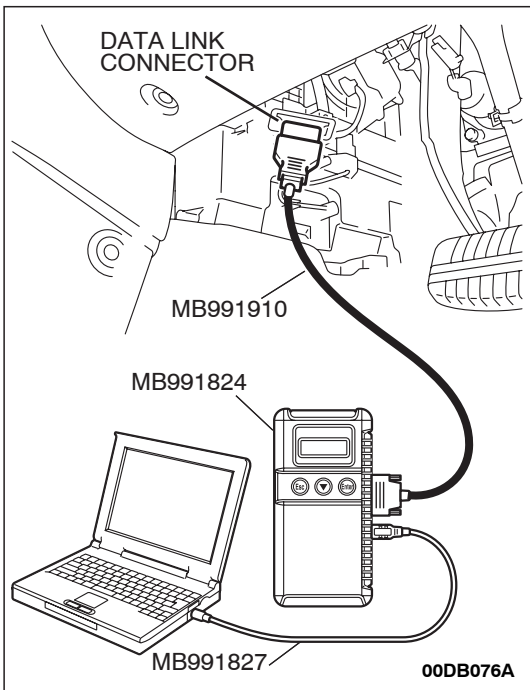
**STEP 6. Using diagnostic tool , check data list.**

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
  - a. Item 5: Intake Air Temperature Sensor.
  - b. Item 6: Engine Coolant Temperature Sensor.
  - c. Item AD: Right Bank Heated Oxygen Sensor (rear).
  - d. Item AC: Right Bank Heated Oxygen Sensor (front).
  - e. Item AF: Left Bank Heated Oxygen Sensor (rear).
  - f. Item AE: Left Bank Heated Oxygen Sensor (front).
  - g. Item 83: Power Steering Pressure Switch.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

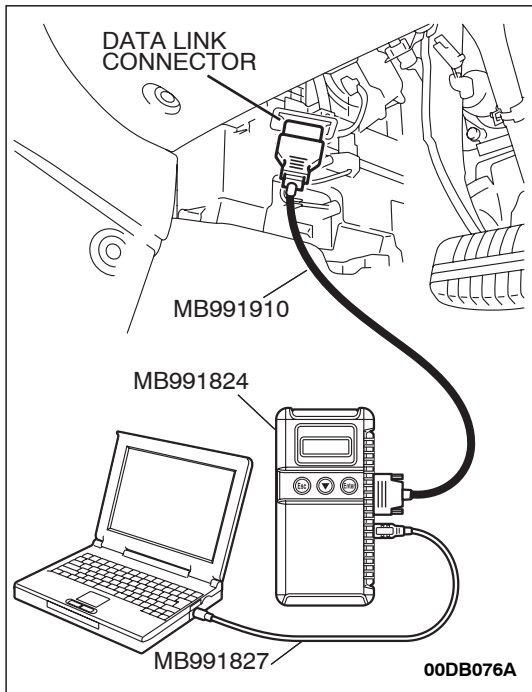
**Q: Are they operating properly?**

**YES :** Go to Step 7.

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







**STEP 7. Using diagnostic tool, check actuator test.**

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
  - a. Item 10: Evaporative Emission Purge Solenoid.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 8.

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

**STEP 8. Check the fuel pressure.**

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

**Q: Is the fuel pressure normal?**

**YES :** a. Check the following items, and repair or replace the defective items.

- Vacuum leak.
- Broken intake manifold gasket.
- Broken air intake hose.
- Broken vacuum hose.
- Positive crankcase ventilation valve does not operate.

b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

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

**STEP 9. Check Data list item No. 16, advance ignition timing.**

Ignition timing is controlled by the ENGINE-ECU and will vary depending on engine requirement.

**Q: Is the advance ignition timing normal?**

**YES :** Check the following items, and repair or replace the defective items.

- a. Check the ignition coil and spark plugs.
- b. Check the purge control system.
- c. Check compression pressure.
- d. Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

**NO :** Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

NEXT PAGE