## DTC P0498: Evaporative Emission Control System Ventilation Control Valve Circuit Low Input

### CIRCUIT OPERATION
- The evaporative emission ventilation solenoid power is supplied from the MFI relay.
- The ECM controls ground evaporative emission ventilation solenoid by turning the power transistor in the ECM "ON" and "OFF".

### TECHNICAL DESCRIPTION
- In response to a signal from the ECM, the evaporative emission ventilation solenoid valve controls the flow rate of the ventilation air to be introduced into the intake manifold.

### DESCRIPTIONS OF MONITOR METHODS
The ECM detects open circuit and short malfunction.

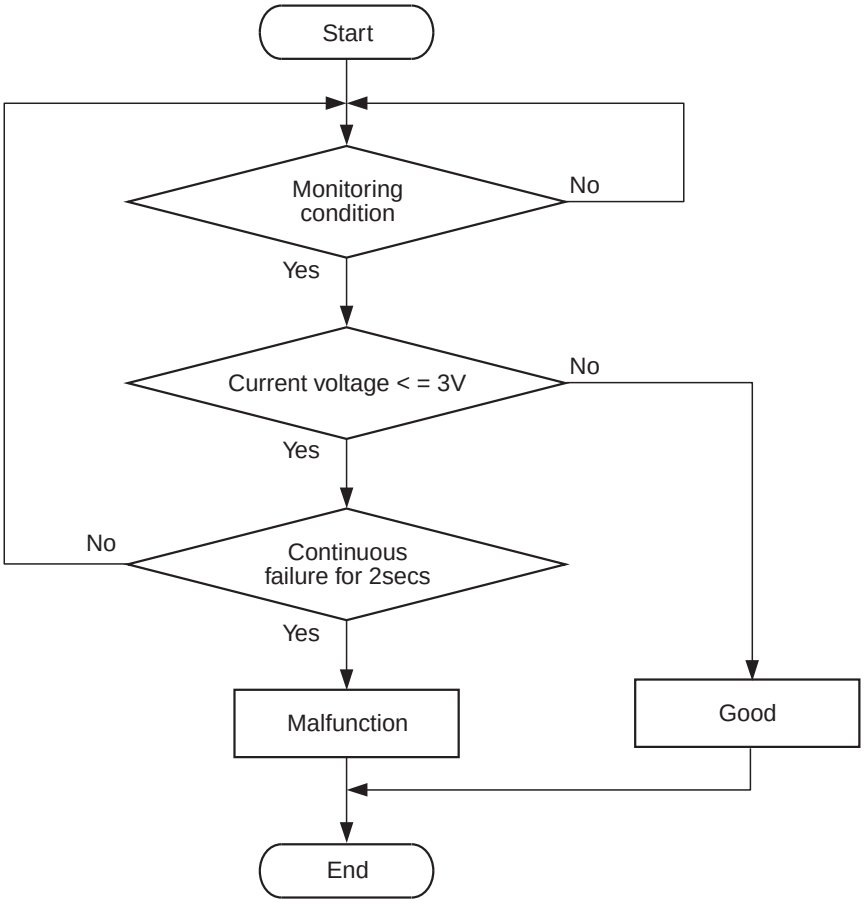
### MONITOR EXECUTION
Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)
**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

### DTC SET CONDITIONS

### Logic Flow Chart <Circuit continuity – open circuit and shorted low>




ACC07078

**Check Conditions**
- Engine is running.

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**Judgment Criterion**

- The supply voltage is less than 3 volts without the evaporative emission ventilation solenoid driving for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

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

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check actuator test item 10: Evaporative Emission Ventilation Solenoid.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T.-III) to the actuator test mode for item 15, Evaporative Emission Ventilation Solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission ventilation solenoid is operated.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**NO :** Go to Step 2.

**STEP 2. Check the evaporative emission ventilation solenoid.**

(1) Disconnect connector, and measure at solenoid side.
(2) Measure the resistance between evaporative emission ventilation solenoid side connector terminals.

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

**Q: Is the measured resistance between 170 and 21 Ω [at 20°C (68°F)]?**

**YES :** Go to Step 3.
**NO :** Replace the evaporative emission ventilation solenoid. Then go to Step 8.

**STEP 3. Measure the power supply voltage at evaporative emission ventilation solenoid harness side connector.**

(1) Disconnect the evaporative emission ventilation solenoid connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal power supply line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in power supply line between evaporative emission ventilation solenoid connector and engine control relay connector. Then go to Step 8.

**STEP 4. Measure the power supply voltage at ECM connector.**

(1) Disconnect connector, and measure at harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal P/VT and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 5.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in P/VT line between evaporative emission ventilation solenoid connector and ECM connector. Then go to Step 8.

**STEP 5. Check of damage in P/VT line between evaporative emission ventilation solenoid connector and ECM connector.**

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

**YES :** Go to Step 6.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 8.

**STEP 6. Check of damage in power supply line between evaporative emission ventilation solenoid connector and MFI relay connector.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 8.

**STEP 7. Using scan tool (M.U.T.-III), check actuator test item 10: Evaporative Emission Ventilation Solenoid.**

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

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656).Then go to Step 8.

**STEP 8. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0498 stored?**

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

## DTC P0499: Evaporative Emission Control System Ventilation Control Valve Circuit High Input

### CIRCUIT OPERATION

- The evaporative emission ventilation solenoid power is supplied from the MFI relay.
- The ECM controls ground evaporative emission ventilation solenoid by turning the power transistor in the ECM "ON" and "OFF".

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## TECHNICAL DESCRIPTION

- In response to a signal from the ECM, the evaporative emission ventilation solenoid valve controls the flow rate of the ventilation air to be introduced into the intake manifold.

## DESCRIPTIONS OF MONITOR METHODS

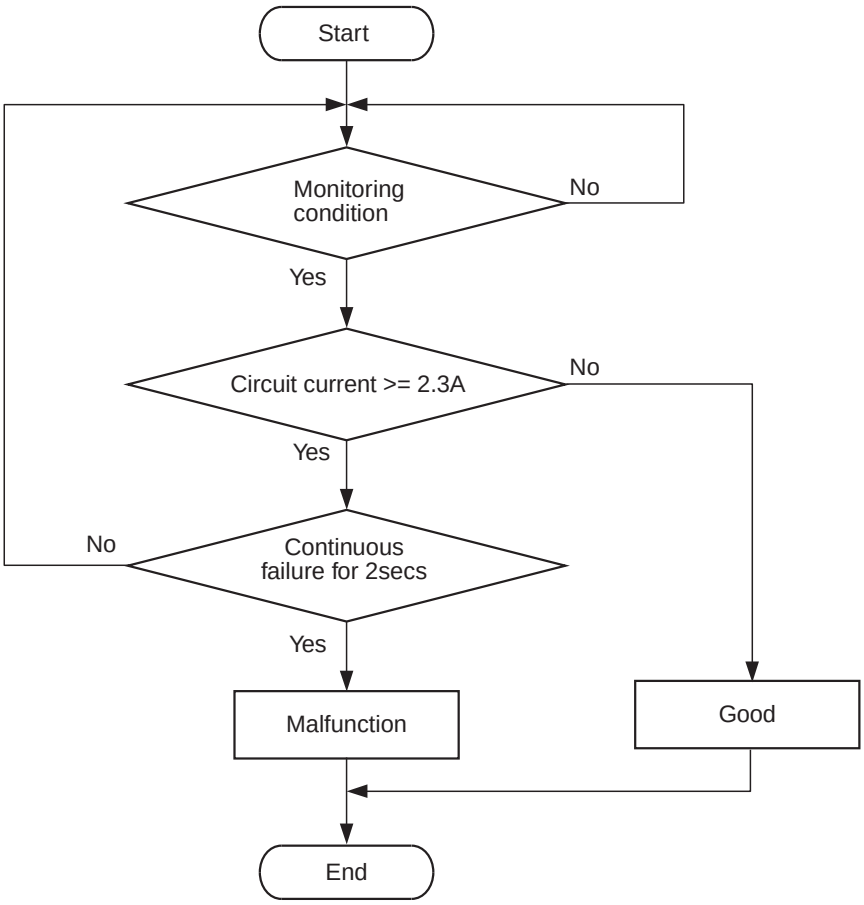
The ECM detects short malfunction.

## MONITOR EXECUTION

Continuous

## DTC SET CONDITIONS

### Logic Flow Chart <Circuit continuity – shorted high>




ACC07079

**Check Conditions**

- Engine is running.

**Judgment Criterion**

- The coil current is more than 2.3 amperes with the evaporative emission ventilation solenoid driving for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

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

- Not applicable

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

- Evaporative emission ventilation solenoid failed.

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

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

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

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T.-III) to the actuator test mode for item 15, Evaporative Emission Ventilation Solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission ventilation solenoid is operated.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Check the evaporative emission ventilation solenoid.**

(1) Disconnect connector, and measure at solenoid side.
(2) Measure the resistance between evaporative emission ventilation solenoid side connector terminals.

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

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

**YES :** Go to Step 3.
**NO :** Replace the evaporative emission ventilation solenoid. Then go to Step 5.

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**STEP 3. Check of short to power supply in P/VT line between evaporative emission ventilation solenoid connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 4. Using scan tool (M.U.T.-III), check actuator test item 15: Evaporative Emission Ventilation Solenoid.**

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

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656).Then go to Step 5.

**STEP 5. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0499 stored?**

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

## DTC P0500: Vehicle Speed Signal Malfunction

### TECHNICAL DESCRIPTION

- The ECM receives the vehicle speed signal from the ASC-ECU by the CAN bus line.

### DESCRIPTIONS OF MONITOR METHODS

When the signal not available as the vehicle speed information send from ASC-ECU, a malfunction is determined to have occurred.

### MONITOR EXECUTION

Continuous

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

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

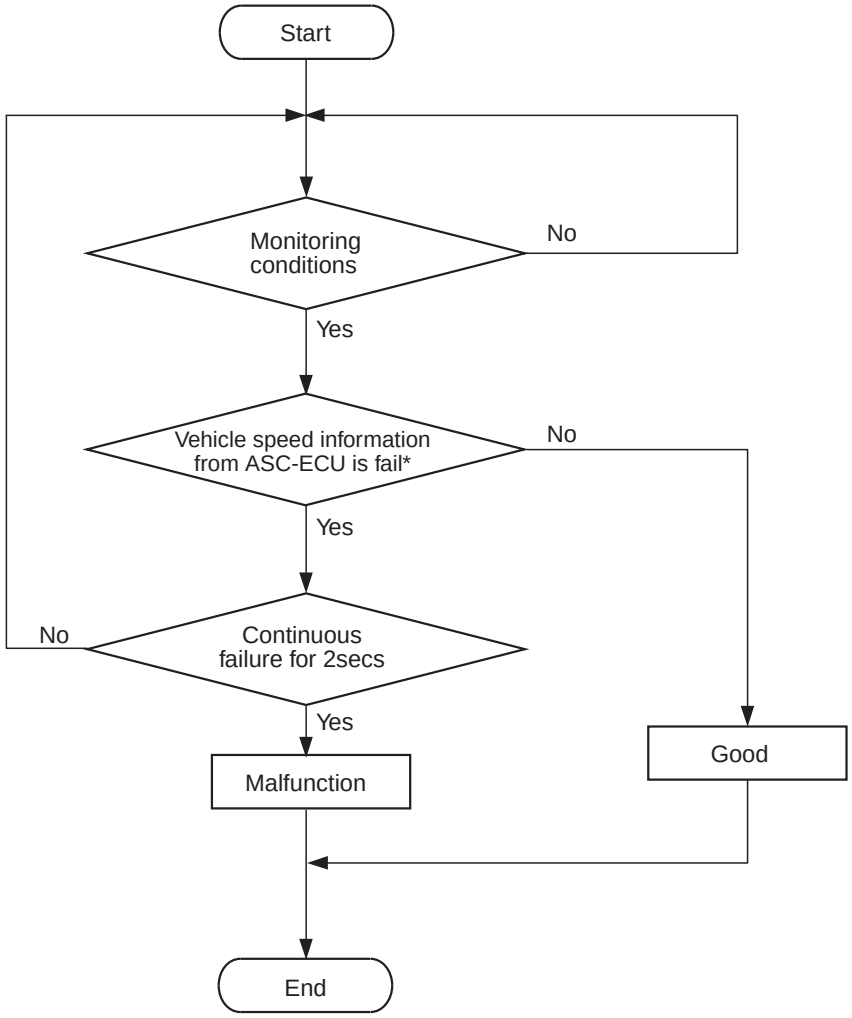
- Not applicable

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

- Mass airflow sensor

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

### Logic Flow Chart




*The fail signal is sent when ASC-ECU detects all four wheel speed sensors failures.

AK704731

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**

- Vehicle speed information from ASC-ECU is fail for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

None

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

- Wheel speed sensor of ASC system failed.
- ASC-ECU failed.
- ECM failed.

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## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the ASC-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ASC-DTC stored?**

**YES :** Refer to GROUP 35C, Diagnosis – Diagnostic Trouble Code Chart P.35C-16.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P0500 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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

## TECHNICAL DESCRIPTION

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

## DESCRIPTIONS OF MONITOR METHODS

Difference between actual and target idle speed is over the specified value.

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## MONITOR EXECUTION
Continuous

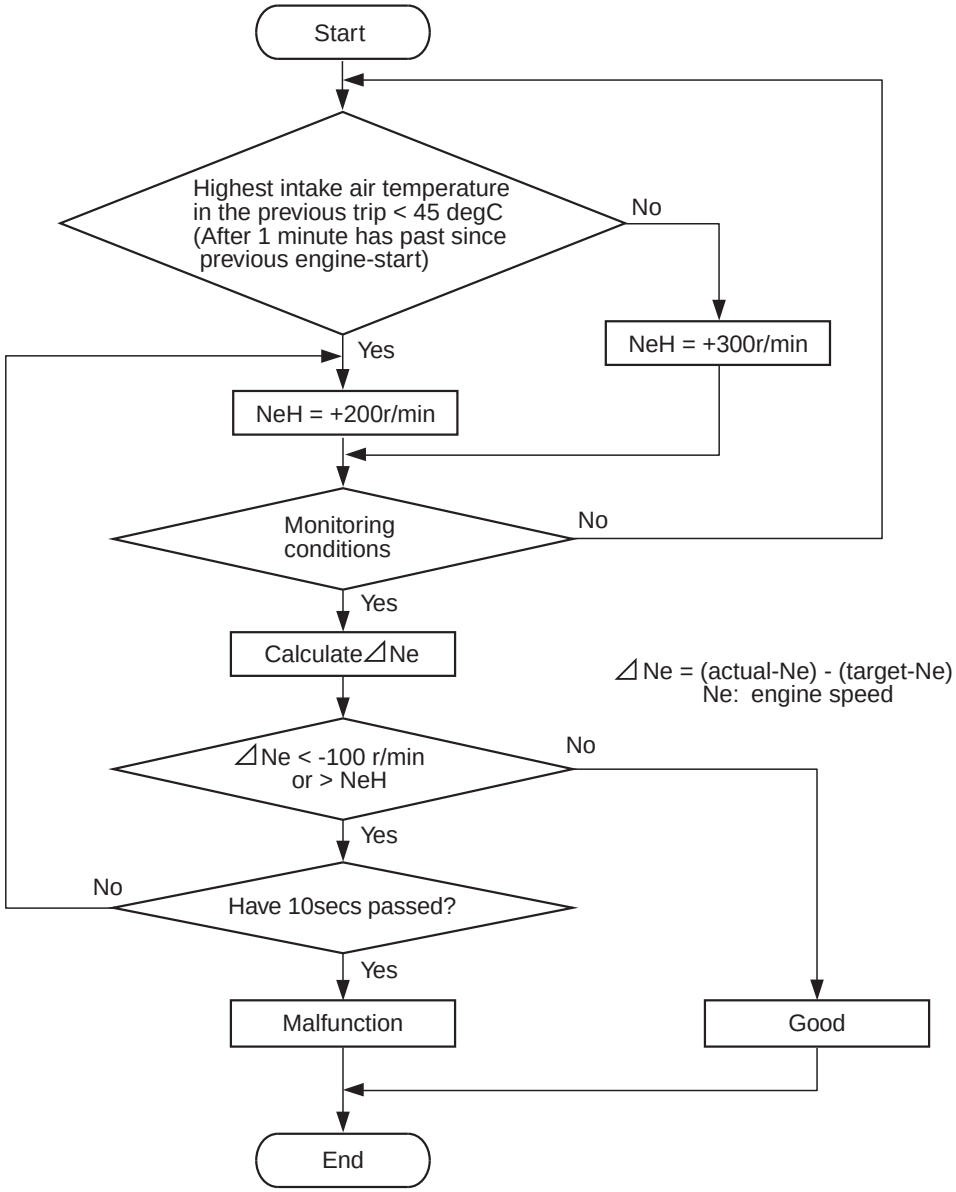
## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Misfire monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

## DTC SET CONDITIONS

### Logic Flow Chart




ACC07175

**Check Conditions**
- Under the closed loop idle speed control.

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- The engine coolant temperature is more than 41°C (106°F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than –10°C (14°F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target airflow rate is more than 11 g/sec (9 L/sec) when engine coolant temperature is more than 77°C (171°F).

**Judgment Criterion**

- The actual idle speed is less than the target idle speed by 100 r/min or more for 10 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**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-638. Then go to Step 4.
**NO :** Go to Step 3.

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

(1) Replace the throttle body assembly.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0506 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

**STEP 4. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0506 stored?**

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

## DTC P0507: Idle Control System RPM Higher Than Expected

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Difference between actual and target idle speed is over the specified value.

### MONITOR EXECUTION

Continuous

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

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

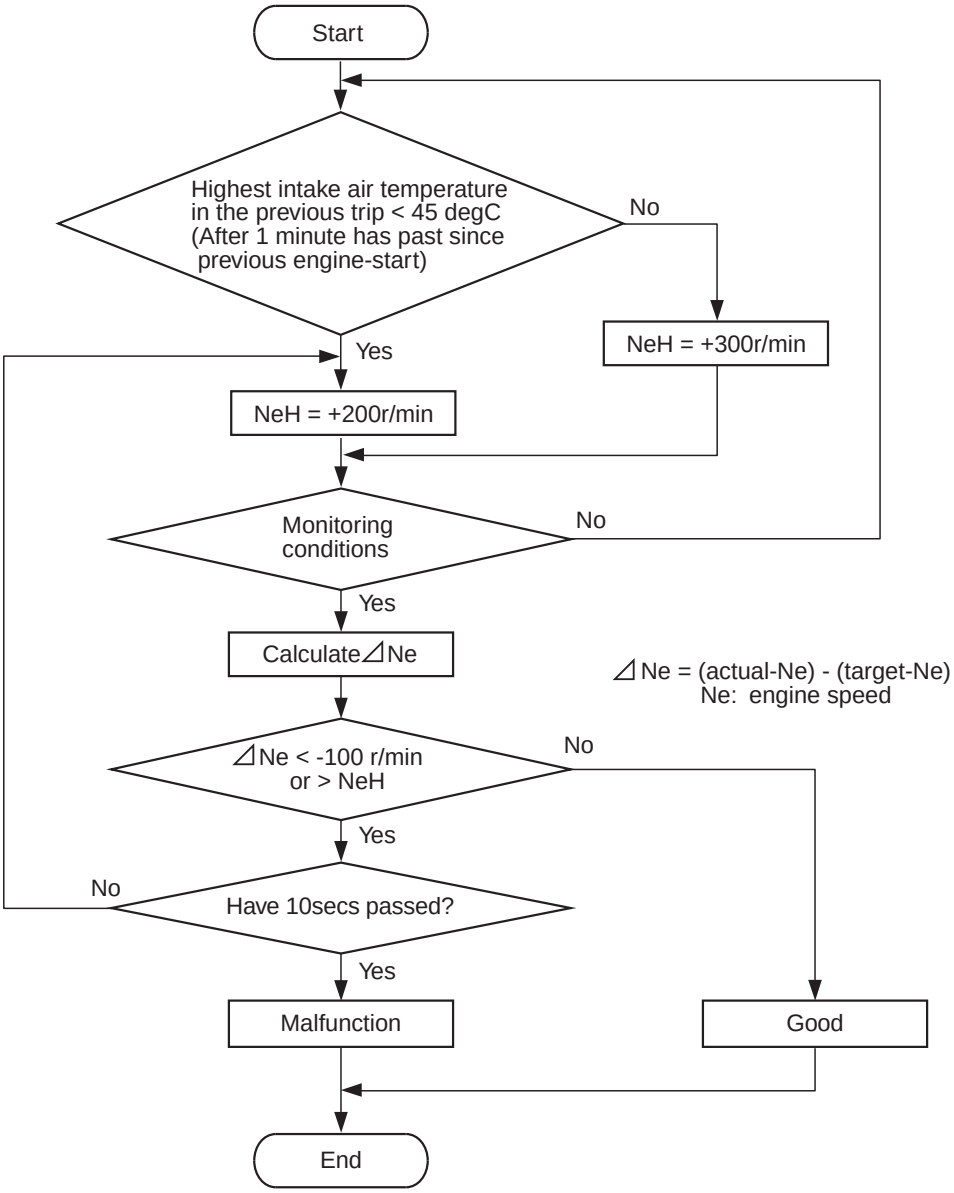
- Misfire monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

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

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

## DTC SET CONDITIONS

### Logic Flow Chart




ACC07175

**Check Conditions**

- Under the closed loop idle speed control.
- Engine coolant temperature is more than 41°C (106°F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than −10°C (14°F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target airflow rate is 0 g/sec (0 L/sec).

**Judgment Criterion**

- The actual idle speed is more than the target idle speed by 203 r/min (305 r/min*) or more for 10 seconds.
  *: Specs in parentheses are applicable if the maximum intake air temperature during the previous operation was more than 45°C (113°F).

## FAIL-SAFE AND BACKUP FUNCTION

- None

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## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.

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

- Intake system vacuum leak.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 4.
**NO :** Go to Step 3.

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

(1) Replace the throttle body assembly.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0507 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

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**STEP 4. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 17 P.13A-10.

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

**Q: Is DTC P0507 stored?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC P0513: Immobilizer Malfunction <Vehicles without KOS>

### TECHNICAL DESCRIPTION

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

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- When it was different in the encrypted code sent from ETACS-ECU (immobilizer system) and operation result by ECM.

### FAIL-SAFE AND BACKUP FUNCTION

- Engine start is prohibited.

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

- CAN system failed.
- Immobilizer system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check VIN Information.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the coding mode for VIN Information.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**STEP 2. Using scan tool (M.U.T.-III), read the immobilizer diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the immobilizer-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the immobilizer-DTC set?**

**YES :** Refer to GROUP 54A, Immobilizer System <Vehicles without KOS> – Diagnostic Trouble Code Chart P.54A-277.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P0513 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P0513: Immobilizer Malfunction <Vehicles with KOS>

### TECHNICAL DESCRIPTION

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

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- When it was different in the encrypted code sent from KOS&OSS-ECU and operation result by ECM.

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## FAIL-SAFE AND BACKUP FUNCTION

- Engine start is prohibited.

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

- CAN system failed.
- OSS system failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check VIN Information.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the coding mode for VIN Information.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**STEP 2. Using scan tool (M.U.T.-III), read the KOS diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the KOS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the KOS-DTC set?**

**YES :** Refer to GROUP 42B, Diagnosis – Diagnostic Trouble Code Chart P.42B-13.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0513 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P0532: A/C Pressure Sensor Circuit Low Input

### CIRCUIT OPERATION

- A power voltage of 5 V is applied to the A/C pressure sensor connector power terminal from the ECM connector terminal ACP5&BVS5 and grounded to the ECM connector terminal ACPE&BVSE from the A/C pressure sensor connector ground terminal.
- The sensor signal is inputted to the ECM connector terminal AC/P from the A/C pressure sensor connector output terminal.

### TECHNICAL DESCRIPTION

- The A/C pressure sensor detects a change in A/C refrigerant pressure and inputs the signal to the ECM.

### DTC SET CONDITIONS

**Check Conditions**

- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.
- Battery positive voltage is more than 10 V and is less than 16.5 V.

**Judgment Criterion**

- Sensor output voltage is 0.2 V or less for 4 seconds.

### FAIL-SAFE AND BACKUP FUNCTION

- Control as if the A/C refrigerant is 0.063 MPa.

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

- Failed A/C pressure sensor
- Open/short circuit or harness damage in A/C pressure sensor circuit or loose connector contact
- Failed ECM

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

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- MB991348: Test Harness

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the sensor supply voltage at A/C pressure sensor harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 line 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 6.
**NO :** Go to Step 3.

**STEP 3. Measure the power supply voltage at ECM connector.**

(1) Disconnect connector, and measure at harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 and ground.
  - Voltage should be between 4.9 and 5.1 volts.

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit in ACP5&BVS5 line between A/C pressure sensor connector and ECM connector. Then go to Step 10.
**NO :** Go to Step 4.

**STEP 4. Check of short to ground in ACP5&BVS5 line between A/C pressure sensor connector and ECM connector.**

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

**YES :** Go to Step 5.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 5. Using scan tool (M.U.T.-III), 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-599.
   a. Item 172: A/C Pressure Sensor (Voltage)
   b. Item 175: A/C Pressure Sensor (Pressure)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**NO :** Replace the ECM. Then go to Step 10.

**STEP 6. Measure the sensor supply voltage at A/C pressure sensor harness side connector.**

(1) Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 line 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 :** Repair or replace the connector(s), or check and repair the harness of damage in ACP5&BVS5 line between A/C pressure sensor connector and ECM connector. Then go to Step 10.

**STEP 7. Measure the sensor output voltage at A/C pressure sensor harness side connector.**

(1) Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
(2) Start the engine.
(3) Measure the voltage between terminal AC/P line and ground.
(4) Perform the simple inspection for the A/C pressure sensor (Refer to GROUP 55A – On-vehicle Service – Simple Inspection of A/C Pressure Sensor P.55A-17).
- Relationship between the manometer indication and the output voltage should comply with the graph.

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

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

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

**STEP 8. Check of short to ground AC/P line between A/C pressure sensor connector and ECM connector.**

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

**YES :** Replace the A/C pressure sensor. Then go to Step 10.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 9. Measure the sensor output voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Start the engine.
(3) Measure the voltage between terminal AC/P line and ground by backprobing.
(4) Perform the simple inspection for the A/C pressure sensor (Refer to GROUP 55A – On-vehicle Service – Simple Inspection of A/C Pressure Sensor P.55A-17).
- Relationship between the manometer indication and the output voltage should comply with the graph.

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

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

**YES :** Go to Step 5.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and damage in AC/P line between A/C pressure sensor connector and ECM connector. Then go to Step 10.

**STEP 10. Using scan tool (M.U.T.-III), 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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** The inspection is complete.
**NO :** Retry the troubleshooting.

## DTC P0533: A/C Pressure Sensor Circuit High Input

### CIRCUIT OPERATION
- A power voltage of 5 V is applied to the A/C pressure sensor connector power terminal from the ECM connector terminal ACP5&BVS5 and grounded to the ECM connector terminal ACPE&BVSE from the A/C pressure sensor connector ground terminal.
- The sensor signal is inputted to the ECM connector terminal AC/P from the A/C pressure sensor connector output terminal.

### TECHNICAL DESCRIPTION
- The A/C pressure sensor detects a change in A/C refrigerant pressure and inputs the signal to the ECM.

### TROUBLE JUDGMENT
**Check Conditions**
- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.
- Battery positive voltage is more than 10 V and is less than 16.5 V.

**Judgment Criterion**
- Sensor output voltage is 4.8 V or more for 4 seconds.

### FAIL-SAFE AND BACKUP FUNCTION
- Control as if the A/C refrigerant is 0.063 MPa.

### TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Failed A/C pressure sensor
- Open/short circuit or harness damage in A/C pressure sensor circuit or loose connector contact
- Failed ECM

### DIAGNOSIS
**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the resistance at A/C pressure sensor harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Measure the resistance between terminal ACPE&BVSE line and ground.
  • Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and damage in ACPE&BVSE line between A/C pressure sensor connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 7.

**STEP 4. Using scan tool (M.U.T.-III), 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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM. Then go to Step 7.

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**STEP 5. Using scan tool (M.U.T.-III), 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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 6.

**STEP 6. Replace the A/C pressure sensor**

- After replacing the A/C pressure sensor, reconfirm whether the diagnostic trouble code is stored.

**Q: Is the diagnostic trouble code stored?**

**YES :** Replace the ECM. Then go to Step 7.
**NO :** Check end.

**STEP 7. Using scan tool (M.U.T.-III), 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-599.
  a. Item 172: A/C Pressure Sensor (Voltage)
  b. Item 175: A/C Pressure Sensor (Pressure)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

## DTC P0537: Fin Thermo Sensor Circuit Low Input

### CIRCUIT OPERATION

- A power voltage of 5 V is applied to the fin thermo sensor connector terminal from the ECM connector terminal AC/T.
- The power voltage is grounded to the ECM connector terminal ACTE from the fin thermo sensor connector terminal.

### TECHNICAL DESCRIPTION

- The fin thermo sensor converts the evaporator surface temperature into a voltage signal, and sends the voltage to the ECM.
- In response to the signal, the ECM controls the A/C compressor relay.
- The fin thermo sensor is a kind of resistor, which has characteristics to reduce its resistance as air temperature rises. Therefore, the sensor output voltage varies with the air temperature, and becomes lower as the air temperature rises.

### DTC SET CONDITIONS

**Check Condition**

- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.

**Judgment Criterion**

- Fin thermo sensor output voltage is less than 0.1 V for 4 seconds.

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## FAIL-SAFE AND BACKUP FUNCTION

- Control as if the evaporator surface temperature is –6.4°C.

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

- Failed fin thermo sensor
- Short circuit in fin thermo sensor circuit or loose connector contact
- Failed ECM

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 174: Fin Thermo sensor
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Check the fin thermo sensor.**

Refer to Fin Thermo Sensor Check (Refer to GROUP 55A – Heater Unit and Blower Assembly – Inspection – Fin Thermo Sensor Check P.55A-39).

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

**YES :** Go to Step 3.
**NO :** Replace the fin thermo sensor. Then go to Step 6.

**STEP 3. Measure the voltage at fin thermo sensor connector.**
(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal AC/T line and ground.
- Voltage should be 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 5.
**NO :** Go to Step 4.

**STEP 4. Check of short to ground in AC/T line between fin thermo sensor connector and ECM connector.**

**Q: Is the harness wire in good condition?**
**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 6.

**STEP 5. Using scan tool (M.U.T.-III), check data list.**
(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
a. Item 174: Fin Thermo sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM. Then go to Step 6.

**STEP 6. Using scan tool (M.U.T.-III), check data list.**
(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
a. Item 174: Fin Thermo sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** The inspection is complete.
**NO :** Retry the troubleshooting.

## DTC P0538: Fin Thermo Sensor Circuit High Input

### CIRCUIT OPERATION

- A power voltage of 5 V is applied to the fin thermo sensor connector terminal from the ECM connector terminal AC/T.
- The power voltage is grounded to the ECM connector terminal ACTE from the fin thermo sensor connector terminal.

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## TECHNICAL DESCRIPTION

- The fin thermo sensor converts the evaporator surface temperature into a voltage signal, and sends the voltage to the ECM.
- In response to the signal, the ECM controls the A/C compressor relay.
- The fin thermo sensor is a kind of resistor, which has characteristics to reduce its resistance as air temperature rises. Therefore, the sensor output voltage varies with the air temperature, and becomes lower as the air temperature rises.

## DTC SET CONDITIONS

**Check Condition**

- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.

**Judgment Criterion**

- Fin thermo sensor output voltage is more than 4.9 V for 4 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Control as if the evaporator surface temperature is –6.4°C.

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

- Failed fin thermo sensor
- Open circuit or harness damage in fin thermo sensor circuit or loose connector contact
- Failed ECM

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 174: Fin Thermo sensor
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Check the fin thermo sensor.**
Refer to Fin Thermo Sensor Check (Refer to GROUP 55A – Heater Unit and Blower Assembly – Inspection – Fin Thermo Sensor Check P.55A-39).

**Q: Is the sensor operating properly?**
**YES :** Go to Step 3.
**NO :** Replace the fin thermo sensor. Then go to Step 9.

**STEP 3. Measure the resistance at fin thermo sensor connector.**
(1) Disconnect the connector and measure at the harness side.
(2) Measure the voltage between terminal ACTE line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**
**YES :** Go to Step 6.
**NO :** Go to Step 4.

**STEP 4. Check of open circuit and damage in ACTE line between fin thermo sensor connector and ECM connector.**

**Q: Is the check result normal?**
**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 9.

**STEP 5. Using scan tool (M.U.T.-III), check data list.**
(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
a. Item 174: Fin Thermo sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM. Then go to Step 9.

**STEP 6. Measure the voltage at fin thermo sensor connector.**
(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal AC/T line and ground.
- Voltage should be between 4.5 and 4.9 volts.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the measured voltage between 4.5 and 4.9 volts?**
**YES :** Go to Step 8.
**NO :** Go to Step 7.

**STEP 7. Check of open circuit in AC/T line between fin thermo sensor connector and ECM connector.**

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 9.

**STEP 8. Check of damage in AC/T line between fin thermo sensor connector and ECM connector.**

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 9.

**STEP 9. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 174: Fin Thermo sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

## DTC P0557: Brake Booster Pressure Sensor Circuit Low Input

### CIRCUIT OPERATION

- A power voltage of 5 V is applied to the brake booster pressure sensor connector power terminal from the ECM connector terminal ACP5&BVS5 and grounded to the ECM connector terminal ACPE&BVSE from the brake booster pressure sensor connector ground terminal.
- The sensor signal is inputted to the ECM connector terminal BVS from the brake booster pressure sensor connector output terminal.

### TECHNICAL DESCRIPTION

- The brake booster pressure sensor detects a change in brake booster negative pressure and inputs the signal to the ECM.

### DTC SET CONDITIONS

**Check Conditions**

- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.
- Battery positive voltage is more than 10 V and is less than 16.5 V.

**Judgment Criterion**

- Senor output voltage is 0.3 V or less for 2 seconds (corresponding to 13 kPa or less of the brake booster pressure).

**FAIL-SAFE AND BACKUP FUNCTION**

- None

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

- Failed brake booster pressure sensor
- Open/short circuit or harness damage in brake booster pressure sensor circuit or loose connector contact
- Failed ECM

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)
- MB991348: Test Harness

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 171: Brake booster pressure sensor
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the sensor supply voltage at brake booster pressure sensor harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 line 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 6.
**NO :** Go to Step 3.

**STEP 3. Measure the power supply voltage at ECM connector.**

(1) Disconnect connector, and measure at harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit in ACP5&BVS5 line between brake booster pressure sensor connector and ECM connector. Then go to Step 10.

**STEP 4. Check of short to ground between brake booster pressure sensor connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 5. Using scan tool (M.U.T.-III), 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-599.
a. Item 171: Brake booster pressure sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM. Then go to Step 10.

**STEP 6. Perform voltage measurement at brake booster pressure sensor connector.**

(1) Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ACP5&BVS5 line 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 :** Repair or replace the connector(s), or check and repair the harness of damage in ACP5&BVS5 line between brake booster pressure sensor connector and ECM connector. Then go to Step 10.

**STEP 7. Measure the sensor output voltage at A/C pressure sensor harness side connector.**

(1) Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
(2) Start up the engine and let it idle for several minutes.
(3) Stop the engine, and turn the ignition switch to the ON position.
(4) Depress the brake pedal several times.
(5) Measure the voltage between terminal BVS line and ground.
- The more frequently the brake pedal is depressed, the more the voltage is decreased.

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

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

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

**STEP 8. Check of short to ground in BVS line between brake booster pressure sensor connector and ECM connector.**

**Q: Is the check result normal?**

**YES :** Replace the brake booster pressure sensor. Then go to Step 10.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 9. Measure the sensor output voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Start up the engine and let it idle for several minutes.
(3) Stop the engine, and turn the ignition switch to the ON position.
(4) Depress the brake pedal several times.
(5) Measure the voltage between terminal BVS line and ground by backprobing.
- The more frequently the brake pedal is depressed, the more the voltage is decreased.

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

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

**YES :** Go to Step 5.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and damage in BVS line between brake booster pressure sensor connector and ECM connector. Then go to Step 10.

**STEP 10. Using scan tool (M.U.T.-III), 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-599.
a. Item 171: Brake booster pressure sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** The inspection is complete.
**NO :** Retry the troubleshooting.

## DTC P0558: Brake Booster Pressure Sensor Circuit High Input

### CIRCUIT OPERATION
- A power voltage of 5 V is applied to the brake booster pressure sensor connector power terminal from the ECM connector terminal ACP5&BVS5 and grounded to the ECM connector terminal ACPE&BVSE from the brake booster pressure sensor connector ground terminal.
- The sensor signal is inputted to the ECM connector terminal BVS from the brake booster pressure sensor connector output terminal.

### TECHNICAL DESCRIPTION
- The brake booster pressure sensor detects a change in brake booster negative pressure and inputs the signal to the ECM.

### DTC SET CONDITIONS
**Check Conditions**
- After 2 seconds since the ignition switch is turned ON or since the completion of engine start.
- Battery positive voltage is more than 10 V and is less than 16.5 V.

**Judgment Criterion**
- Senor output voltage is 4.8 V or more for 2 seconds (corresponding to 120 kPa or less of the brake booster pressure).

**FAIL-SAFE AND BACKUP FUNCTION**
- None

### TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Failed brake booster pressure sensor
- Open circuit or harness damage in brake booster pressure sensor circuit or loose connector contact
- Failed ECM

### DIAGNOSIS
**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 171: Brake booster pressure sensor
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the resistance at brake booster pressure sensor harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Measure the resistance between terminal ACPE&BVSE line and ground.
  • Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and damage in ACPE&BVSE line between brake booster pressure sensor connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 7.

**STEP 4. Using scan tool (M.U.T.-III), 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-599.
  a. Item 171: Brake booster pressure sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM. Then go to Step 7.

**STEP 5. Using scan tool (M.U.T.-III), 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-599.
  a. Item 171: Brake booster pressure sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 6.

**STEP 6. Replace the brake booster pressure sensor**
- After replacing the brake booster pressure sensor, reconfirm whether the diagnostic trouble code is stored.

**Q: Is the diagnostic trouble code stored?**
**YES :** Replace the ECM. Then go to Step 7.
**NO :** Check end.

**STEP 7. Using scan tool (M.U.T.-III), 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-599.
  a. Item 171: Brake booster pressure sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**
**YES :** The inspection is complete.
**NO :** Retry the troubleshooting.

## DTC P0602: Control Module Programming Error

### TECHNICAL DESCRIPTION
- The ECM performs proper engine control based on vehicle information entered.
- A vehicle information is entered at a plant before shipment. This diagnostic trouble code occurs when no vehicle information is entered during ECM replacement.

### MONITOR EXECUTION
Continuous

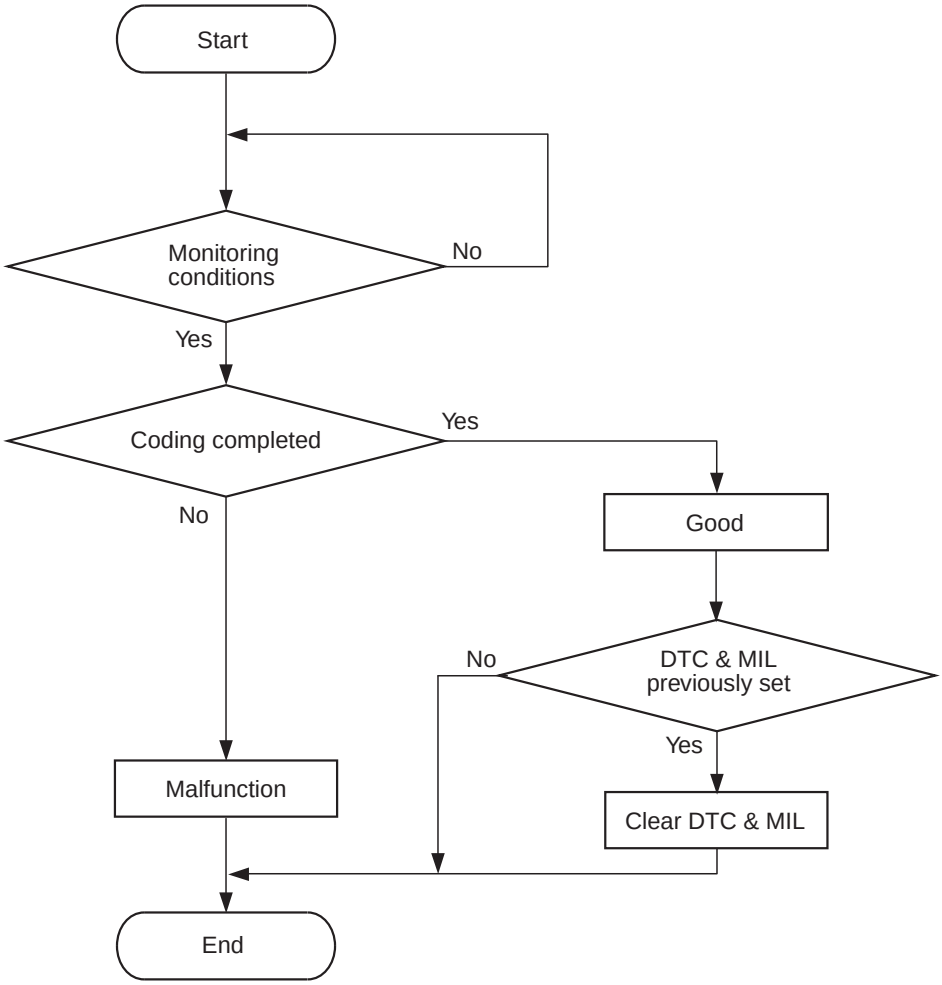
### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604358

**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- Vehicle information is not entered into the ECM.

## FAIL-SAFE AND BACKUP FUNCTION
- None

## OBD-II DRIVE CYCLE PATTERN
None.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

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|---|

- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 P0602 stored?**

**YES :** Replace the ECM with one into which vehicle information is correctly entered (Refer to, Removal and Installation P.13A-656).

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

## DTC P0604: Internal Control Module Random Access Memory (RAM) Error

### TECHNICAL DESCRIPTION

Monitors the computation function of the ECM periodically.

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- All RAM data of ECM are defect.

or

- RAM data (engine) is defect.

### FAIL-SAFE AND BACKUP FUNCTION

- Microcomputer is reset.

or

- Throttle opening degree position is in default position.

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

- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)

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- MB991824: Vehicles Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 P0602 stored?**

**YES :** Replace the ECM with one into which vehicle information is correctly entered (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P0606: Engine Control Module Main Processor Malfunction

### ENGINE CONTROL MODULE MAIN PROCESSOR MALFUNCTION CIRCUIT

- Refer to Inspection Procedure 22 – Power Supply System and Ignition Switch-IG System P.13A-556.

### CIRCUIT OPERATION

- Refer to Inspection Procedure 22 – Power Supply System and Ignition Switch-IG System P.13A-556.

### TECHNICAL DESCRIPTION

- Throttle actuator control processor checks the ECM for abnormal conditions.

### DESCRIPTIONS OF MONITOR METHODS

No watch dog pulse is detected.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- No surveillance pulse signals is inputted for 0.5 second.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- MFI relay failed.
- Shorted MFI relay circuit or connector damage.
- Open or shorted ignition switch-IG circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the battery.**

Refer to GROUP 54A, Battery – On-vehicle Service – Battery Test P.54A-5.

**Q: Are there any abnormalities?**

**YES :** Replace the battery. Then go to Step 8.
**NO :** Go to Step 2.

**STEP 2. Measure the ignition switch-IG signal voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal IGN line and ground.
- Voltage should be battery positive voltage.

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

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

**YES <Vehicles without KOS> :** Go to Step 3.
**YES <Vehicles with KOS> :** Go to Step 4.
**NO <Vehicles without KOS> :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in IGN line between ignition switch connector (IG1) and ECM connector. Then go to Step 8.
**NO <Vehicles with KOS> :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in IGN line between IG1 relay connector and ECM connector. Then go to Step 8 .

**STEP 3. Check of harness damage in IGN line between ignition switch connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 8.

**STEP 4. Check of harness damage in IGN line between IG1 relay and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 8.

**STEP 5. Check the MFI relay.**

Refer to MFI Relay Check P.13A-644.

**Q: Is the MFI relay normal?**

**YES :** Go to Step 6.
**NO :** Replace the MFI relay. Then go to Step 8.

**STEP 6. Check of short circuit to ground in C/R line between MFI relay connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 8.

**STEP 7. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 8.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 8. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0606 stored?**

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

## DTC P060B: Internal Control Module A/D Processing Performance Problem

### TECHNICAL DESCRIPTION

Monitors whether input voltage from the accelerator pedal position sensor (sub) is normally converted into a digital signal in the ECM.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- When the input voltage from the accelerator pedal position sensor (sub) is periodically 0 V for 0.45 second, the digital value of the input voltage indicates 0.2 V or more.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

### OBD-II DRIVE CYCLE PATTERN

None.

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

- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable

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- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 P060B stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P060D: Internal Control Module Accelerator Pedal Position Performance Problem

### TECHNICAL DESCRIPTION

Compare the output value of the accelerator pedal position sensor (main) with that of the accelerator pedal position sensor (sub).

### MONITOR EXECUTION

Continuous

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

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

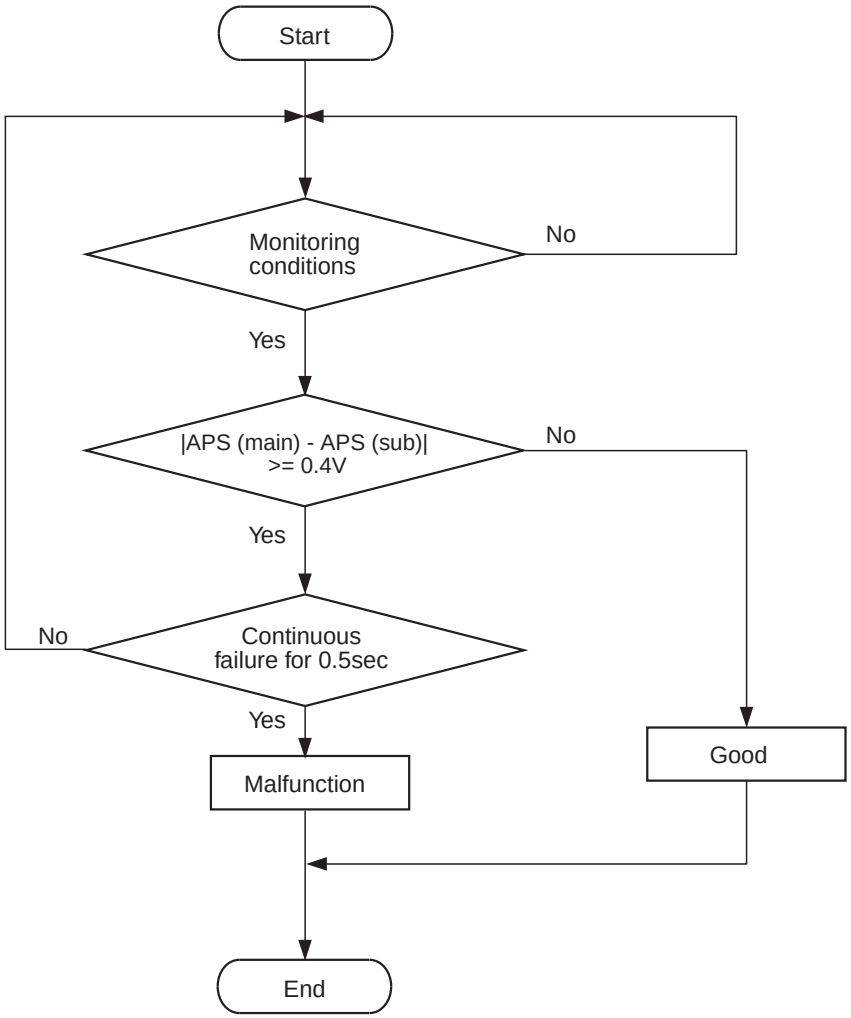
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604353

**Check Conditions**

- Range/performance error of accelerator pedal position sensor (main and sub) circuit is not detected.

**Judgment Criterion**

- The difference between the accelerator pedal position sensor (main) output voltage and the accelerator pedal position sensor (sub) output voltage is more than 0.4 volt for 0.5 second.

*NOTE: The accelerator pedal position sensor voltage used for the judgment is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor system failed.
- ECM failed.

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## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P060D stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.
**NO :** Refer to, DTC P2122 – Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-443, DTC P2123 – Accelerator Pedal Position Sensor (main) Circuit High Input P.13A-447.

**STEP 3. Using scan tool (M.U.T.-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** Go to Step 4.
**NO :** Refer to, DTC P2127 – Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-450, DTC P2128 – Accelerator Pedal Position Sensor (sub) Circuit High Input P.13A-454.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P060D stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 5.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P060D stored?**

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

## DTC P061A: Internal Control Module Torque Performance Problem

### TECHNICAL DESCRIPTION

Compares the actual torque signal computed from a mass airflow sensor signal with the driver demand torque signal computed from an accelerator pedal position sensor signal.

### MONITOR EXECUTION

Continuous

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

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

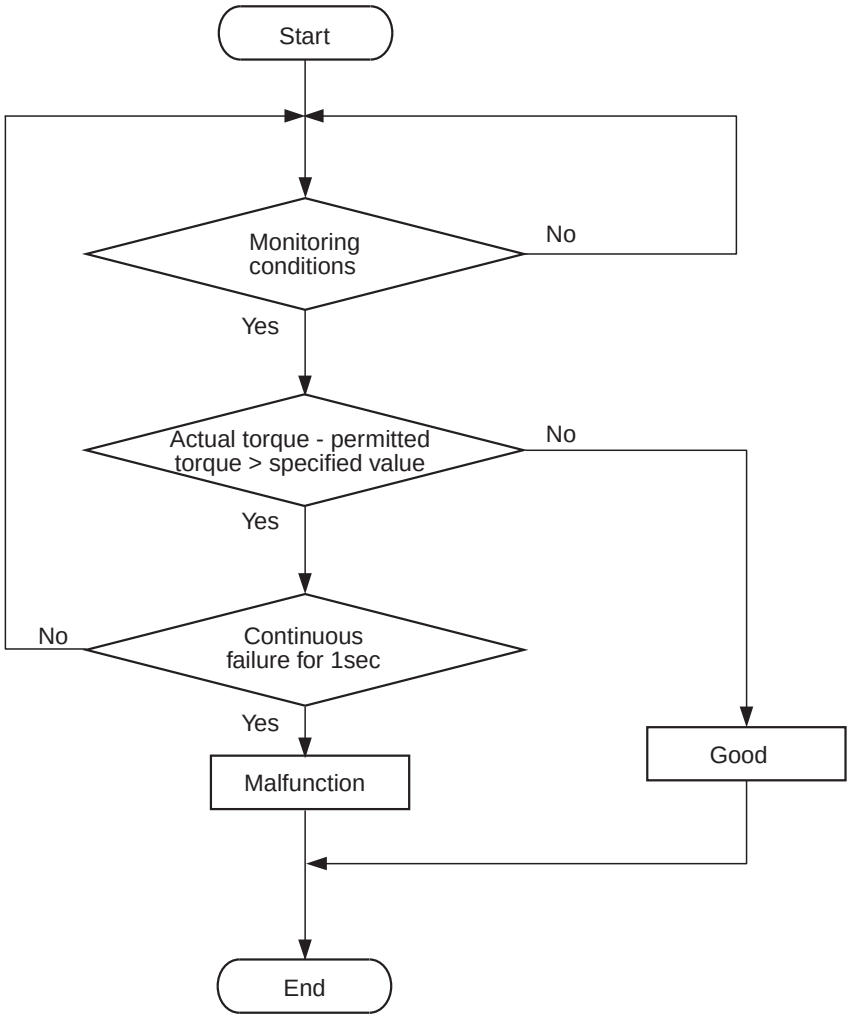
- Not applicable

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**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

## Logic Flow Chart




AK800587

**Check Conditions**
- Engine speed is more than 500 r/min.
- Volumetric efficiency is more than 16 percent.

**Judgment Criterion**
- The requested torque signal subtracted from the actual torque signal is more than 50 N·m (37 ft-lb) for 1 second.

## FAIL-SAFE AND BACKUP FUNCTION
- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN
Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 16 P.13A-10.

**TSB Revision**

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

- Throttle actuator control motor failed.
- Connector damage.
- Harness damage.
- Intake system vacuum leak.
- There is some foreign matter around mass air-flow sensor.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

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

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P061A stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 11.
**NO :** Go to Step 3.

**STEP 3. Check for foreign matter being around the mass airflow sensor.**

**Q: Are there any foreign matter?**

**YES :** Repair it. Then go to Step 11.
**NO :** Go to Step 4.

**STEP 4. Using scan tool (M.U.T.-III), check data list item 10: Mass Airflow Sensor.**

(1) Start the engine and run at idle.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 10, Mass Airflow Sensor.
(3) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
- The standard value during idling should be between 760 and 1,080 millivolts.
- When the engine is revved, the output voltage should increase according to the increase in engine speed.

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

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

**YES :** Go to Step 5.
**NO :** Refer to, DTC P0102 – Mass Airflow Circuit Low Input P.13A-89, DTC P0103 – Mass Airflow Circuit High Input P.13A-94.

**STEP 5. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
- Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** Go to Step 6.
**NO :** Refer to, DTC P2122 – Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-443, DTC P2123 – Accelerator Pedal Position Sensor (main) Circuit High Input P.13A-447.

**STEP 6. Using scan tool (M.U.T.-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** Go to Step 7.
**NO :** Refer to, DTC P2127 – Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-450, DTC P2128 – Accelerator Pedal Position Sensor (sub) Circuit High Input P.13A-454.

**STEP 7. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector.
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal ETV+ line and ETV– line.

**Standard value: 0.3 – 100 Ω [at 20°C (68°C)]**

**Q: Is the measured resistance between 0.3 and 100 Ω [at 20°C (68°C)?**

**YES :** Go to Step 8.
**NO :** Replace the throttle body assembly. Then go Step 11.

**STEP 8. Check of harness damage in ETV+ line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 9.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 11.

**STEP 9. Check of harness damage in ETV– line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 10.
**NO :** Repair it. Then go to Step 11.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 16P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P061A stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 11.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 16 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P061A stored?**

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

**DTC P061C: Internal Control Module Engine RPM Performance Problem**

## TECHNICAL DESCRIPTION

Compares the actual engine speed calculated from the crankshaft position sensor signal cycle with the estimated engine speed calculated from the number of the crankshaft position sensor signal pulses after a lapse of the specified time.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

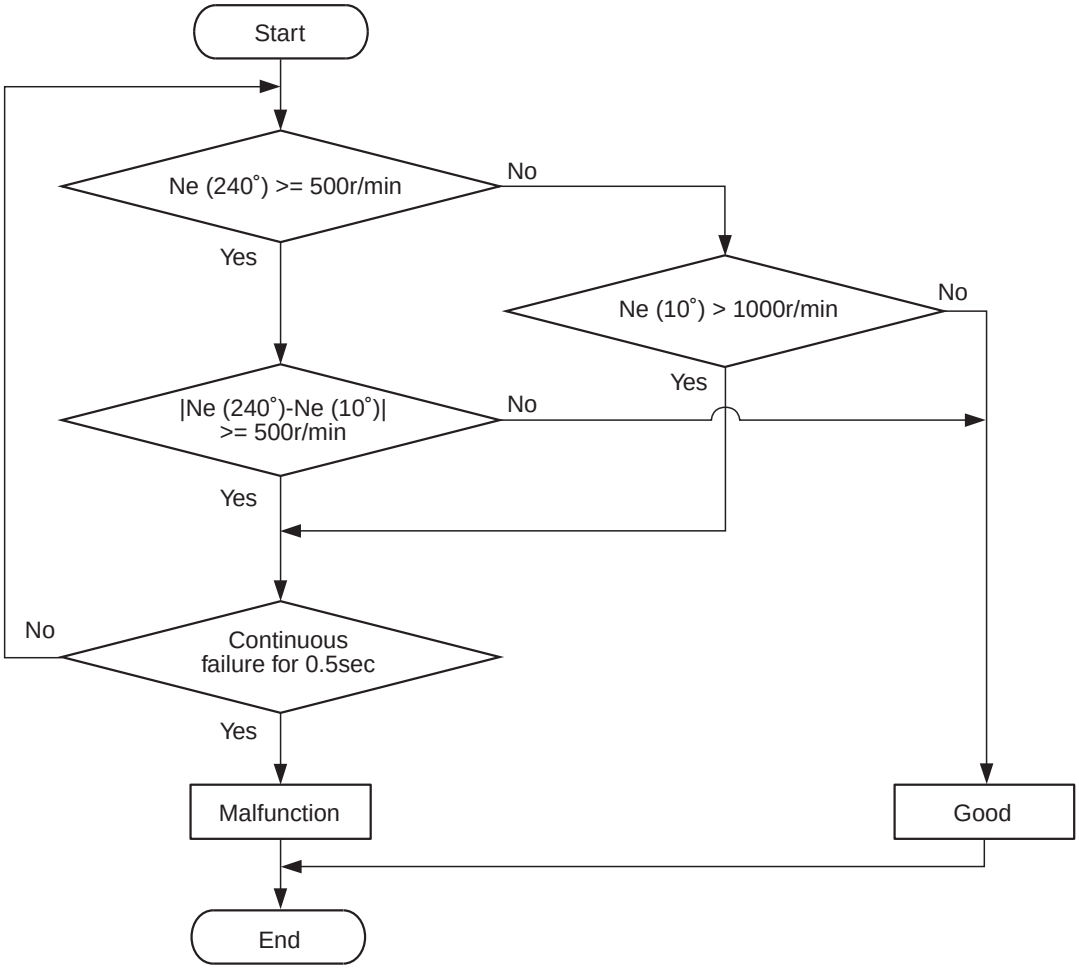
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




ACC07166

**Check Condition**

- The engine speed monitored with a 180 degree-cycle pulse is more than 500 r/min.

**Judgment Criterion**

- The difference between the engine speed monitored with a 240 degree-cycle pulse and the engine speed monitored with a 10 degree-cycle pulse is more than 500 r/min for 0.5 second.

**Check Condition**

- The engine speed monitored with a 240 degree-cycle pulse is less than 500 r/min.

**Judgment Criterion**

- The engine speed monitored with a 10 degree-cycle pulse is more than 1,000 r/min for 0.5 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 22 P.13A-10.

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

- Crankshaft position sensor system failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P061C stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P061C stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 3.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

**Q: Is DTC P061C stored?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC P061F: Internal Control Module Throttle Actuator Controller Performance Problem

### TECHNICAL DESCRIPTION

- To judge whether fail-safe control can be performed, check that power supply to the throttle actuator control motor circuit can be stopped by turning the throttle actuator control motor relay to OFF position momentarily.

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- Power supply to the throttle actuator control motor cannot be shut down (though power supply is stopped).

### FAIL-SAFE AND BACKUP FUNCTION

- Microcomputer is reset.

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

- Throttle actuator control motor relay circuit failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

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

**Q: Is DTC P0657 stored?**

**YES :** Refer to, DTC P0657 – Throttle Actuator Control Motor Relay Circuit Malfunction P.13A-407.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P061F stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P0622: Generator FR Terminal Circuit Malfunction

### CIRCUIT OPERATION

- The ECM terminal ALTF apply a battery voltage into the generator FR terminal via resistance inside the unit.

### TECHNICAL DESCRIPTION

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

### DTC SET CONDITIONS

**Check Condition**

- Engine speed is more than 50 r/min.

**Judgment Criterion**

- Input voltage from the generator FR terminal is battery positive voltage for 20 seconds.

### FAIL-SAFE AND BACKUP FUNCTION

- Prohibits generator output suppression control against current consumers. (Operates as a normal generator.)

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

- Generator failed.
- Open circuit in generator FR terminal circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Measure the output voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Start the engine and run at idle.
(3) Measure the voltage between terminal ALTF line and ground.

*NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.*

a. Engine: warming up
b. Radiator fan: stopped
c. Headlight switch: OFF to ON
d. Rear defogger switch: OFF to ON
e. Stoplight switch: OFF to ON
- Voltage should be drop.

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

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

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

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Start the engine and run at idle.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0622 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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**STEP 3. Measure the power supply voltage at generator harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ALTF line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 4. Check of open circuit in ALTF line between generator connector and ECM connector.**

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 6.

**STEP 5. Check of harness damage in ALTF line between generator connector and ECM connector.**

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

**YES :** Replace the generator. Then go to Step 6.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 6.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Start the engine and run at idle.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0622 stored?**

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

## DTC P062F: Internal Control Module EEPROM Error

### TECHNICAL DESCRIPTION

- ECM stored the information such as the idle learned value and so on in the memory of ECM.

### DESCRIPTIONS OF MONITOR METHODS

To check whether the information such as the idle learned value and so on is stored in the memory of ECM.

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## MONITOR EXECUTION
Once per driving cycle

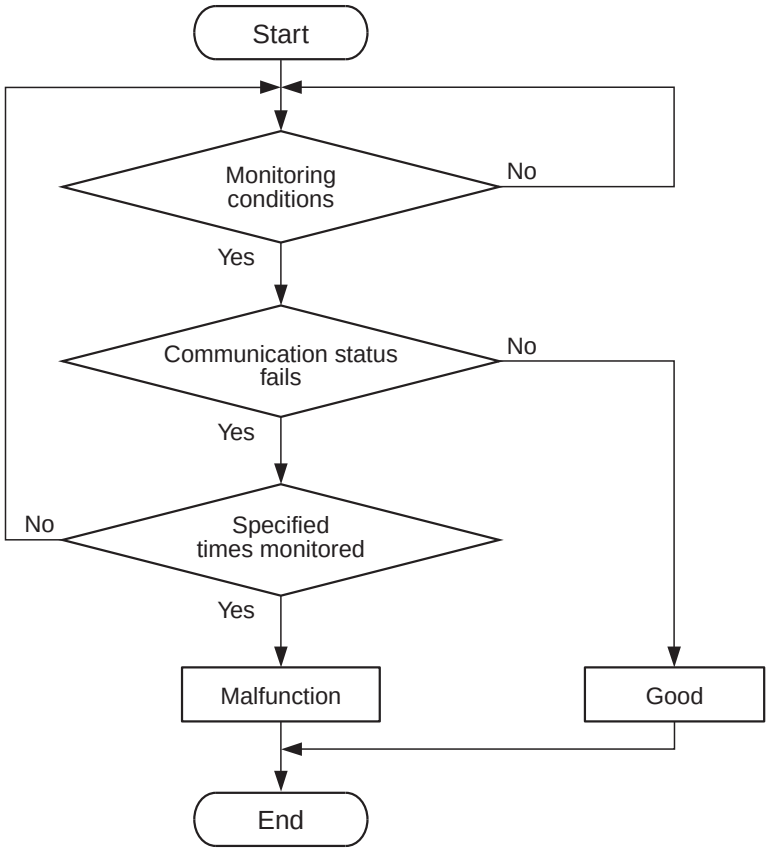
## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK704415

**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- The latest data that was flashed while the ignition switch was in "LOCK" (OFF) position are not stored correctly.

## FAIL-SAFE AND BACKUP FUNCTION
- None

## OBD-II DRIVE CYCLE PATTERN
None.

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

- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 P062F stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P0630: Vehicle Identification Number (VIN) Malfunction

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

The ECM checks whether the VIN is being entered or not.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

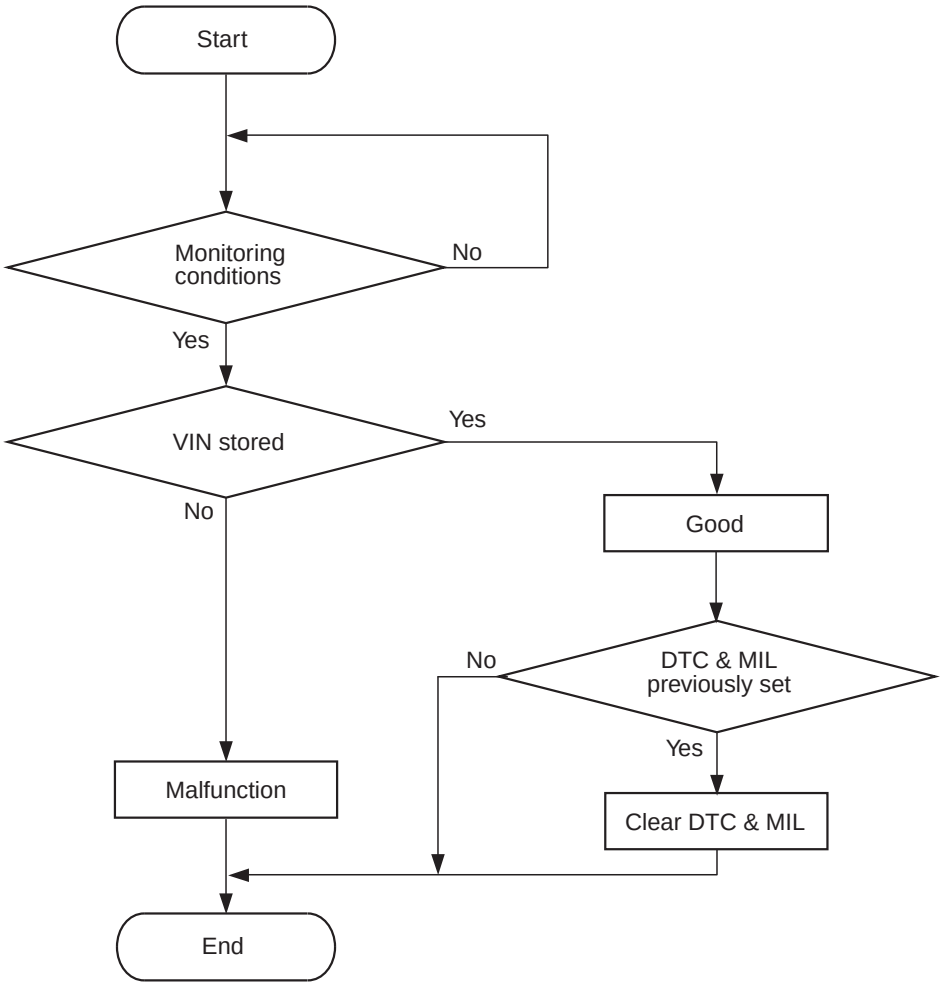
**Sensor (The sensor below is determined to be normal)**

- Not applicable

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## DTC SET CONDITIONS

### Logic Flow Chart




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**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- VIN (current) is not written.

## FAIL-SAFE AND BACKUP FUNCTION
- None

## OBD-II DRIVE CYCLE PATTERN
None.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long

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- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check VIN Information.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the coding mode for VIN Information.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 2.
**NO :** Write VIN. Then go to Step 3.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P0630 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P0630 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** The inspection is complete.

## DTC P0638: Throttle Actuator Control Motor Circuit Range/Performance

### THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE CIRCUIT

- Refer to DTC P2101 – Throttle Actuator Control Motor Magneto Malfunction P.13A-441.

### CIRCUIT OPERATION

- Refer to DTC P2101 – Throttle Actuator Control Motor Magneto Malfunction P.13A-441.

### TECHNICAL DESCRIPTION

- ECM checks the electronic-controlled throttle system for abnormal conditions.

### DESCRIPTIONS OF MONITOR METHODS

Difference between throttle position sensor (main) output and target opening is greater than the specified value.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

### DTC SET CONDITIONS

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is more than –0.04 volt.

**Judgment Criterion**

- The target throttle position sensor (main) voltage subtracted from the throttle position sensor (main) output voltage is more than 0.5 volt for 0.4 second.

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Target throttle position sensor (main) output voltage is less than 1.5 volts.

**Judgment Criterion**

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is more than 0.6 volt for 0.4 second.

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.

**Judgment Criterion**

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is more than 1 volt for 0.4 second.

**Check Condition**

- Battery positive voltage is more than 8.3 volts.

**Judgment Criterion**

- Throttle position sensor (main) default opening learnt value is more than 4 volts.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

### OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle valve return spring failed.
- Throttle valve operation failed.
- Throttle actuator control motor failed.
- Harness damage in throttle actuator control motor circuit or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector.
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal ETV+ line and ETV– line.

**Standard value: 0.3 – 100 Ω [at 20°C (68°C)]**

**Q: Is the measured resistance between 0.3 and 100 Ω [at 20°C (68°C)?**

**YES :** Go to Step 2.
**NO :** Replace the throttle body assembly. Then go to Step 5.

**STEP 2. Check of harness damage in ETV+ line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 3.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 3. Check of harness damage in ETV– line between electronic-controlled throttle valve connector and ECM connector B-26.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

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

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 5.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

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

## DTC P0642: Throttle Position Sensor Power Supply

### TECHNICAL DESCRIPTION

- ECM checks the throttle position sensor power voltage for abnormal conditions.

### DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor source voltage is smaller than the specified value.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

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## DTC SET CONDITIONS

**Check Condition**

- Battery positive voltage is more than 6.3 volts.

**Judgment Criterion**

- Throttle position sensor power voltage is less than 4.3 volts for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is DTC P0642 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P0657: Throttle Actuator Control Motor Relay Circuit Malfunction

## CIRCUIT OPERATION

- Battery positive voltage is applied to the throttle actuator control motor relay terminal.
- Battery positive voltage is applied to the throttle actuator control motor relay terminal from the MFI relay terminal.

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- ECM terminal C/RL applies current to the throttle actuator control motor relay coil by turning ON the power transistor in the unit in order to turn the relay ON.
- When the throttle actuator control motor relay turns ON, battery positive voltage is supplied by the throttle actuator control motor relay to the ECM terminal RSB.

## TECHNICAL DESCRIPTION

- When the ignition switch ON signal is input into the ECM, the ECM turns ON the throttle actuator control motor relay.

## DESCRIPTIONS OF MONITOR METHODS

Throttle actuator control motor relay circuit voltage is smaller than the specified value.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

**Check Condition**

- Battery positive voltage is more than 8.3 volts.

**Judgment Criterion**

- The power line voltage of the electronic-controlled throttle valve system is less than 6.0 volts for 0.35 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle actuator control motor relay failed.
- Open or shorted throttle actuator control motor relay circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the throttle actuator control motor relay.**

Refer to Throttle Actuator Control Motor Relay Continuity Check P.13A-645.

**Q: Is the throttle actuator control motor relay normal?**

**YES :** Go to Step 2.

**NO :** Replace the throttle actuator control motor relay. Then go to Step 11.

**STEP 2. Measure the power supply voltage at throttle actuator control motor relay harness side connector.**

(1) Disconnect the throttle actuator control motor relay connector and measure at the harness side.
(2) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 3.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in battery line between battery and throttle actuator control motor relay connector. Then go to Step 11.

**STEP 3. Measure the power supply voltage at throttle actuator control motor relay harness side connector.**

(1) Disconnect the throttle actuator control motor relay connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal coil power supply line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in coil power supply line between MFI relay connector and throttle actuator control motor relay connector. Then go to Step 11.

**STEP 4. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Short-circuit the terminal C/R line of the ECM harness connector to the ground.
(3) Measure the voltage between terminal C/RL line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 5.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in C/RL line between throttle actuator control motor relay connector and ECM connector. Then go to Step 11.

**STEP 5. Measure the power supply voltage at ECM harness side connector B-27.**

(1) Disconnect the connector and measure at the harness side.
(2) Short-circuit the terminals C/R line and C/RL line of the ECM harness connector to the ground.
(3) Measure the voltage between terminal RSB line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 8.
**NO :** Go to Step 6.

**STEP 6. Check of open circuit and short circuit to ground in RSB line between throttle actuator control motor relay connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Repair it. Then go to Step 11.

**STEP 7. Check of harness damage in coil power supply line between MFI relay connector and throttle actuator control motor relay connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit in C/RL line between throttle actuator control motor relay connector and ECM connector. Then go to Step 11.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 11.

**STEP 8. Check of harness damage in battery line between battery and throttle actuator control motor relay connector.**

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

**YES :** Go to Step 9.
**NO :** Repair it. Then go to Step 11.

**STEP 9. Check of harness damage in RSB line between throttle actuator control motor relay connector and ECM connector.**

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

**YES :** Go to Step 10.
**NO :** Repair it. Then go to Step 11.

**STEP 10. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0657 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 11.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 11. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0657 stored?**

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

## DTC P1231: Active Stability Control Plausibility

### TECHNICAL DESCRIPTION

- Checks for an abnormal signal of active stability control (ASC) via the CAN communication.

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- A torque demand signal from the active stability control is not normal.

### FAIL-SAFE AND BACKUP FUNCTION

- Torque requested by active stability control (ASC) is ignored.

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

- Active stability control system failed.
- ECM failed.

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## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the ASC-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is ASC-DTC stored?**

**YES :** Refer to GROUP 35C, Diagnosis – Diagnostic Trouble Code Chart P.35C-16.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1231 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1231 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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**DTC P1238: Mass Airflow Sensor Plausibility (torque monitor)**

## TECHNICAL DESCRIPTION

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main or sub) signal.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

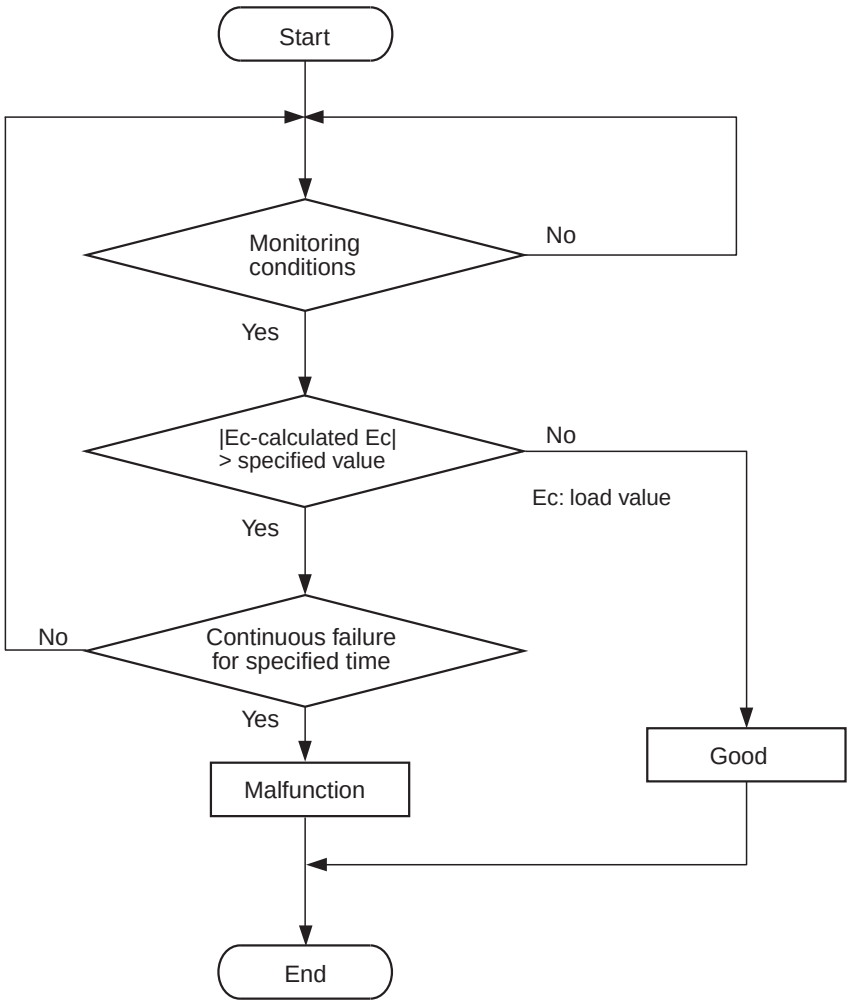
**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**

- Not applicable

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

- Not applicable

## DTC SET CONDITIONS




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**Check Conditions**
- The volumetric efficiency estimated by the throttle position sensor (main) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- Engine speed is more than 750 r/min.

**Judgment Criterion**
- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is more than 35 percent.

**Check Conditions**
- The volumetric efficiency estimated by the throttle position sensor (sub) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- Engine speed is more than 750 r/min.

**Judgment Criterion**
- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is more than 35 percent.

## FAIL-SAFE AND BACKUP FUNCTION
- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN
Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 16 P.13A-10.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Mass airflow sensor system failed.
- Intake system vacuum leak.
- ECM failed.

## DIAGNOSIS
**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1238 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), check data list item 10: Mass Airflow Sensor.**

(1) Start the engine and run at idle.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 10, Mass Airflow Sensor.
(3) Warm up the engine to normal operating temperature: 80°C to 95°C (176°F to 203°F).
- The standard value during idling should be between 760 and 1,080 millivolts.
- When the engine is revved, the output voltage should increase according to the increase in engine speed.

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

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

**YES :** Go to Step 4.
**NO :** Refer to, DTC P0102 – Mass Airflow Circuit Low Input P.13A-89, DTC P0103 – Mass Airflow Circuit High Input P.13A-94.

**STEP 4. Check the trouble symptoms.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 16 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1238 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 5.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle Pattern 16 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1238 stored?**

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

## DTC P1240: Ignition Angle

### TECHNICAL DESCRIPTION

Checks for an abnormal ignition timing retard angle demand signal from the active stability control (ASC).

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- The ignition timing retard angle demand signal is not normal.

### FAIL-SAFE AND BACKUP FUNCTION

- Ignition retard is not carried out.

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

- ASC system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the ASC-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ASC-DTC stored?**

**YES :** Refer to GROUP 35C, Diagnosis – Diagnostic Trouble Code Chart P.35C-16.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1240 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 3.

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**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1240 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P1242: Fail Safe Control Monitor

### TECHNICAL DESCRIPTION

Monitors the engine speed during fail-safe control.

### DTC SET CONDITIONS

**Check Condition**

- During fail safe control.

**Judgment Criterion**

- The engine speed is more than assumed.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

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

- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1242 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1242 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P1243: Inquiry/Response Error

### TECHNICAL DESCRIPTION

Monitors the computation function of the ECM.

### DTC SET CONDITIONS

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- ECM can not calculate input data.

### FAIL-SAFE AND BACKUP FUNCTION

- Microcomputer is reset.

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

- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)

**TSB Revision**

- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P1243 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P1247: CVT Plausibility <CVT>

### TECHNICAL DESCRIPTION
Checks for an abnormal signal of TCM.

### DTC SET CONDITIONS

**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- A torque demand signal from TCM is not normal.

### FAIL-SAFE AND BACKUP FUNCTION
- Torque requested by TCM is ignored.

### TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- CVT system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the CVT-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is CVT-DTC stored?**

**YES :** Refer to GROUP 23A, Diagnosis – Diagnostic Trouble Code Chart P.23A-16.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1247 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1247 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

## DTC P1506: Idle Control System RPM Lower Than Expected at Low Temperature

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Difference between actual and target idle speed is over the specified value.

### MONITOR EXECUTION

Continuous

**TSB Revision**

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

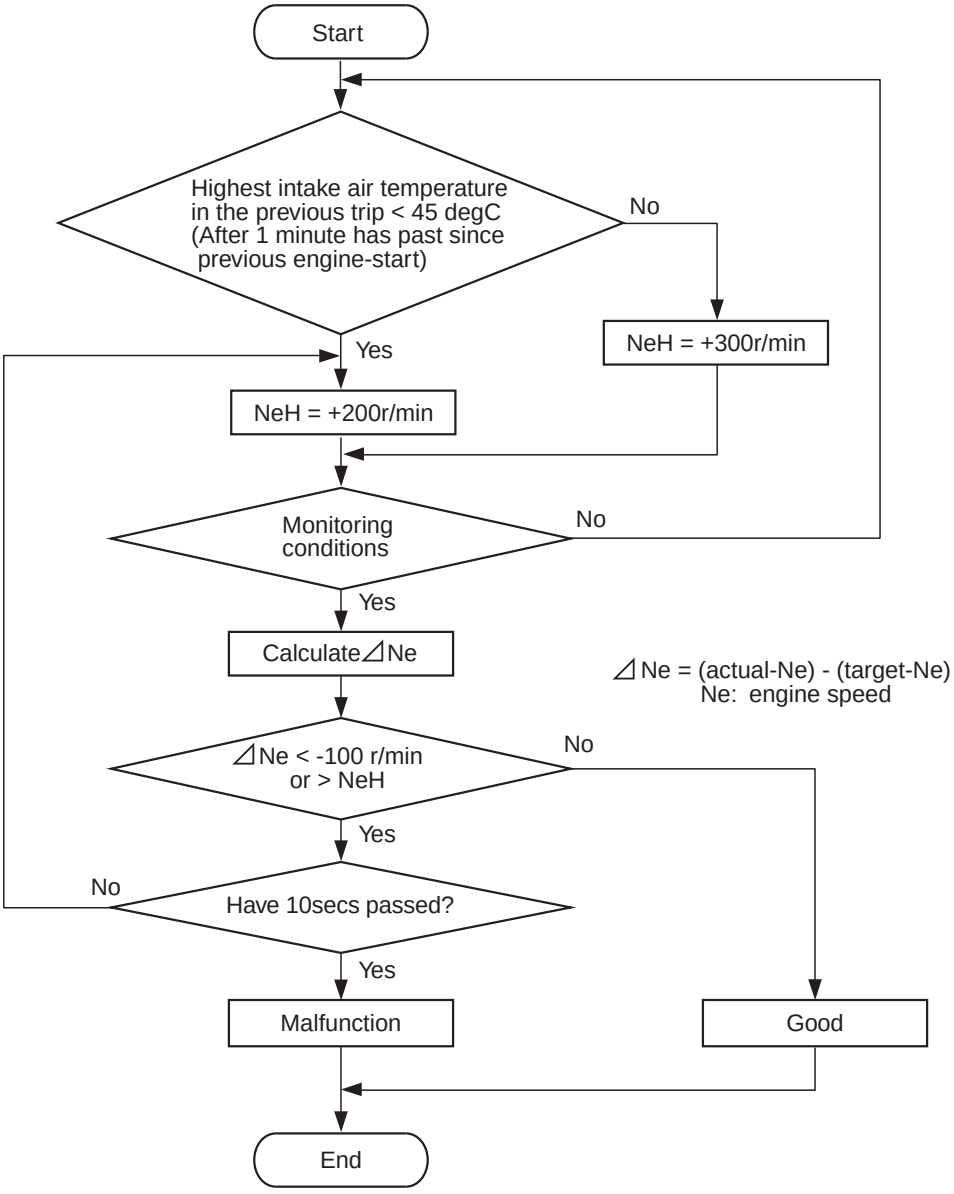
- Misfire monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

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

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

## DTC SET CONDITIONS

### Logic Flow Chart




ACC07175

**Check Conditions**

- Under the closed loop idle speed control.
- The engine coolant temperature is between 7°C (45°F) and 41°C (106°F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than –10°C (14°F).

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- More than 3 seconds have passed from the end of the previous monitoring.
- Target air flow rate is more than 11 g /sec (9 L/sec).

**Judgment Criterion**

- The actual idle speed is less than the target idle speed by 100 r/min or more for 10 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1506 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**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-638. Then go to Step 4.
**NO :** Go to Step 3.

**STEP 3. Replace the throttle body assembly.**
(1) Replace the throttle body assembly.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1506 stored?**
**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

**STEP 4. Test the OBD-II drive cycle.**
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1506 stored?**
**YES :** Retry the troubleshooting.
**NO :** The inspection is complete.

## DTC P1507: Idle Control System RPM Higher Than Expected at Low Temperature

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

### DESCRIPTIONS OF MONITOR METHODS
Difference between actual and target idle speed is over the specified value.

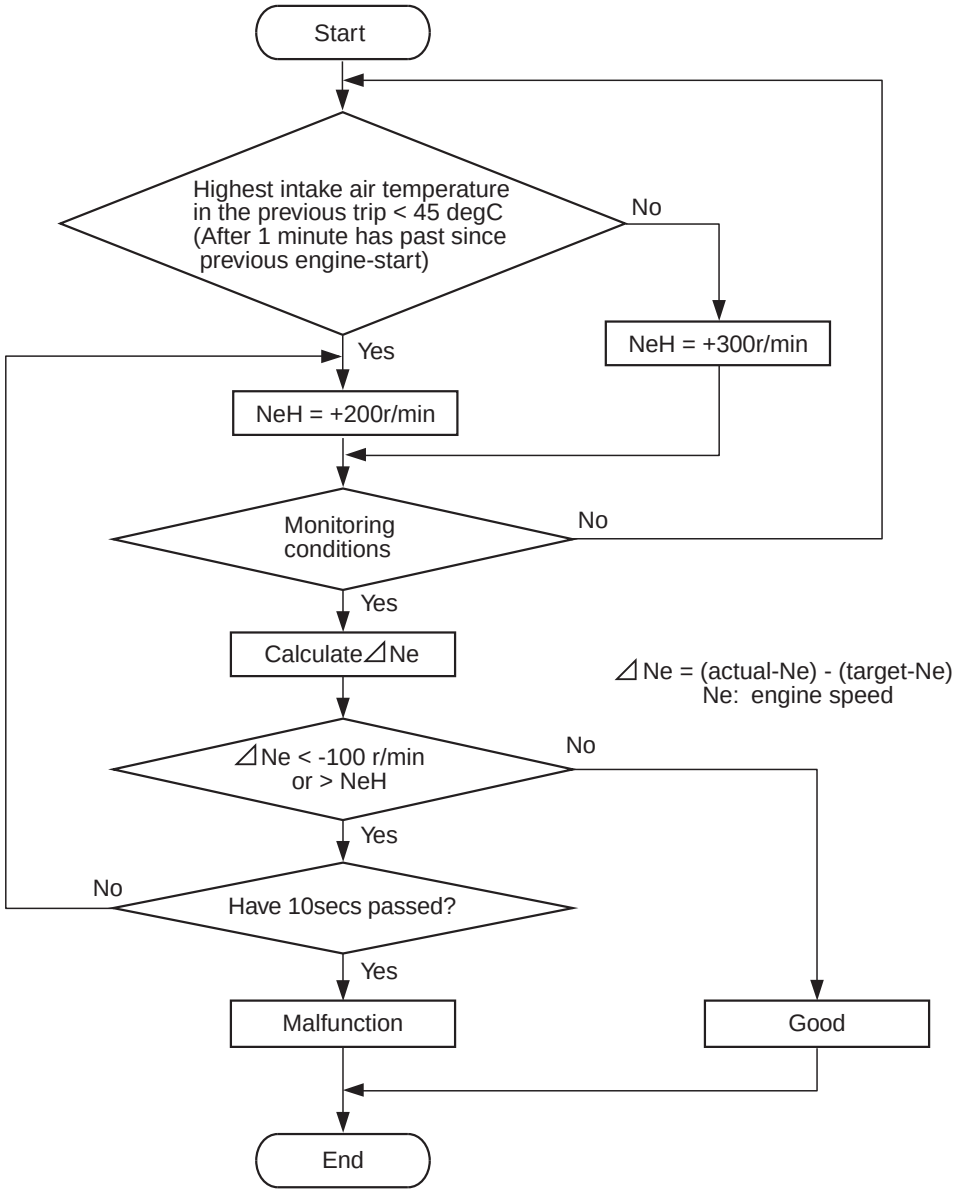
### MONITOR EXECUTION
Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)
**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Misfire monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

## DTC SET CONDITIONS

### Logic Flow Chart




ACC07175

**Check Conditions**

- Under the closed loop idle speed control.
- Engine coolant temperature is between 7°C (45°F) and 41°C (106°F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than −10°C (14°F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target air flow rate is 0 g/sec (0 L/sec).

**Judgment Criterion**

- The actual idle speed is more than the target idle speed by 203 r/min (305 r/min*) or more for 10 seconds.
  *: Specs in parentheses are applicable if the maximum intake air temperature during the previous operation was more than 45°C (113°F).

## FAIL-SAFE AND BACKUP FUNCTION

- None

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## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.

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

- Intake system vacuum leak.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P1507 stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 4.
**NO :** Go to Step 3.

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

(1) Replace the throttle body assembly.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1507 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

**TSB Revision**

**STEP 4. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 18 P.13A-10.

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

**Q: Is DTC P1507 stored?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC P1590: TCM to ECM Communication Error in Torque Reduction Request <CVT>

### TECHNICAL DESCRIPTIONS OF MONITOR METHODS

The ECM checks whether the errors in data communications sent by the TCM exist or not.

### MONITOR EXECUTION

Continuous

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

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

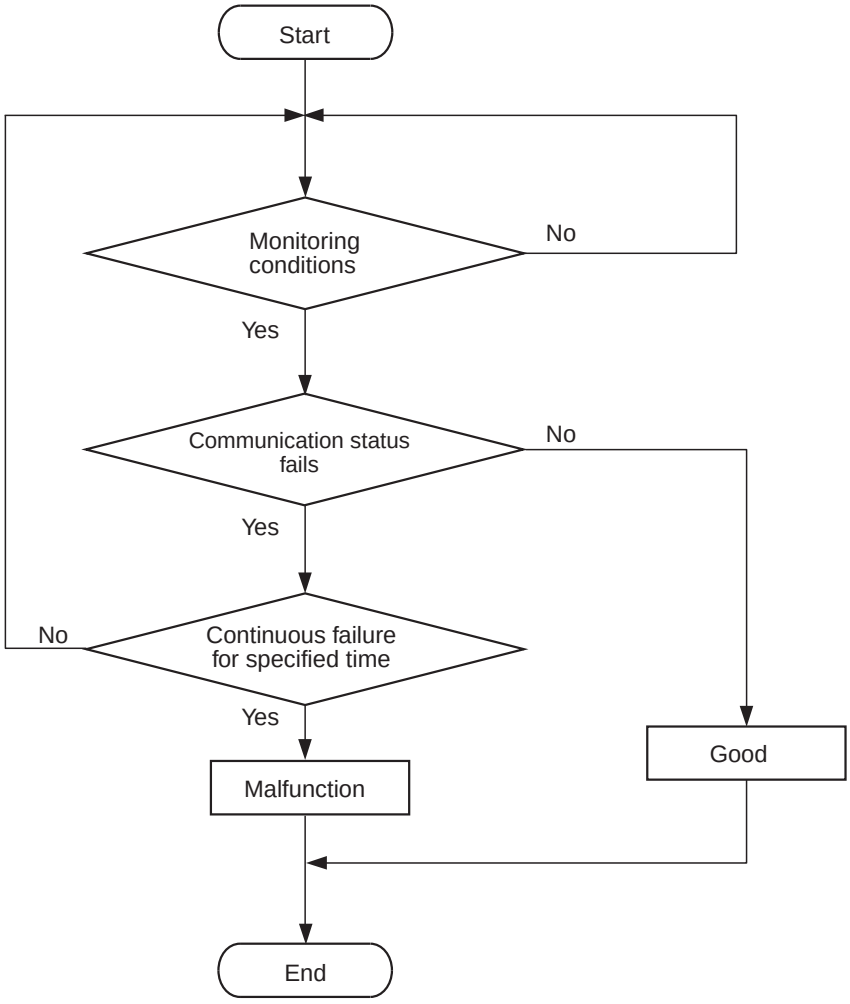
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604369

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- ECM detects an error in communication between ECM and TCM.

## FAIL-SAFE AND BACKUP FUNCTION

- Engine output is restricted.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- CAN line harness damage or connector damage.
- ECM failed.

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 3.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1590 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 3.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1590 stored?**

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

**TSB Revision**

**DTC P1603: Battery Backup Circuit Malfunction**

## TECHNICAL DESCRIPTION

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

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

## DESCRIPTIONS OF MONITOR METHODS

Battery backup line voltage is under specified value.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

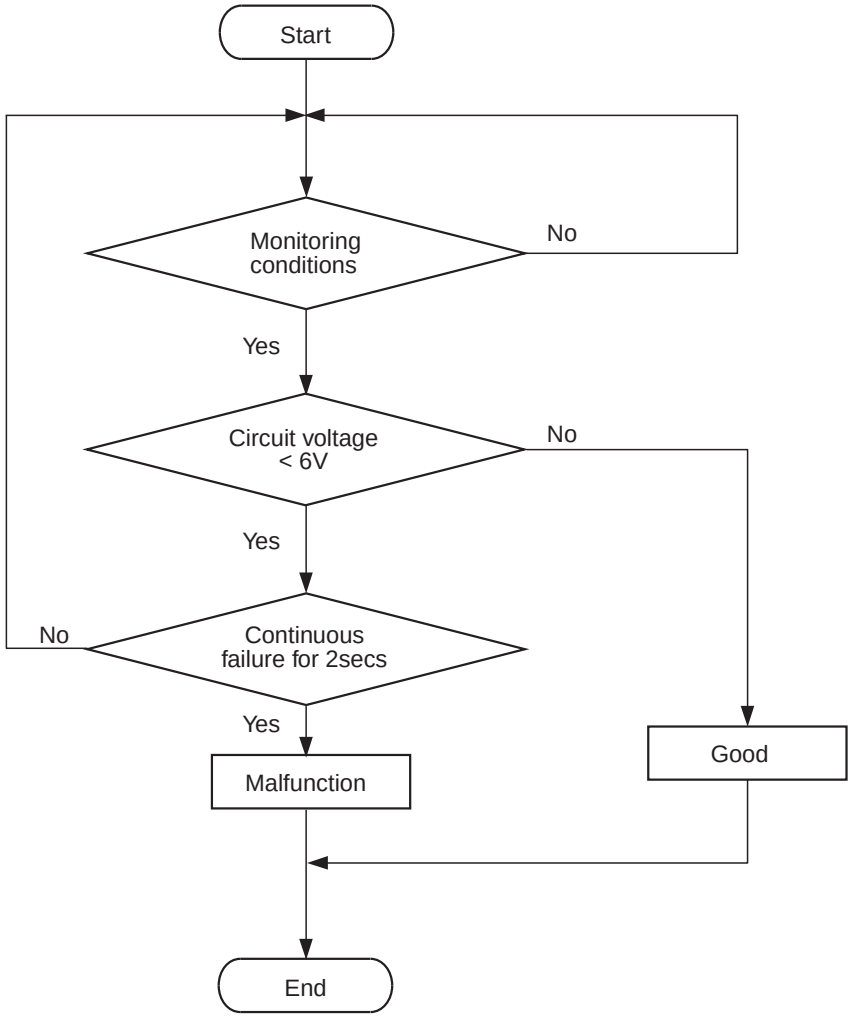
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604357

**Check Conditions**

- Engine starting sequence was completed.
- Battery positive voltage is more than 10 volts.

**Judgment Criterion**

- Battery backup line voltage is less than 6 volts for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- All diagnostic trouble codes are stored once failure judgment is completed.

## OBD-II DRIVE CYCLE PATTERN

None.

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

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

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**YES :** Go to Step 2.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 2. Measure the power supply voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Measure the voltage between terminal BACK line and ground by backprobing.
  - Voltage should be battery positive voltage.

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** Go to Step 3.

**STEP 3. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Measure the voltage between terminal BACK line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Repair or replace the connector(s), or check and repair the harness of damage in BACK line between battery and ECM connector. Then go to Step 4.

**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in BACK line between battery and ECM connector. Then go to Step 4.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1603 stored?**

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

## DTC P2096: Post Catalyst Fuel Trim System too Lean (bank 1)

### TECHNICAL DESCRIPTION

- The ECM effects right bank air/fuel ratio feedback control in accordance with the signals from the right bank linear air-fuel ratio sensor.
- If the right bank linear air-fuel ratio sensor has deteriorated, corrections will be made by the right bank heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS

- When an abnormality exists in the right bank linear air-fuel ratio sensor, the amount of compensated fuel injection is abnormal. When this situation continues, it is judged to be faulty.
- If an abnormality exists in the right bank heated oxygen sensor (rear), also it is judged to be faulty even though the right bank linear air-fuel ratio sensor is normal.

### MONITOR EXECUTION

Continuous

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

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

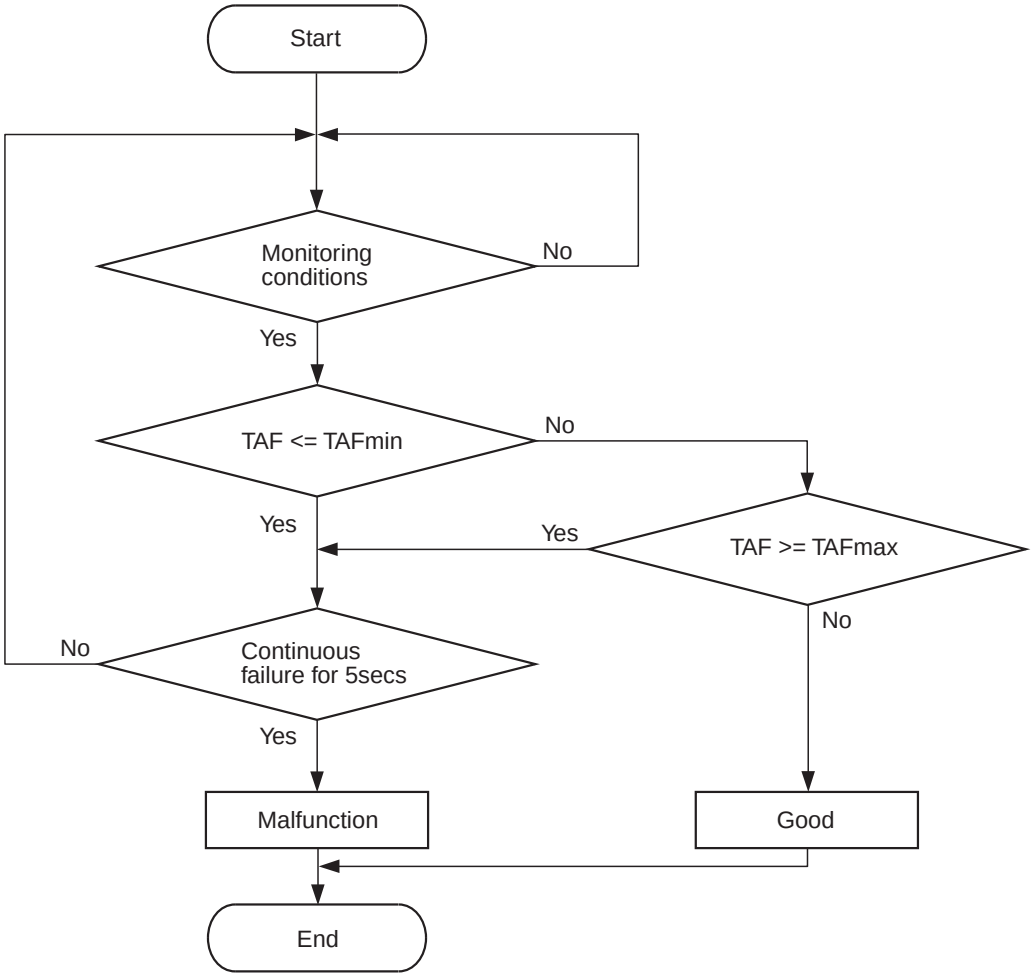
- Linear air-fuel ratio sensor monitor
- Heated oxygen sensor (rear) monitor
- Linear air-fuel ratio sensor heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor

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

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

## DTC SET CONDITIONS

### Logic Flow Chart




TAF: Fuel trim based on heated oxygen sensor (rear)
TAFmin: Minimum limit of TAF
TAFmax: Maximum limit of TAF

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**Check Conditions**

- Engine coolant temperature is more than 76°C (169°F).
- The closed loop air/fuel control continues for more than 15 seconds.
- More than 128 seconds have passed since the engine starting sequence was completed.
- Mass airflow sensor output is more than 8 g/sec.
- After the engine start, the accumulated time where the four conditions mentioned above are satisfied is more than 60 seconds.

**Judgment Criterion**

- The amount of compensated rich air/fuel ratio is output by the right bank heated oxygen sensor (rear). The status that the amount of compensated rich air/fuel ratio is greater than the specified amount continues for 5 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

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## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.

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

- Right bank linear air-fuel ratio sensor failed.
- Right bank heated oxygen sensor (rear) failed.
- Injector failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P2096 stored?**

**YES :** Refer to Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Replace the right bank linear air-fuel ratio sensor.**

(1) Replace the right bank linear air-fuel ratio sensor.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 stored?**

**YES :** Go to Step 3.
**NO :** The inspection is complete.

**STEP 3. Replace the right bank heated oxygen sensor (rear).**

(1) Replace the right bank heated oxygen sensor (rear).
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 stored?**

**YES :** Go to Step 4.
**NO :** The inspection is complete.

**STEP 4. Replace the right bank injector.**

(1) Replace the right bank injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 stored?**

**YES :** Replace the ECM (Refer to Removal and Installation P.13A-656).
**NO :** The inspection is complete.

## DTC P2097: Post Catalyst Fuel Trim System too Rich (bank 1)

### TECHNICAL DESCRIPTION

- The ECM effects right bank air/fuel ratio feedback control in accordance with the signals from the linear air-fuel ratio sensor.
- If the right bank linear air-fuel ratio sensor has deteriorated, corrections will be made by the right bank heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS

- When an abnormality exists in the linear air-fuel ratio sensor, the amount of compensated fuel injection is abnormal. When this situation continues, it is judged to be faulty.
- If an abnormality exists in the right bank heated oxygen sensor (rear), also it is judged to be faulty even though the right bank linear air-fuel ratio sensor is normal.

### MONITOR EXECUTION

Continuous

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

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

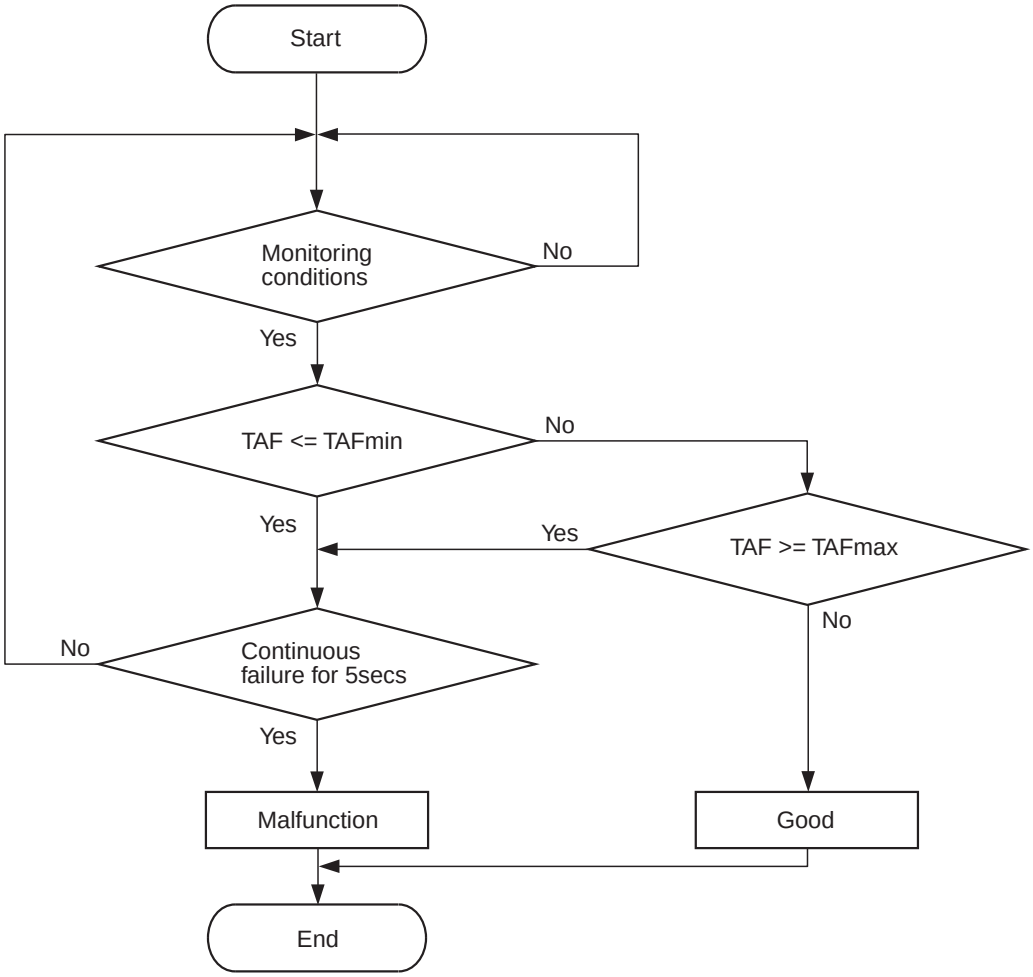
- Linear air-fuel ratio sensor monitor
- Heated oxygen sensor (rear) monitor
- Linear air-fuel ratio sensor heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor

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

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

## DTC SET CONDITIONS

### Logic Flow Chart




TAF: Fuel trim based on heated oxygen sensor (rear)
TAFmin: Minimum limit of TAF
TAFmax: Maximum limit of TAF

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**Check Conditions**

- Engine coolant temperature is more than 76°C (169°F).
- The closed loop air/fuel control continues for more than 15 seconds.
- More than 128 seconds have passed since the engine starting sequence was completed.
- Mass airflow sensor output is more than 8 g/sec.
- After the engine start, the accumulated time where the four conditions mentioned above are satisfied is more than 60 seconds.

**Judgment Criterion**

- The amount of compensated lean air/fuel ratio is output by the right bank heated oxygen sensor (rear). The status that the amount of compensated lean air/fuel ratio is greater than the specified amount continues for 5 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

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## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.

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

- Right bank linear air-fuel ratio sensor failed.
- Right bank heated oxygen sensor (rear) failed.
- Injector failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P2096 stored?**

**YES :** Refer to Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Replace the right bank linear air-fuel ratio sensor.**

(1) Replace the right bank linear air-fuel ratio sensor.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 stored?**

**YES :** Go to Step 3.
**NO :** The inspection is complete.

**STEP 3. Replace the right bank heated oxygen sensor (rear).**

(1) Replace the right bank heated oxygen sensor (rear).
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 stored?**

**YES :** Go to Step 4.
**NO :** The inspection is complete.

**STEP 4. Replace the right bank injector.**

(1) Replace the right bank injector.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 1 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 stored?**

**YES :** Replace the ECM (Refer to Removal and Installation P.13A-656).
**NO :** The inspection is complete.

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

### CIRCUIT OPERATION

- Controls the current that is applied from the ECM (terminals ETV+, ETV–) to the throttle actuator control motor terminals.

### TECHNICAL DESCRIPTION

- ECM varies the direction and the amperage of the current that is applied to the throttle actuator control motor in order to control the opening of the throttle valve.

### DESCRIPTIONS OF MONITOR METHODS

The voltage difference between the throttle position sensor output voltage and the throttle position sensor output at the throttle actuator control motor relay off is smaller than the specified value.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

### DTC SET CONDITIONS

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- The target throttle position sensor (main) voltage subtracted from the throttle position sensor (main) output voltage is more than 0.1 volt.
- The target throttle position sensor (sub) voltage subtracted from the throttle position sensor (sub) output voltage is more than 0.1 volt.
- The drive duty of the throttle actuator control motor is more than 100 percent.
- Except while during cranking.

or

- Battery positive voltage is more than 8.3 volts.

- The throttle position sensor (main) output voltage subtracted from the target throttle position sensor (main) voltage is more than 0.1 volt.
- The throttle position sensor (sub) output voltage subtracted from the target throttle position sensor (sub) voltage is more than 0.1 volt.
- The drive duty of the throttle actuator control motor is more than 100 percent.
- Except while during cranking.

**Judgment Criterion**

- For 0.4 second, the difference between the output voltage of throttle position sensor (main) and the learning value of the middle-opened degree is less than 0.2 volt.

or

- For 0.4 second, the difference between the output voltage of throttle position sensor (sub) and the learning value of the middle-opened degree is less than 0.2 volt.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle actuator control motor failed.
- Open throttle actuator control motor circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector.
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal ETV+ line and ETV– line.

**Standard value: 0.3 – 100 Ω [at 20°C (68°C)]**

**Q: Is the measured resistance between 0.3 and 100 Ω [at 20°C (68°C)?**

**YES :** Go to Step 2.
**NO :** Replace the throttle body assembly. Then go to Step 6.

**STEP 2. Check the continuity at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Check for the continuity between terminal RSG line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 3.
**NO :** Repair or replace the connector(s), or check and repair the harness of damage in RSG line between ECM connector and ground. Then go to Step 6.

**STEP 3. Check of open circuit and harness damage in ETV+ line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 6.

**STEP 4. Check of open circuit and harness damage in ETV– line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 6.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**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 ECM (terminals ETV+, ETV−) to the throttle actuator control motor terminals.

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Throttle actuator control motor intelligent power device detects shorted-high/low and overheat of itself.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

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

- Not applicable

### DTC SET CONDITIONS

**Check Condition**

- Battery positive voltage is more than 8.3 volts.

**Judgment Criterion**

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

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

### OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle actuator control motor failed.
- Shorted throttle actuator control motor circuit or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector.
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal ETV+ line and ETV– line.

**Standard value: 0.3 – 100 Ω [at 20°C (68°C)]**

**Q: Is the measured resistance between 0.3 and 100 Ω [at 20°C (68°C)?**

**YES :** Go to Step 2.
**NO :** Replace the throttle body assembly. Then go to Step 5.

**STEP 2. Check of short circuit to ground in ETV+ line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 3.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 3. Check for short circuit to ground in ETV– line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 5.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 stored?**

**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 from the ECM terminal APS5.
- A voltage that is according to the accelerator opening angle is sent to the ECM terminal APSM from the accelerator pedal position sensor (main) output terminal.
- The accelerator pedal position sensor ground terminal is grounded with ECM terminal APSE.

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Accelerator pedal position sensor (main) output voltage is out of specified range.

### MONITOR EXECUTION

Continuous

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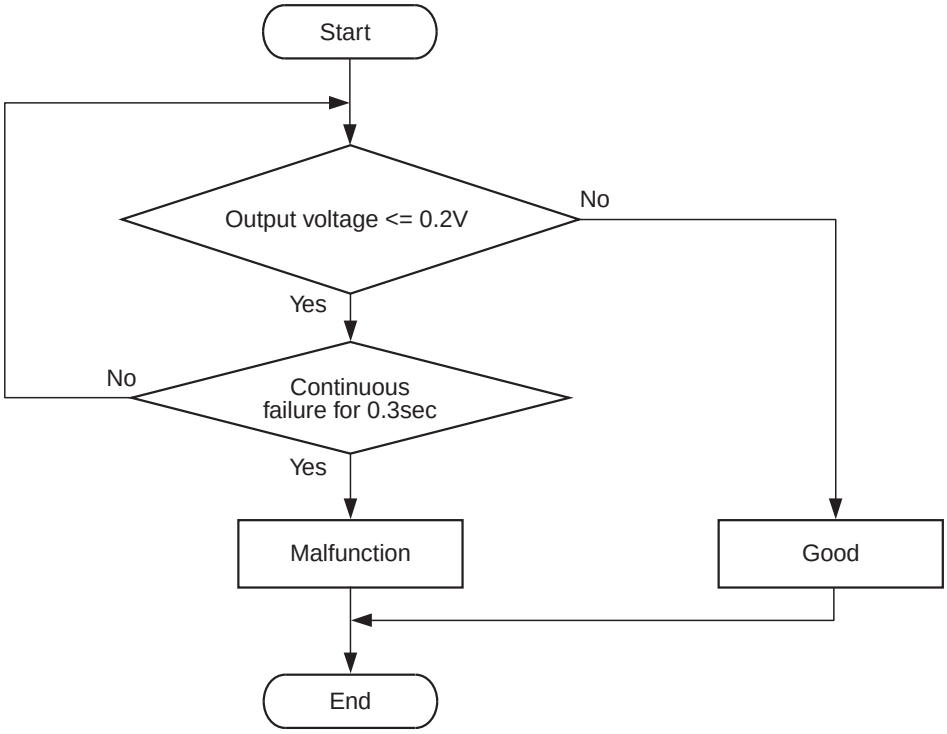
## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




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**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- Accelerator pedal position sensor (main) output voltage is less than 0.2 volt for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION
- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

## OBD-II DRIVE CYCLE PATTERN
None.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Accelerator pedal position sensor failed.
- Open or shorted accelerator pedal position sensor (main) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A

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- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector.**

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal APS5 line 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 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and short circuit to ground in APS5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 4. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
- Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 8.

**STEP 5. Check of harness damage in APS5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 6.
**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 6. Check of open circuit, short circuit to ground and harness damage in APSM line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 7. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2122 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 8.
**NO :** The inspection is complete.

**STEP 8. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2122 stored?**

**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 from the ECM terminal APS5.
- A voltage that is according to the accelerator opening angle is sent to the ECM terminal APSM from the accelerator pedal position sensor (main) output terminal.
- The accelerator pedal position sensor ground terminal is grounded with ECM terminal APSE.

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Accelerator pedal position sensor (main) output voltage is out of specified range.

### MONITOR EXECUTION

Continuous

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

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

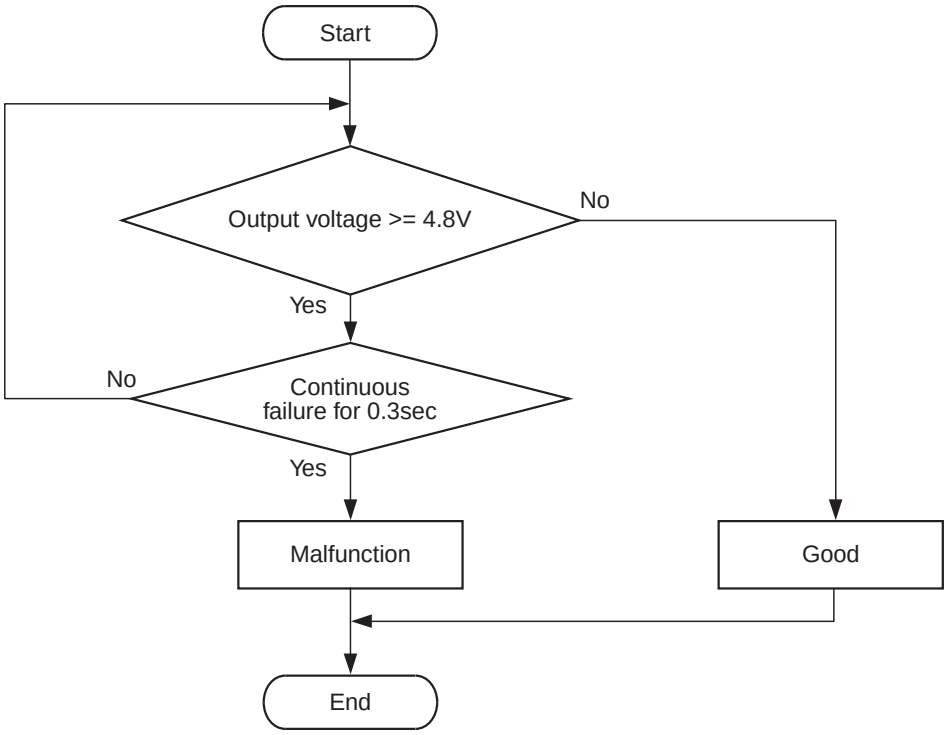
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604360

**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- Accelerator pedal position sensor (main) output voltage is more than 4.8 volts for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION
- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

## OBD-II DRIVE CYCLE PATTERN
None.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Accelerator pedal position sensor failed.
- Open accelerator pedal position sensor (main) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

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**STEP 1. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
- Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

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

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Check for the continuity between terminal APSE line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and harness damage in APSE line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Replace the engine coolant temperature sensor. Then go to Step 6.

**STEP 4. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
- Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
- Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.

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

**Q: Is the sensor operating properly?**
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.

**STEP 5. Replace the accelerator pedal assembly.**
(1) Replace the accelerator pedal assembly.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2123 stored?**
**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** The inspection is complete.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2123 stored?**
**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 from the ECM terminal AP5.
- A voltage that is according to the accelerator opening angle is sent to the ECM terminal APSS from the accelerator pedal position sensor (sub) output terminal (terminal No. 6).
- The ground terminal (terminal No. 5) is grounded with ECM terminal APSE.

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

### DESCRIPTIONS OF MONITOR METHODS
Accelerator pedal position sensor (sub) output voltage is out of specified range.

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## MONITOR EXECUTION
Continuous

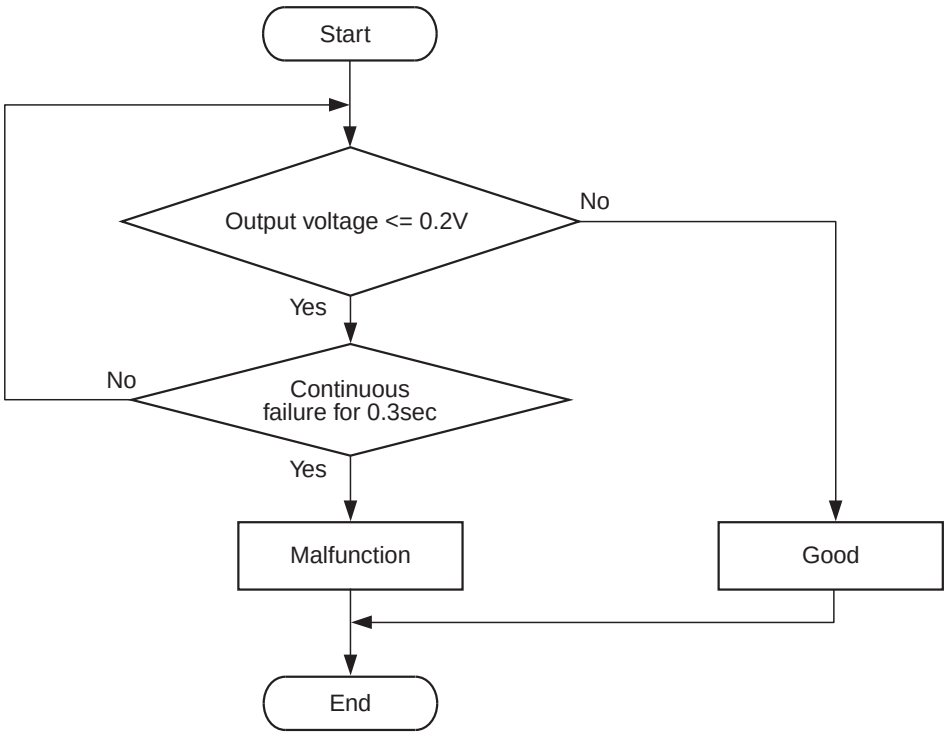
## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK800588

**Check Condition**
- Ignition switch is "ON" position.

**Judgment Criterion**
- Accelerator pedal position sensor (sub) output voltage is less than 0.2 volt for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION
- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (main) fails.

## OBD-II DRIVE CYCLE PATTERN
None.

## TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- Accelerator pedal position sensor failed.
- Open or shorted accelerator pedal position sensor (sub) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector.**

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal AP5 line 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 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and short circuit to ground in AP5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 4.

**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 4. Using scan tool (M.U.T.-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 8.

**STEP 5. Check of harness damage in AP5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 6.

**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 6. Check of open circuit, short circuit to ground and harness damage in APSS line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 7.

**NO :** Replace the engine coolant temperature sensor. Then go to Step 8.

**STEP 7. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2127 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 8.

**NO :** The inspection is complete.

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**STEP 8. Using scan tool (M.U.T-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2127 stored?**

**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 from the ECM terminal AP5.
- A voltage that is according to the accelerator opening angle is sent to the ECM terminal APSS from the accelerator pedal position sensor (sub) output terminal (terminal No. 6).
- The ground terminal (terminal No. 5) is grounded with ECM terminal APSE.

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Accelerator pedal position sensor (sub) output voltage is out of specified range.

### MONITOR EXECUTION

Continuous

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

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

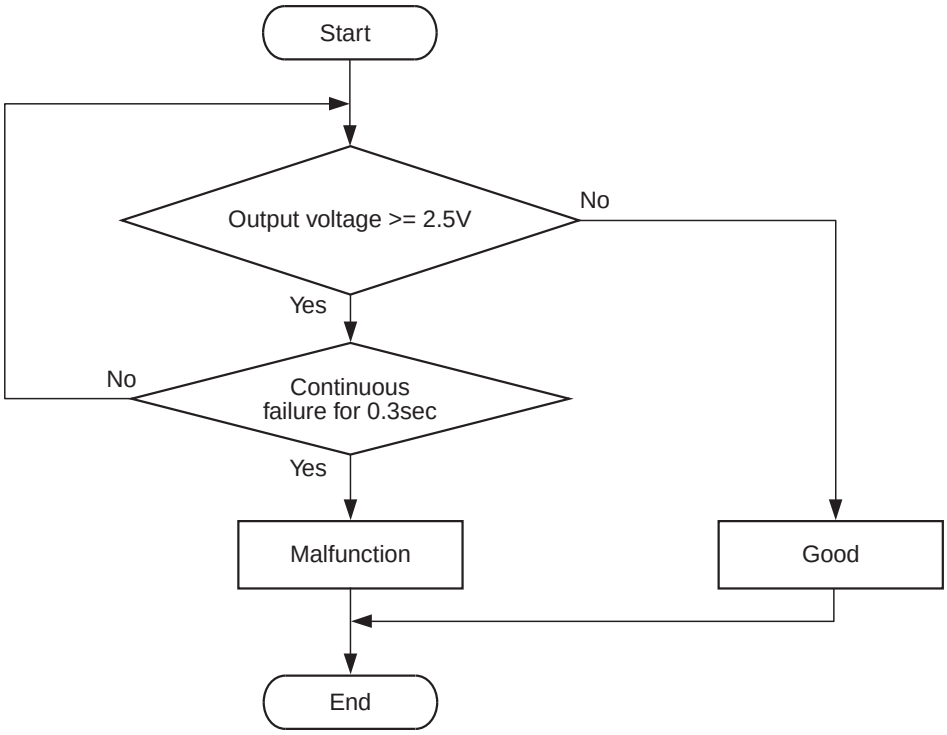
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604340

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- Accelerator pedal position sensor (sub) output voltage is more than 2.5 volts for 0.3 second.

## FAIL-SALE AND BACKUP FUNCTION

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (main) fails.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor failed.
- Open accelerator pedal position sensor (sub) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

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**STEP 1. Using scan tool (M.U.T-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

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

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Check for the continuity between terminal APE and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Check of open circuit and harness damage in APE line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair it. Then go to Step 6.

**STEP 4. Using scan tool (M.U.T-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.

**STEP 5. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2128 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** The inspection is complete.

**STEP 6. Using scan tool (M.U.T-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P2128 stored?**

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

## DTC P2135: Throttle Position Sensor (main and sub) Range/Performance Problem

### THROTTLE POSITION SENSOR (main and sub) RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P0122 – Throttle Position Sensor (main) Circuit Low Input P.13A-139.
- Refer to DTC P0222 – Throttle Position Sensor (sub) Circuit Low Input P.13A-213.

### CIRCUIT OPERATION

- Refer to DTC P0122 – Throttle Position Sensor (main) Circuit Low Input P.13A-139.
- Refer to DTC P0222 – Throttle Position Sensor (sub) Circuit Low Input P.13A-213.

### TECHNICAL DESCRIPTION

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

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## DESCRIPTIONS OF MONITOR METHODS

Detect malfunction if the relation between throttle position sensor (main) and throttle position sensor (sub) is wrong.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

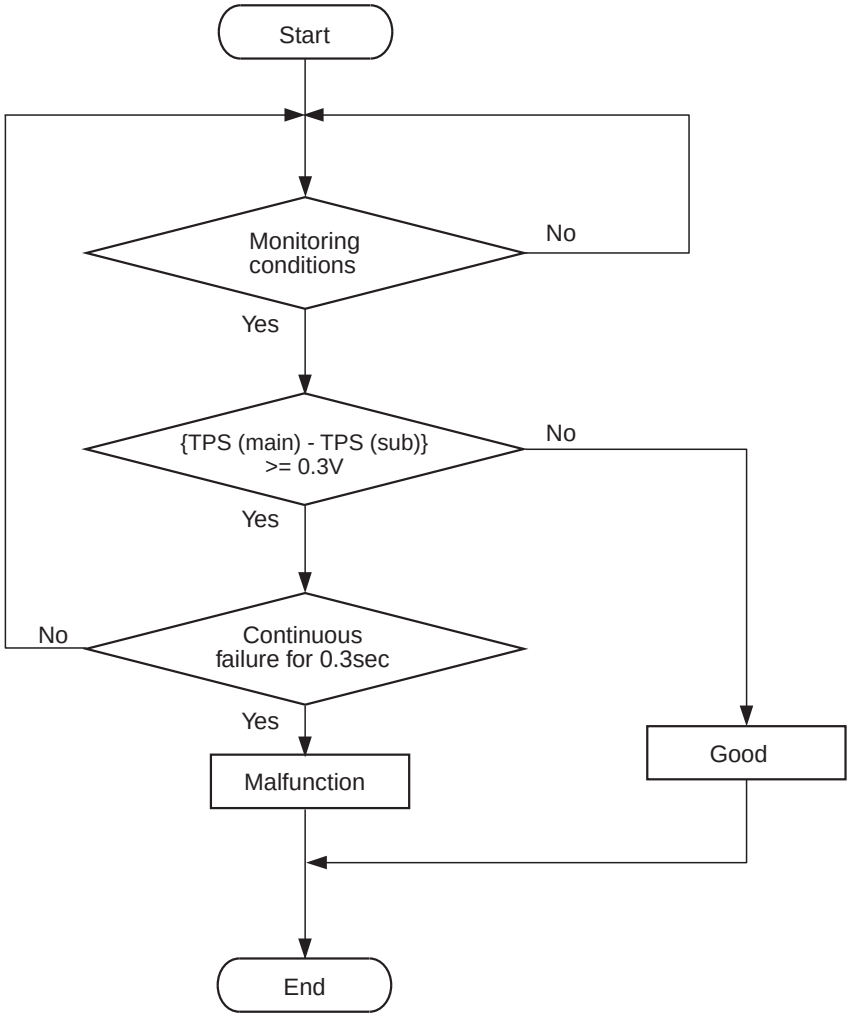
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS <Range/Performance problem-relation between main and sub>

### Logic Flow Chart




AK604361

**Check Conditions**

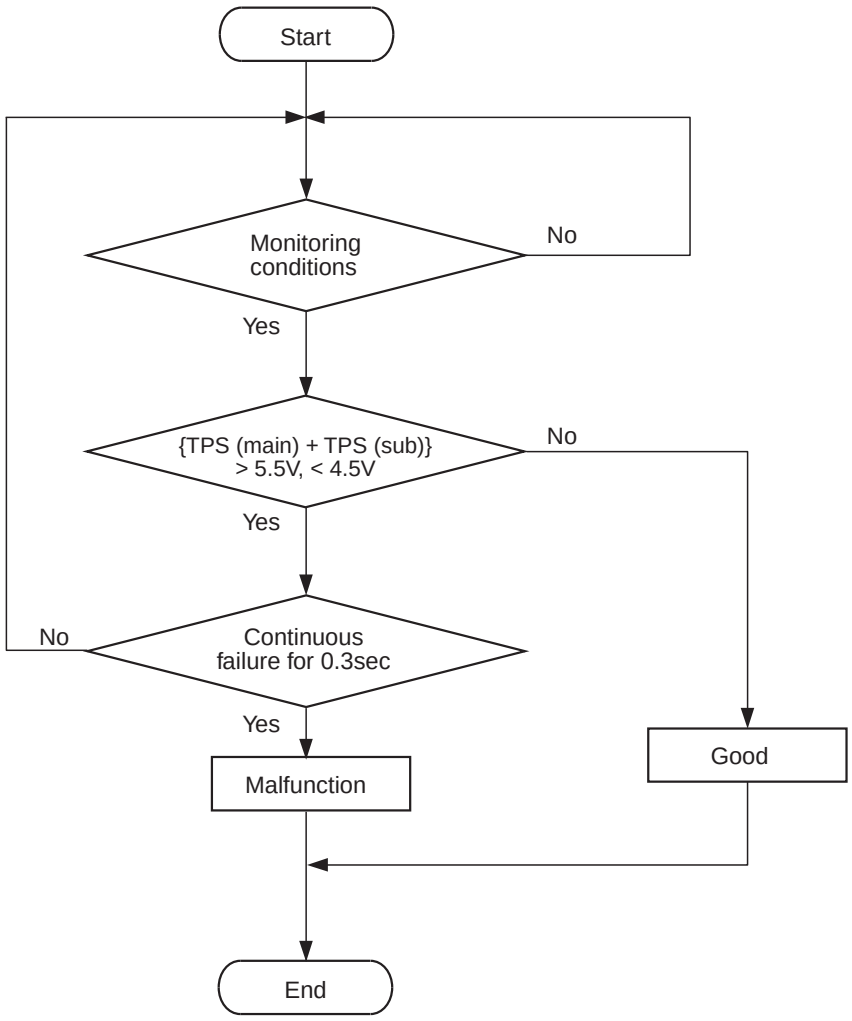
- The target output voltage of the throttle position sensor is less than 0.9 volt.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Throttle position sensor (sub) output voltage is between 0.2 and 4.8 volts.
- Battery positive voltage is more than 8.3 volts.

**Judgment Criterion**

- The difference between V1 and V2 is more than 0.3 volt for 0.3 second.
  V1: Throttle position sensor (main) output voltage
  V2: Throttle position sensor (sub) output voltage subtracted from 5 volts

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## Logic Flow Chart




AK604362

**Check Conditions**

- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Throttle position sensor (sub) output voltage is between 0.2 and 4.8 volts.

**Judgment Criterion**

- For 0.3 second, the sum of the output voltage of the throttle position sensors (main) and (sub) is less than 4.5 volts, or more than 5.5 volts.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle position sensor failed.
- Harness damage in throttle position sensor circuit or connector damage.
- ECM failed.

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## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)
- MB991658: Test Harness

**STEP 1. Using scan tool (M.U.T-III), check data list item 13: Throttle Position Sensor (main).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Detach the intake air hose at the throttle body.
(3) Disconnect the connector of the electronic-controlled throttle valve.
(4) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(5) Turn the ignition switch to the "ON" position.
(6) Set scan tool (M.U.T-III) to the data reading mode for item 13, Throttle Position Sensor (main).
  - Output voltage should be between 300 and 700 millivolts when the throttle valve is fully closed with your finger.
  - Output voltage should be between 4,000 and 4,800 millivolts when the throttle valve is fully open with your finger.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 2.
**NO :** Refer to, DTC P0122 – Throttle Position Sensor (main) Circuit Low Input P.13A-139, DTC P0123 – Throttle Position Sensor (main) Circuit High Input P.13A-143.

**STEP 2. Using scan tool (M.U.T-III), check data list item 15: Throttle Position Sensor (sub).**

(1) Detach the intake air hose at the throttle body.
(2) Disconnect the connector of the electronic-controlled throttle valve.
(3) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(4) Turn the ignition switch to the "ON" position.
(5) Set scan tool (M.U.T-III) to the data reading mode for item 15, Throttle Position Sensor (sub).
- Output voltage should be between 4,300 and 4,700 millivolts when the throttle valve is fully closed with your finger.
- Output voltage should be between 200 and 600 millivolts when the throttle valve is fully open with your finger.

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

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

**YES :** Go to Step 3.
**NO :** Refer to, DTC P0222 – Throttle Position Sensor (sub) Circuit Low Input P.13A-213, DTC P0223 – Throttle Position Sensor (sub) Circuit High Input P.13A-217.

**STEP 3. Check the continuity at electronic-controlled throttle valve harness side connector.**

(1) Disconnect the electronic-controlled throttle valve connector and measure at the harness side.
(2) Check for the continuity between terminal TPSE and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

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

**STEP 4. Check of harness damage in TPSE line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 5. Using scan tool (M.U.T-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Erase the DTC.
(3) Depress the accelerator pedal fully for a few seconds.
(4) Check the DTC.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2135 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 10.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Check of harness damage TPS5 line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 7. Check of harness damage in TPSM line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 8.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 8. Check of harness damage in TPSS line between electronic-controlled throttle valve connector and ECM connector.**

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

**YES :** Go to Step 9.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 10.

**STEP 9. Replace the throttle body assembly.**
(1) Replace the throttle body assembly.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTC.
(4) Depress the accelerator pedal fully for a few seconds.
(5) Check the DTC.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2135 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 10.
**NO :** The inspection is complete.

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**STEP 10. Using scan tool (M.U.T-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Erase the DTC.
(3) Depress the accelerator pedal fully for a few seconds.
(4) Check the DTC.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2135 stored?**

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

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

### ACCELERATOR PEDAL POSITION SENSOR (main and sub) RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P2122 – Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-443.
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-450.

### CIRCUIT OPERATION

- Refer to DTC P2122 – Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-443.
- Refer to DTC P2127 – Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-450.

### TECHNICAL DESCRIPTION

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

### DESCRIPTIONS OF MONITOR METHODS

Detect malfunction if the relation between accelerator pedal position sensor (main) and accelerator pedal position sensor (sub) is wrong.

### MONITOR EXECUTION

Continuous

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

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

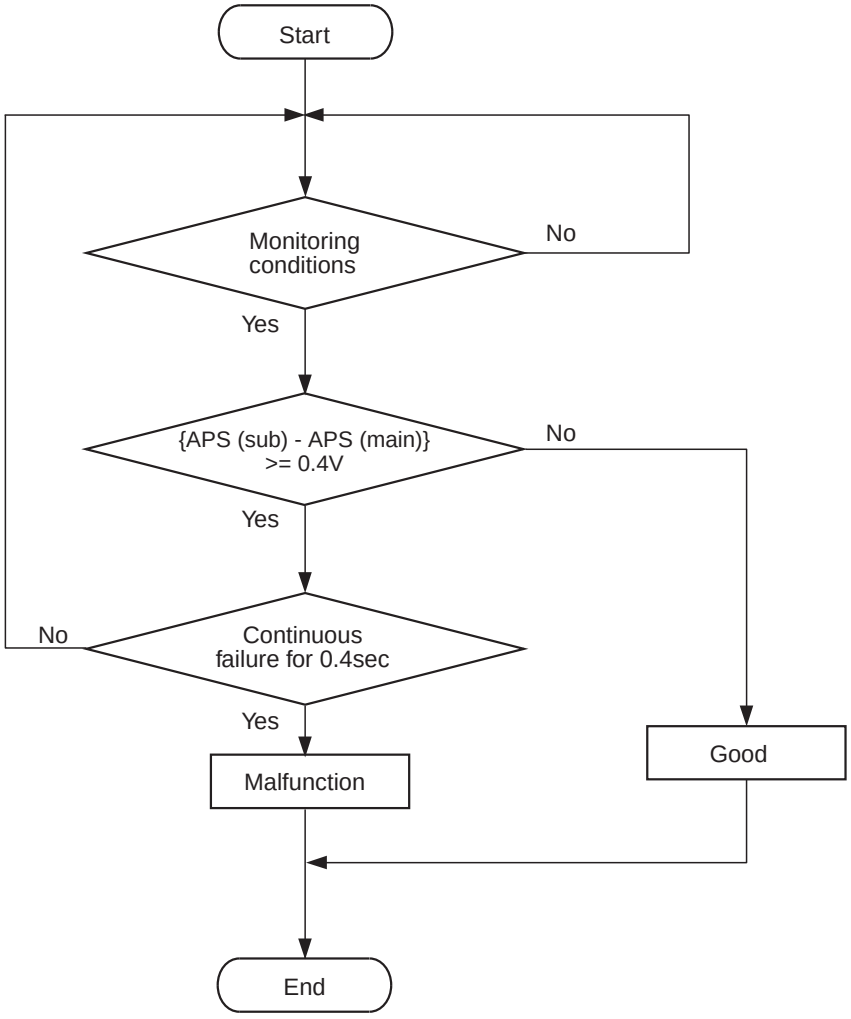
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

### Logic Flow Chart




AKB00473

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

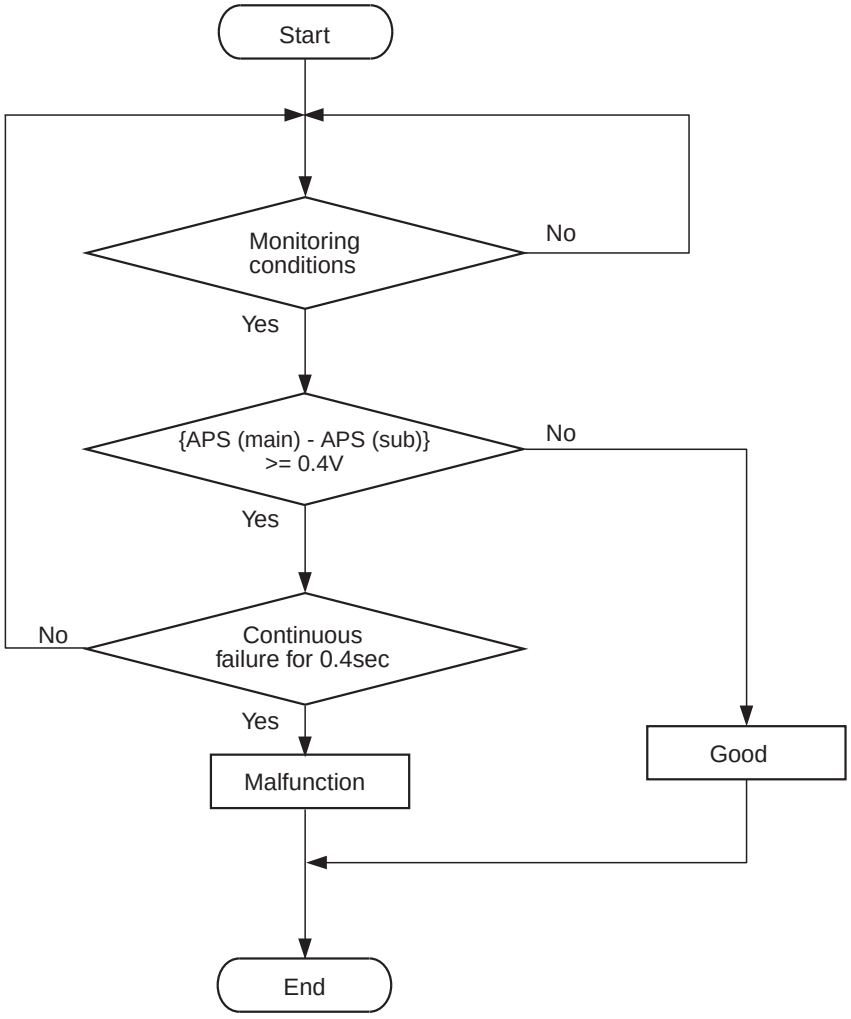
- The accelerator pedal position sensor (main) output voltage subtracted from the accelerator pedal position sensor (sub) output voltage is more than 0.4 volt for 0.4 second.

*NOTE: The accelerator pedal position sensor voltage used for the judgment is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*

**TSB Revision**

## DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>

### Logic Flow Chart




AKB00474

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- The accelerator pedal position sensor (sub) output voltage subtracted from the accelerator pedal position sensor (main) output voltage is more than 0.4 volt for 0.4 second.

  *NOTE: The accelerator pedal position sensor voltage used for the judgment is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

### OBD-II DRIVE CYCLE PATTERN

None.

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|---|

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

- Accelerator pedal position sensor failed.
- Harness damage in accelerator pedal position sensor circuit or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list item 11: Accelerator Pedal Position Sensor (main).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T.-III) to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 2.
**NO :** Refer to, DTC P2122 – Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-443, DTC P2123 – Accelerator Pedal Position Sensor (main) Circuit High Input P.13A-447.

**STEP 2. Using scan tool (M.U.T.-III), check data list item 12: Accelerator Pedal Position Sensor (sub).**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
- Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
- Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.

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

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

**YES :** Go to Step 3.
**NO :** Refer to, DTC P2127 – Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-450, DTC P2128 – Accelerator Pedal Position Sensor (sub) Circuit High Input P.13A-454.

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

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Check for the continuity between terminal APSE line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

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

**STEP 4. Check of harness damage in APSE line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 10.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

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

(1) Disconnect the accelerator pedal position sensor connector and measure at the harness side.
(2) Check for the continuity between terminal APE line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 8.
**NO :** Go to Step 6.

**STEP 6. Check of harness damage in APE line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 7.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

**STEP 7. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P2138 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 13.

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

**STEP 8. Check of harness damage in APS5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 9.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

**STEP 9. Check of harness damage in AP5 line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 10.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

**STEP 10. Check of harness damage in APSM line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 11.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

**STEP 11. Check of harness damage in APSS line between accelerator pedal position sensor connector and ECM connector.**

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

**YES :** Go to Step 12.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 13.

**STEP 12. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2138 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 13.
**NO :** The inspection is complete.

**STEP 13. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P2138 stored?**

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

## DTC P2228: Barometric Pressure Circuit Low Input

### TECHNICAL DESCRIPTION

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM checks whether this voltage is within a specified range.

### DESCRIPTIONS OF MONITOR METHODS

Barometric pressure sensor output voltage is out of reasonable barometric pressure range.

### MONITOR EXECUTION

Continuous

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

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

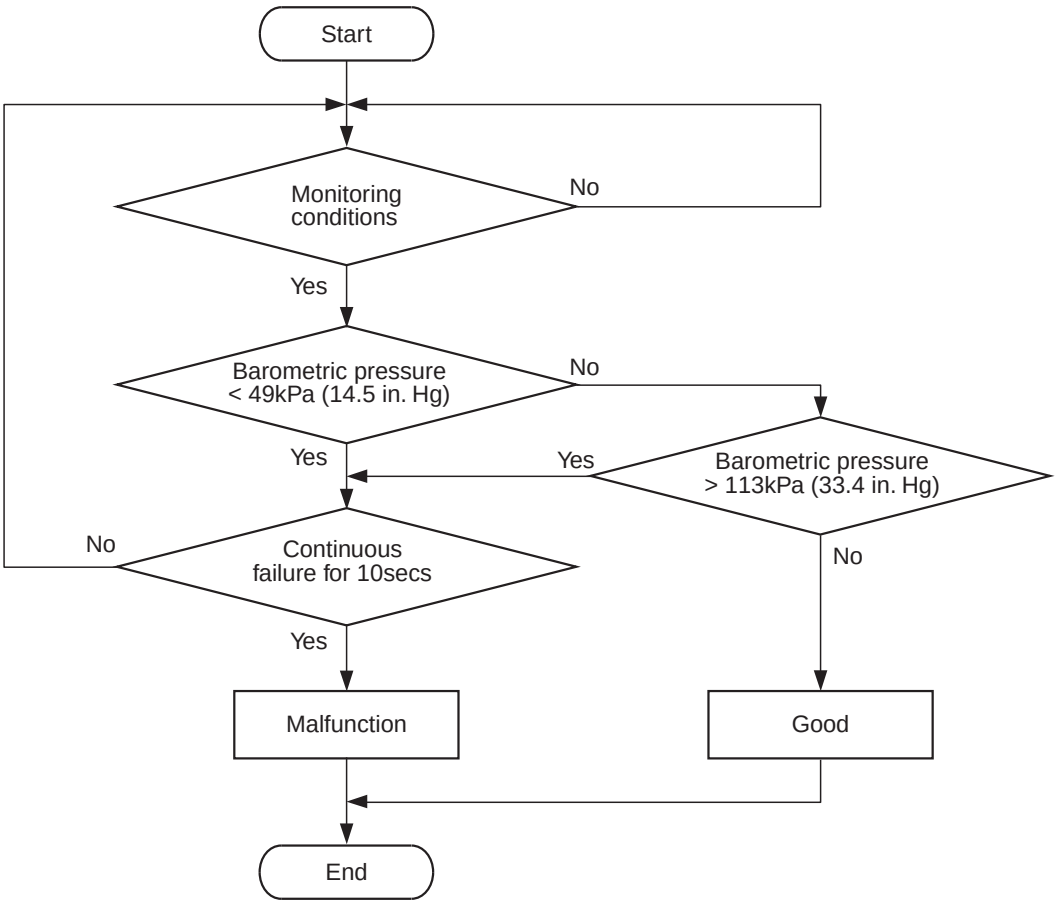
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK704299

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Battery positive voltage is more than 6 volts.

**Judgment Criterion**

- Barometric pressure sensor output signal is less than 49 kPa (14.5 in.Hg) (approximately 15,000 ft above sea level) for 10 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Control as if the barometric pressure is 101 kPa (29.8 in.Hg).

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)

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- MB991824: Vehicles Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Test the OBD-II drive cycle.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2228 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P2229: Barometric Pressure Circuit High Input

### TECHNICAL DESCRIPTION

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM checks whether this voltage is within a specified range.

### DESCRIPTIONS OF MONITOR METHODS

Barometric pressure sensor output voltage is out of reasonable barometric pressure range.

### MONITOR EXECUTION

Continuous

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

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

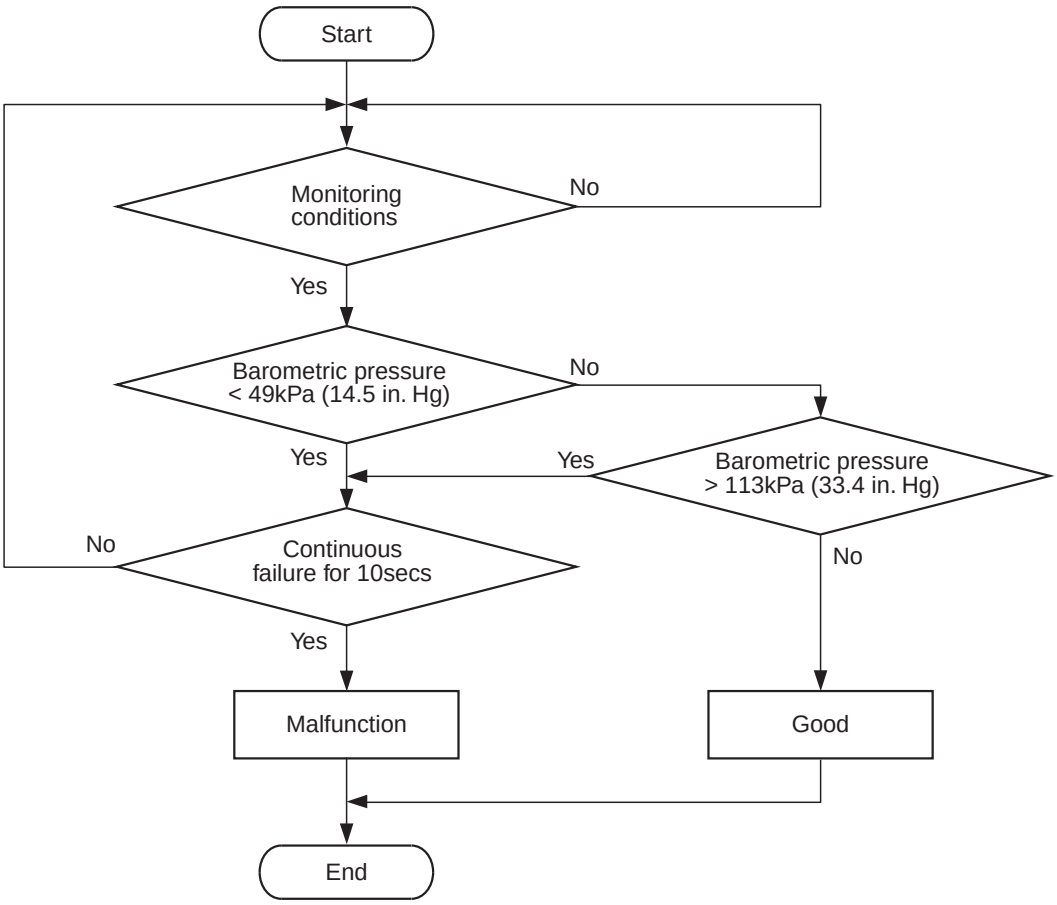
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK704299

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Battery positive voltage is more than 6 volts.

**Judgment Criterion**

- Barometric pressure sensor output signal is more than 113 kPa (33.4 in.Hg) (approximately 4,000 ft below sea level) for 10 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Control as if the barometric pressure is 101 kPa (29.8 in.Hg).

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)

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- MB991824: Vehicles Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Test the OBD-II drive cycle.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2229 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656).

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

## DTC P2237: Linear Air-Fuel Ratio Sensor Positive Current Control Circuit/Open

### CIRCUIT OPERATION

The linear air-fuel ratio sensor and the ECM are connected by the following three lines to detect the air-fuel ratio.

- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LPFL detects the air-fuel ratio.
- The auxiliary line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LSFL detects the air-fuel ratio.
- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LEFL is connected to ground.

### TECHNICAL DESCRIPTION

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the linear air-fuel ratio sensor.
- If the linear air-fuel ratio sensor has deteriorated, corrections will be made by the heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS

- If the electrical currents of the ECM line are not detected although being supplied by the ECM, the DTC is stored as an open circuit.

### MONITOR EXECUTION

Continuous

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

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

- Linear air-fuel ratio sensor heater monitor
- Misfire monitor
- Fuel system monitor

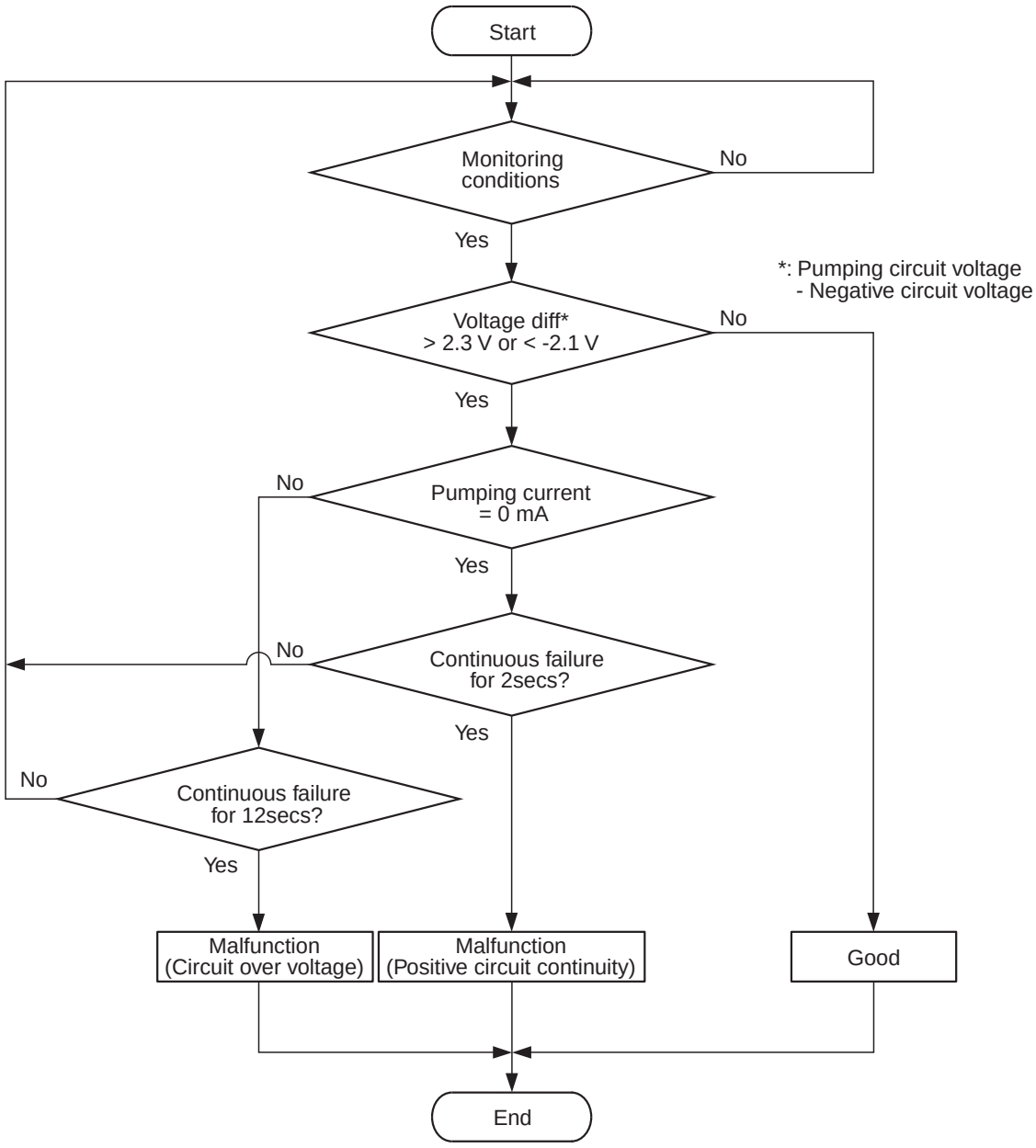
**Sensor (The sensor below is determined to be normal)**

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

- Accelerator pedal position sensor

## DTC SET CONDITIONS

### Logic Flow Chart




AK900360

**Check Conditions**

- Battery positive voltage is between 10 and 16.5 volts.
- More than 60 – 308 seconds have passed since the engine starting sequence was completed.

**Judgment Criteria**

- The negative circuit voltage subtracted from the pumping circuit voltage is be lower than –2.1 volts or higher than 2.3 volts for 2 seconds.
- The pumping current is 0 milli ampere for 2 seconds.

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## FAIL-SAFE AND BACKUP FUNCTION

- Does not control air-fuel ratio closed loop.

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.

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

- Linear air-fuel ratio sensor failed.
- Open linear air-fuel ratio sensor circuit, or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check of open circuit in LPFL line between linear air-fuel ratio sensor connector and ECM connector.**

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

**YES :** Go to Step 2.

**NO :** Repair the connector(s) or wiring harness. Then go to Step 4.

**STEP 2. Test the OBD-II drive cycle.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position and delete the DTC.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2237 stored?**

**YES :** Then go to Step 3.

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

**STEP 3. Replace the linear air-fuel ratio sensor.**
(1) Replace the linear air-fuel ratio sensor.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2237 stored?**
**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

**STEP 4. Test the OBD-II drive cycle.**
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2237 stored?**
**YES :** Retry the troubleshooting.
**NO :** The inspection is complete.

## DTC P2243: Linear Air-Fuel Ratio Sensor Reference Voltage Circuit/Open

### CIRCUIT OPERATION
The linear air-fuel ratio sensor and the ECM are connected by the following three lines to detect the air-fuel ratio.
- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LPFL detects the air-fuel ratio.
- The auxiliary line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LSFL detects the air-fuel ratio.
- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LEFL is connected to ground.

### TECHNICAL DESCRIPTION
- The ECM effects air/fuel ratio feedback control in accordance with the signals from the linear air-fuel ratio sensor.
- If the linear air-fuel ratio sensor has deteriorated, corrections will be made by the heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS
- The linear air-fuel ratio sensor heater or the exhaust gas heats the linear air-fuel ratio sensor to sufficiently activate the linear air-fuel ratio sensor, resulting in the small resistance. However, the DTC is stored as an open circuit if the large resistance continues.

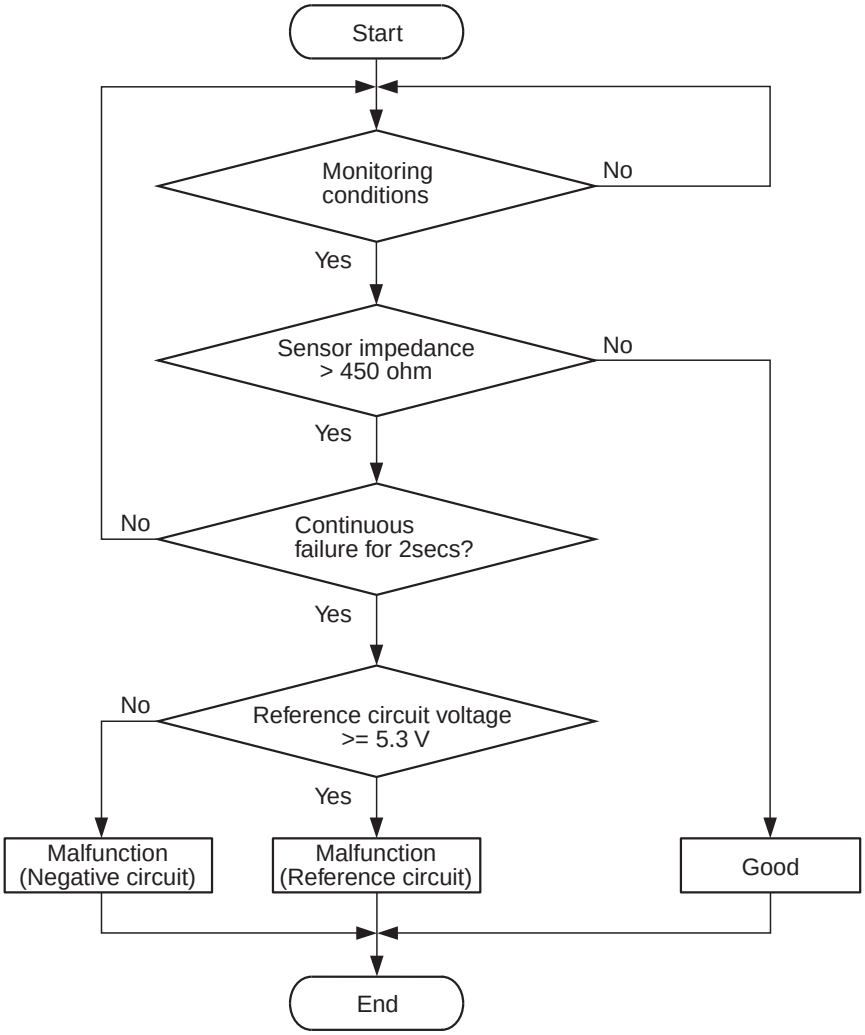
### MONITOR EXECUTION
Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)
**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Linear air-fuel ratio sensor heater monitor
- Misfire monitor
- Fuel system monitor

**Sensor (The sensor below is determined to be normal)**
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor
- Accelerator pedal position sensor

## DTC SET CONDITIONS

### Logic Flow Chart




AK900359

**Check Conditions**

- Battery positive voltage is between 10 and 16.5 volts.
- More than 60 – 308 seconds have passed since the engine starting sequence was completed.

**Judgment Criteria**

- The sensor impedance is be higher than 450 ohms for 2 seconds.
- The reference circuit voltage is more than 5.3 volts for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Does not control air-fuel ratio closed loop.
- Control linear air-fuel ratio sensor heater off.

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.

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

- Linear air-fuel ratio sensor failed.
- Open linear air-fuel ratio sensor circuit, or connector damage.
- ECM failed.

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check of open circuit in LSFL line between linear air-fuel ratio sensor connector and ECM connector.**

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

**YES :** Go to Step 2.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 4.

**STEP 2. Test the OBD-II drive cycle.**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position and delete the DTC.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2243 stored?**

**YES :** Then go to Step 3.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 3. Replace the linear air-fuel ratio sensor.**

(1) Replace the linear air-fuel ratio sensor.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2243 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

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**STEP 4. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.

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

**Q: Is DTC P2243 stored?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC P2251: Linear Air-Fuel Ratio Sensor Negative Current Control Circuit/Open

### CIRCUIT OPERATION

The linear air-fuel ratio sensor and the ECM are connected by the following three lines to detect the air-fuel ratio.

- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LPFL detects the air-fuel ratio.
- The auxiliary line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LSFL detects the air-fuel ratio.
- The line between the linear air-fuel ratio sensor connector terminal and the ECM terminal LEFL is connected to ground.

### TECHNICAL DESCRIPTION

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the linear air-fuel ratio sensor.
- If the linear air-fuel ratio sensor has deteriorated, corrections will be made by the heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS

- The linear air-fuel ratio sensor heater or the exhaust gas heats the linear air-fuel ratio sensor to sufficiently activate the linear air-fuel ratio sensor, resulting in the small resistance. However, the DTC is stored as an open circuit if the large resistance continues.

### MONITOR EXECUTION

Continuous

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

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

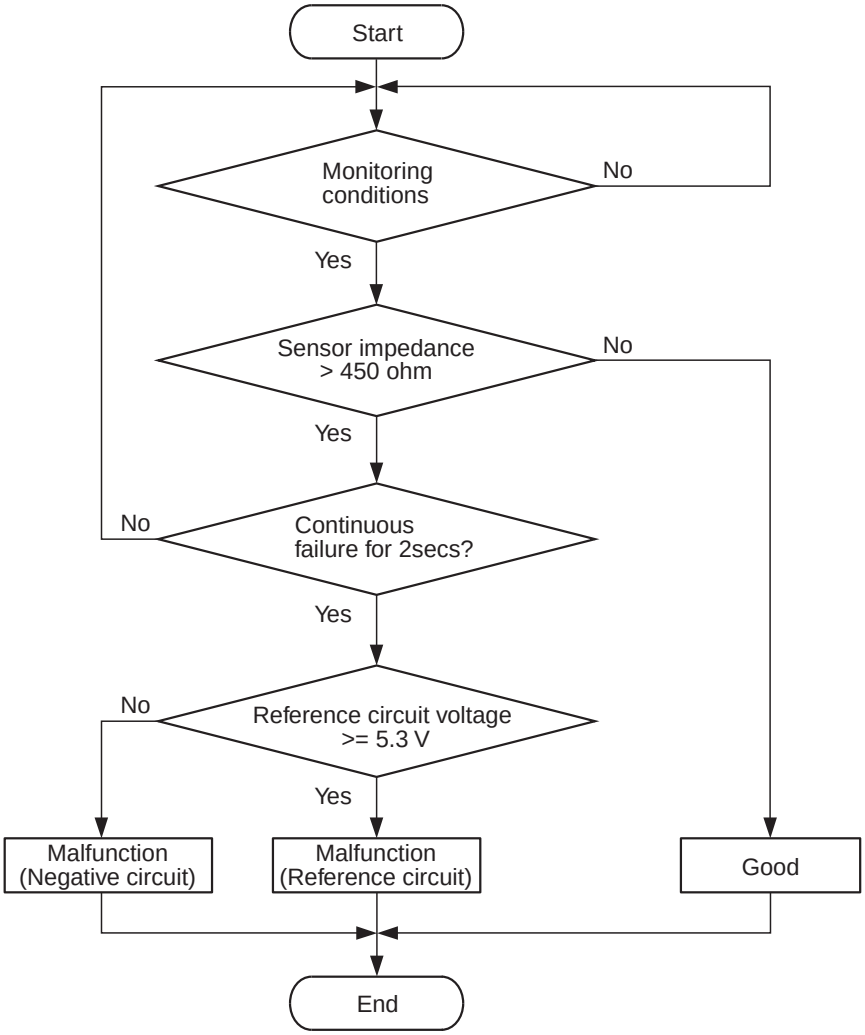
- Linear air-fuel ratio sensor heater monitor
- Misfire monitor
- Fuel system monitor

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

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

## DTC SET CONDITIONS

### Logic Flow Chart




AK900359

**Check Conditions**

- Battery positive voltage is between 10 and 16.5 volts.
- More than 60 – 308 seconds have passed since the engine starting sequence was completed.

**Judgment Criteria**

- The sensor impedance is be higher than 450 ohms for 2 seconds.
- The reference circuit voltage is be lower than 5.3 volts for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Does not control air-fuel ratio closed loop.
- Control linear air-fuel ratio sensor heater off.

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.

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

- Linear air-fuel ratio sensor failed.
- Open linear air-fuel ratio sensor circuit, or connector damage.
- ECM failed.

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1 Check of open circuit in LEFL line between linear air-fuel ratio sensor connector and ECM connector.**

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

**YES :** Go to Step 2.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 4.

**STEP 2. Test the OBD-II drive cycle.**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position and delete the DTC.
(3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2251 stored?**

**YES :** Then go to Step 3.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 3. Replace the linear air-fuel ratio sensor.**

(1) Replace the linear air-fuel ratio sensor.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.
(3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2251 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** The inspection is complete.

**TSB Revision**

**STEP 4. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 21 P.13A-10.

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

**Q: Is DTC P2251 stored?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

## DTC P2252: Heated Oxygen Sensor Offset Circuit Low Voltage

### HEATED OXYGEN SENSOR OFFSET CIRCUIT LOW VOLTAGE CIRCUIT

Refer to DTC P0137 – Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-172.

### CIRCUIT OPERATION

Refer to DTC P0137 – Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-172.

### TECHNICAL DESCRIPTION

- The ECM applies an offset voltage of 0.5 volt to the heated oxygen sensor.
- The ECM checks for heated oxygen sensor offset voltage.

### DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is under specified range.

### MONITOR EXECUTION

Continuous

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

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

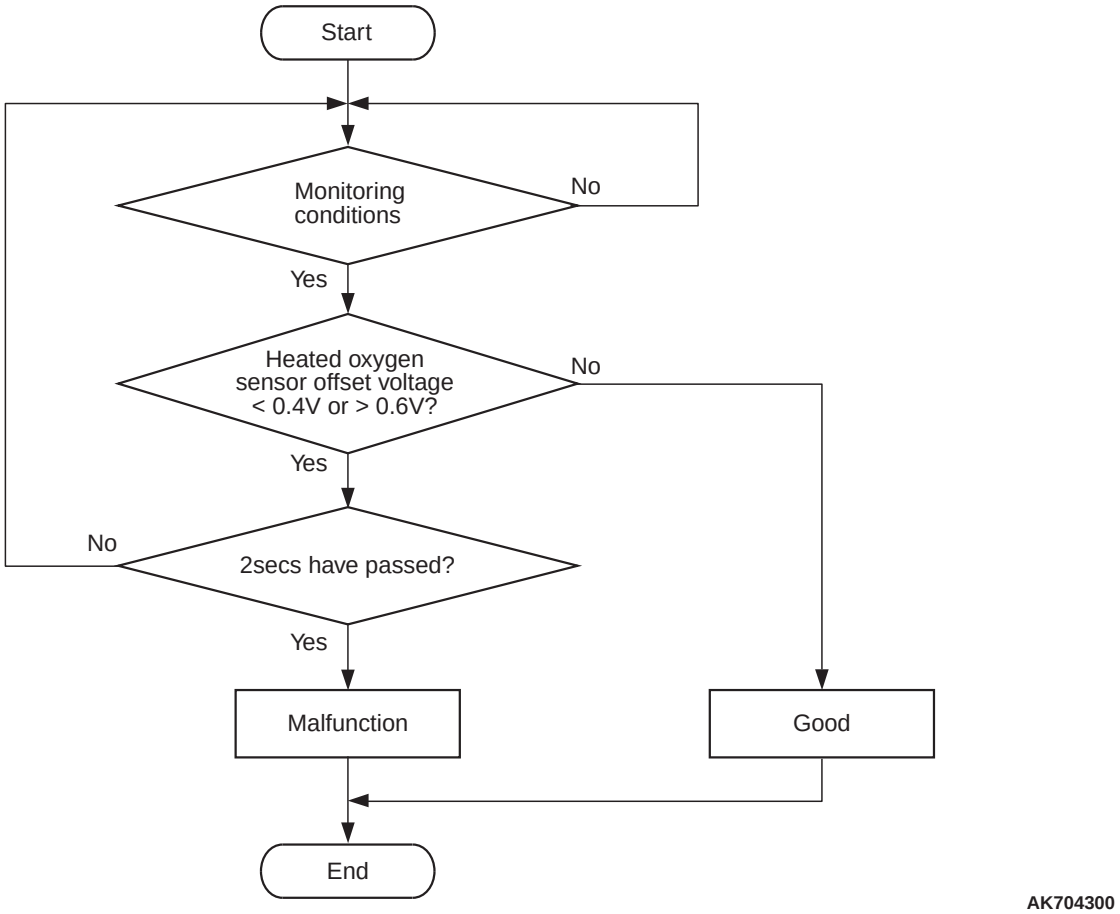
- Not applicable

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

- Not applicable

## DTC SET CONDITION

### Logic Flow Chart




AK704300

**Check Condition**

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

**Judgment Criterion**

- Heated oxygen sensor offset voltage is less than 0.4 volt for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

- Heated oxygen sensor (rear) failed.
- Shorted heated oxygen sensor (rear) circuit or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)

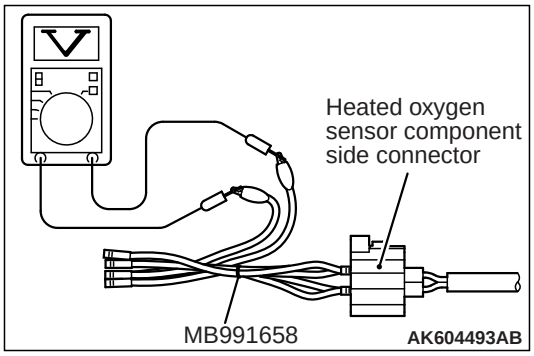
**TSB Revision**

- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)
- MB991658: Test Harness

**STEP 1. Check the heated oxygen sensor (rear).**

(1) Disconnect the heated oxygen sensor (rear) connector and connect test harness special tool MB991658 to the connector on the heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.
(4) Connect a digital voltage meter between terminal O2RL line and terminal ORLE line.
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: 2nd speed (CVT: B range)
- Drive with wide open throttle
- Engine: 3,500 r/min or more

**Standard value: 0.6 – 1.0 V**




*NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.*

*NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.*

**Q: Is the measured voltage between 0.6 and 1.0 volt?**

**YES :** Go to Step 2.
**NO :** Replace the heated oxygen sensor (rear). Then go to Step 5.

**STEP 2. Measure the sensor offset voltage at heated oxygen sensor (rear) harness side connector.**

(1) Disconnect the heated oxygen sensor (rear) connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ORLE line and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

**Q: Is the measured voltage between 0.4 and 0.6 volt?**

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

**STEP 3. Check of short circuit to ground in ORLE line between heated oxygen sensor (rear) connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness. Then go to Step 5.

**STEP 4. Check the trouble symptoms.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2252 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 5.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2252 stored?**

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

## DTC P2253: Heated Oxygen Sensor Offset Circuit High Voltage

### HEATED OXYGEN SENSOR OFFSET CIRCUIT HIGH VOLTAGE CIRCUIT

Refer to DTC P0137 – Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-172.

### CIRCUIT OPERATION

Refer to DTC P0137 – Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-172.

### TECHNICAL DESCRIPTION

- The ECM applies an offset voltage of 0.5 volt to the heated oxygen sensor.
- The ECM checks for heated oxygen sensor offset voltage.

### DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is over specified range.

### MONITOR EXECUTION

Continuous

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

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

- Not applicable

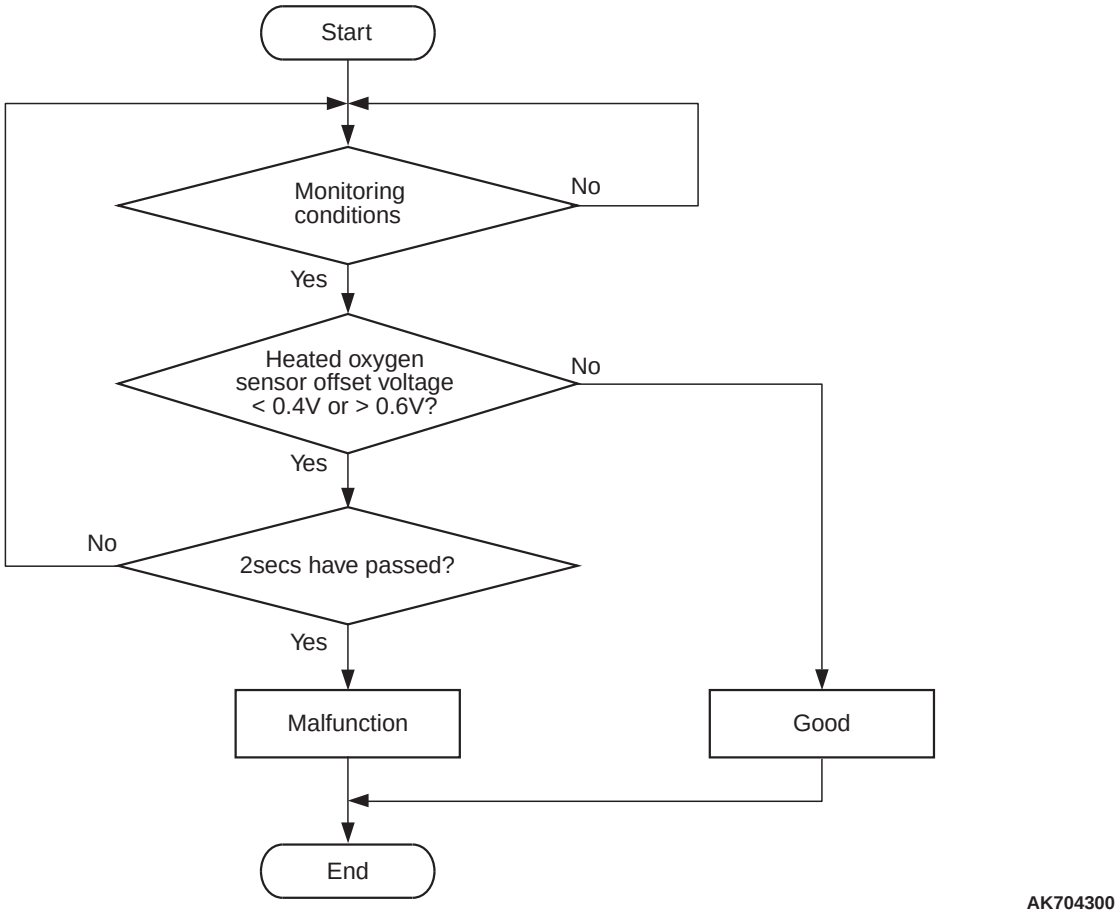
**Sensor (The sensor below is determined to be normal)**

- Not applicable

**TSB Revision**

## DTC SET CONDITION

### Logic Flow Chart




**Check Condition**

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

**Judgment Criterion**

- Heated oxygen sensor offset voltage is more than 0.6 volt for 2 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Does not control air-fuel ratio closed loop.

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnosis Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.

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

- Heated oxygen sensor (rear) failed.
- Shorted heated oxygen sensor (rear) circuit or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)

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- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)
- MB991658: Test Harness

**STEP 1. Check the heated oxygen sensor (rear).**

(1) Disconnect the heated oxygen sensor (rear) connector and connect test harness special tool MB991658 to the connector on the heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80°C (176°F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.
(4) Connect a digital voltage meter between terminal O2RL line and terminal ORLE line.
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: 2nd speed (CVT: B range)
- Drive with wide open throttle
- Engine: 3,500 r/min or more

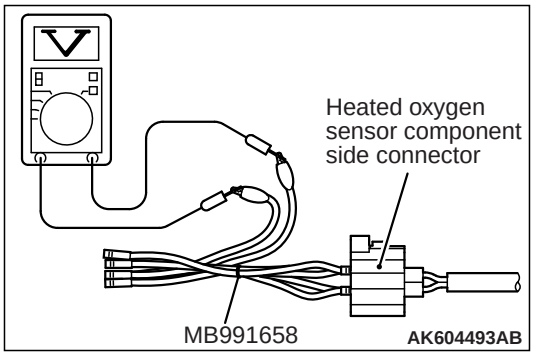
**Standard value: 0.6 – 1.0 V**

*NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.*

*NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.*

**Q: Is the measured voltage between 0.6 and 1.0 volt?**

**YES :** Go to Step 2.
**NO :** Replace the heated oxygen sensor (rear). Then go to Step 6.




**STEP 2. Measure the sensor offset voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal ORLE line and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

**Q: Is the measured voltage between 0.4 and 0.6 volt?**

**YES :** Go to Step 5.
**NO :** Go to Step 3.

**STEP 3. Check of short circuit to power supply in ORLE line between heated oxygen sensor (rear) connector and ECM connector.**

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

**YES :** Go to Step 4.
**NO :** Replace the heated oxygen sensor (rear). Then go to Step 6.

**STEP 4. Check of short circuit to power supply in O2RL line between heated oxygen sensor (rear) connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Replace the heated oxygen sensor (rear). Then go to Step 6.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2253 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

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

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Pattern 22 P.13A-10.
(2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2253 stored?**

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

## DTC U0101: TCM Time-out <CVT>

**⚠ CAUTION**

- **If the ECM output the DTC U0101, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DESCRIPTIONS OF MONITOR METHODS

There is no data from TCM for the specified time. (TCM also detect communication error with ECM.)

### MONITOR EXECUTION

Continuous

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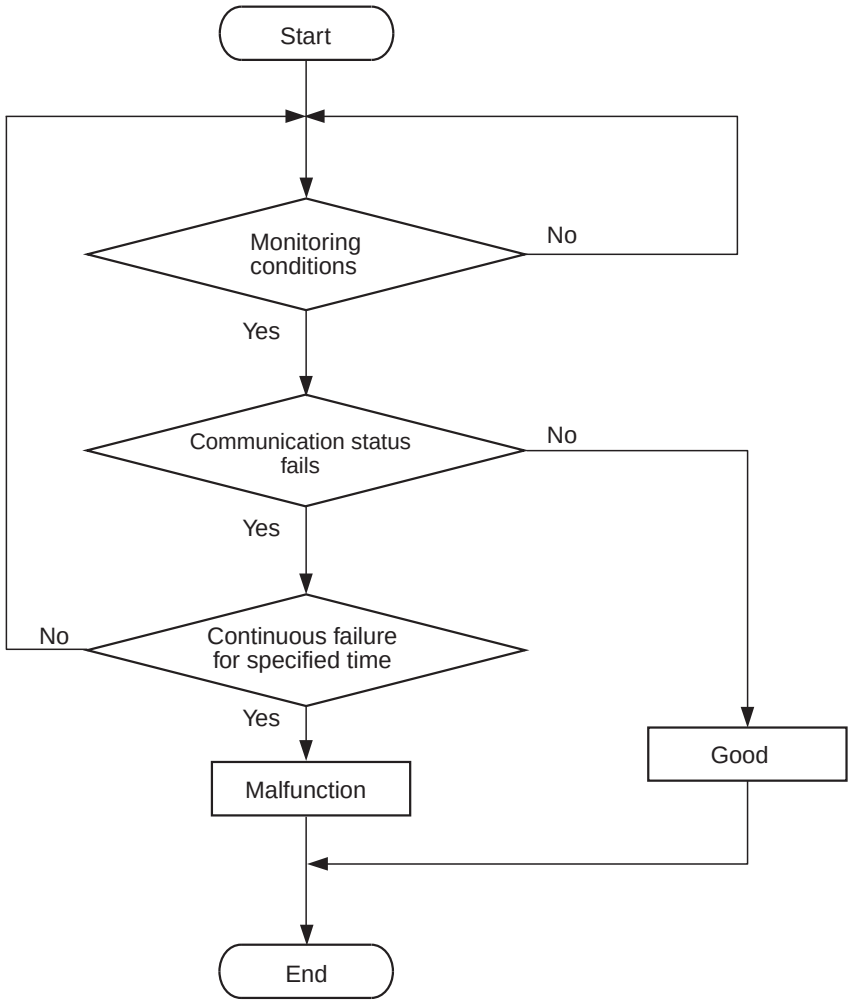
## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**
- Not applicable

**Sensor (The sensor below is determined to be normal)**
- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604369

**Check Condition**
- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**
- Unable to receive TCM signals through the CAN bus line for 4 seconds.

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## COMMENT

**Current Trouble**

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

**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and TCM, and a failure in the TCM power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

None.

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

- CAN line harness damage or connector damage.
- TCM failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CVT-DTC stored?**

**YES :** Refer to GROUP 23A, Diagnosis – Diagnostic Trouble Code Chart P.23A-16.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the ASC-DTC and ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0101 stored?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0101 stored?**

**YES :** Replace the TCM. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and TCM. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0101 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and TCM. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0101 stored?**

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

**DTC U0121: ASC-ECU Time-out**

**⚠ CAUTION**

- **If the ECM output the DTC U0121, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

## DESCRIPTIONS OF MONITOR METHODS

There is no data from ASC-ECU for the specified time. (ASC-ECU also detect communication error with ECM.)

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

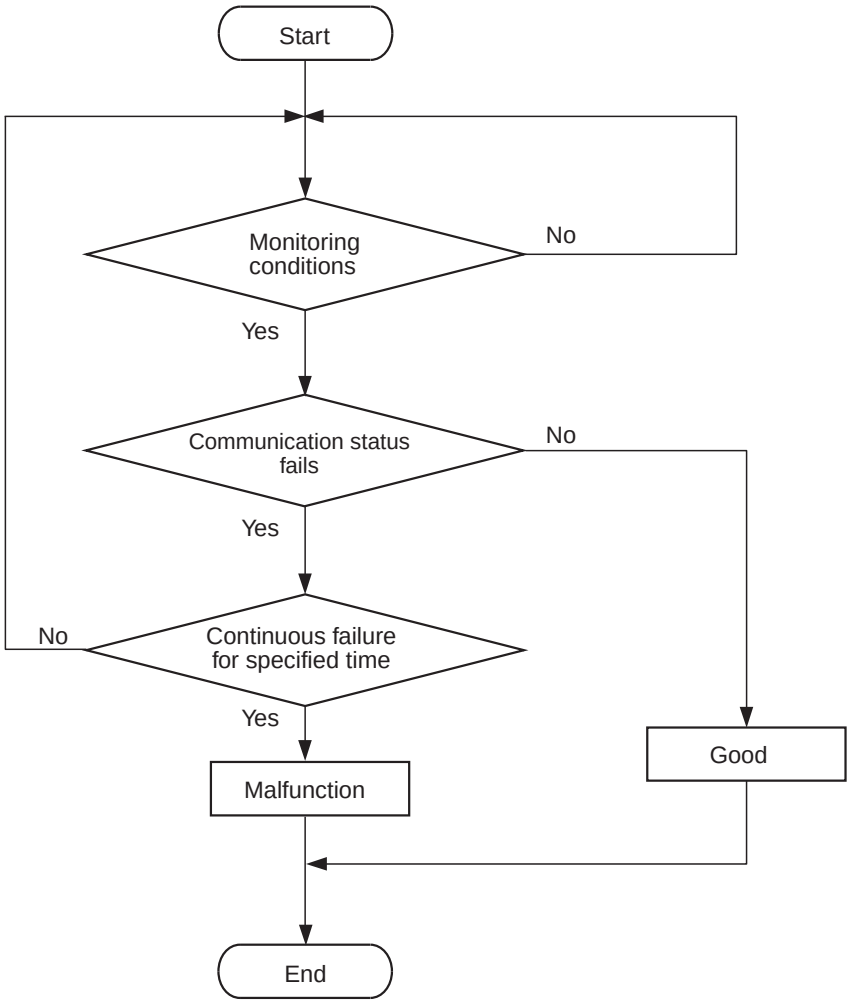
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604369

**Check Condition**

- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**

- Unable to receive ASC-ECU signals through the CAN bus line for 4 seconds.

## COMMENT

**Current Trouble**

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

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**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and ASC-ECU, and a failure in the ASC-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

None.

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

- CAN line harness damage or connector damage.
- ASC-ECU failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the ASC-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ASC-DTC stored?**

**YES :** Refer to GROUP 35C, Diagnosis – Diagnostic Trouble Code Chart P.35C-16.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC <CVT> and combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0121 stored?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0121 stored?**

**YES :** Replace the ASC-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ASC-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0121 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ASC-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0121 stored?**
**YES :** Retry the troubleshooting.
**NO :** The inspection is complete.

## DTC U0131: Electric Power Steering-ECU Time-out

**⚠ CAUTION**
- **If the ECM output the DTC U0131, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Condition**
- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**
- Unable to receive electric power steering-ECU signals through the CAN bus line for 4 seconds.

### COMMENT

**Current Trouble**
- Some of the possible causes are a harness or connector damage between the ECM and the electric power steering-ECU on the CAN bus line, a failure in the electric power steering-ECU power supply system, a failure in the electric power steering-ECU, or a failure in the ECM.

**Past Trouble**
- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and electric power steering-ECU, and a failure in the electric power steering-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

### FAIL-SAFE AND BACKUP FUNCTION
- None

### TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- CAN line harness damage or connector damage.
- Electric power steering-ECU failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A

- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the electric power steering-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the electric power steering-DTC stored?**

**YES :** Refer to GROUP 37, Power Steering Diagnosis – Diagnostic Trouble Code Chart P.37-8.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the Combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0131 stored?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0131 stored?**

**YES :** Replace the electric power steering-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and electric power steering-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0131 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and electric power steering-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0131 stored?**

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

## DTC U0141: ETACS-ECU Time-out

**⚠ CAUTION**

- **If the ECM output the DTC U0141, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Condition**

- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**

- Unable to receive ETACS-ECU signals through the CAN bus line for 4 seconds.

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## COMMENT

**Current Trouble**

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

**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and ETACS-ECU, and a failure in the ETACS-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- None

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

- CAN line harness damage or connector damage.
- ETACS-ECU failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ETACS-DTC stored?**

**YES :** Refer to GROUP 54A, ETACS – Diagnostic Trouble Code Chart P.54A-218.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC <CVT>, KOS-DTC and Combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0141 stored?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0141 stored?**

**YES :** Replace the ETACS-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ETACS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0141 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ETACS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0141 stored?**

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

## DTC U0155: Combination Meter Time-out

**⚠ CAUTION**

- **If the ECM output the DTC U0155, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DESCRIPTIONS OF MONITOR METHODS

There is no data from combination meter for the specified time. (Combination meter also detect communication error with ECM.)

### MONITOR EXECUTION

Continuous

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

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

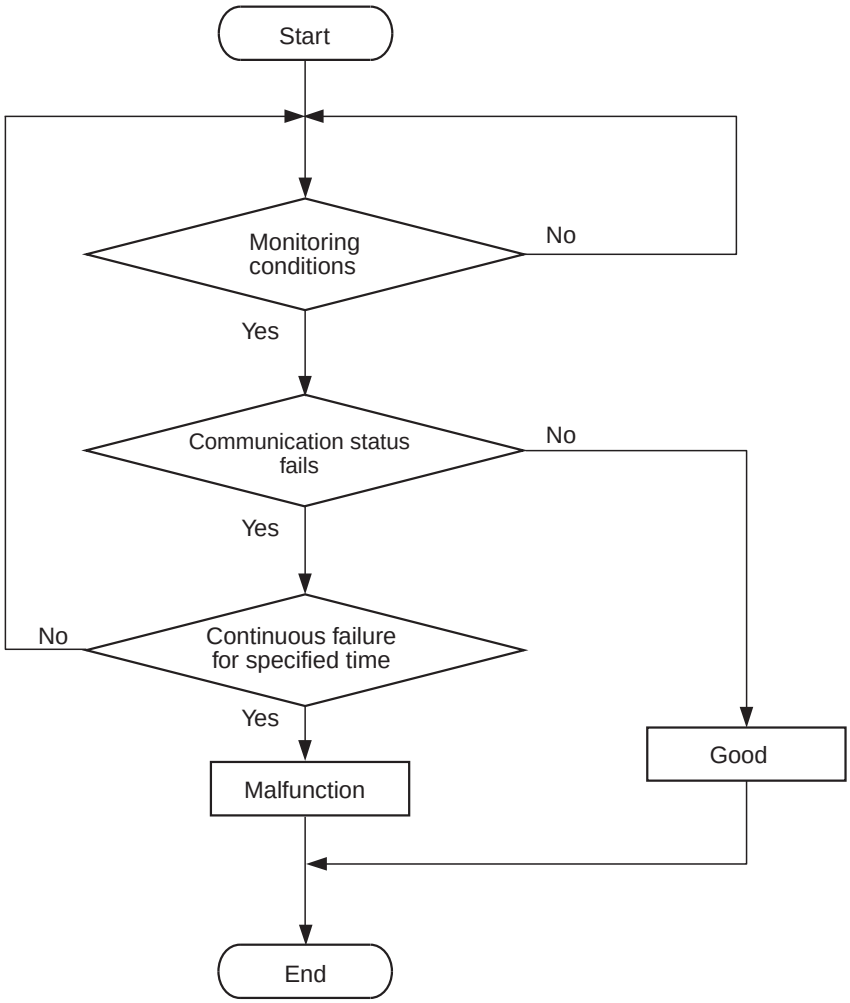
- Not applicable

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

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart




AK604369

**Check Condition**

- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**

- Unable to receive combination meter signals through the CAN bus line for 4 seconds.

## COMMENT

**Current Trouble**

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

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**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM 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 Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the M.U.T. – III CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

None.

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

- CAN line harness damage or connector damage.
- Combination meter failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Refer to GROUP 54A, Combination Meter – Diagnostic Trouble Code Chart P.54A-18.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC <CVT> and KOS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0155 stored?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0155 stored?**

**YES :** Replace the combination meter-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and combination meter. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0155 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ETACS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0155 stored?**
**YES :** Retry the troubleshooting.
**NO :** The inspection is complete.

## DTC U0164: A/C-ECU Time-out

**⚠ CAUTION**
- **If the ECM sets DTC U0164, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Condition**
- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**
- Unable to receive A/C-ECU signals through the CAN bus line for 4 seconds.

### COMMENT

**Current Trouble**
- Some of the possible causes are a harness or connector damage between the ECM and the A/C-ECU on the CAN bus line, a failure in the A/C-ECU power supply system, a failure in the A/C-ECU, or a failure in the ECM.

**Past Trouble**
- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and A/C-ECU, and a failure in the A/C-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are set in the ECUs, which are communicating on the CAN bus [Refer to GROUP 54C, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

### FAIL-SAFE AND BACKUP FUNCTION
- None

### OBD-II DRIVE CYCLE PATTERN
None.

### TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- CAN line harness damage or connector damage.
- A/C-ECU failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

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- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the A/C-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the A/C-DTC set?**

**YES :** Refer to GROUP 55B, Diagnostic Trouble Code Chart P.55B-8.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the KOS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0164 set?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0164 set?**

**YES :** Replace the A/C-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and A/C-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0164 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and A/C-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0164 set?**

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

## DTC U0167: Immobilizer Communication Error

**⚠ CAUTION**

- **If the ECM sets DTC U0167, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Conditions**

- Ignition switch is "ON" position.
- Battery positive voltage is more than 8 volts.

**Judgment Criterion**

- Unable to receive KOS&OSS-ECU/ETACS-ECU (immobilizer) signals through the CAN bus line.

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## COMMENT

**Current Trouble**

- Some of the possible causes are a harness or connector damage between the ECM and the KOS&OSS-ECU/ETACS-ECU (immobilizer-ECU) on the CAN bus line, a failure in the KOS&OSS-ECU/ETACS-ECU (immobilizer) power supply system, a failure in the KOS&OSS-ECU/ETACS-ECU (immobilizer-ECU), or a failure in the ECM.

**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and KOS&OSS-ECU/ETACS-ECU (immobilizer-ECU), and a failure in the KOS&OSS-ECU/ETACS-ECU (immobilizer) power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are set in the ECUs, which are communicating on the CAN bus [Refer to GROUP 54C, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- Engine start is prohibited.

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

- CAN line harness damage or connector damage.
- KOS&OSS-ECU/ETACS-ECU (immobilizer) failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 4.

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**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the immobilizer-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the immobilizer-DTC set?**

**YES :** Refer to GROUP 42B, Diagnosis – Diagnostic Trouble Code Chart <Vehicles with KOS>P.42B-13 or GROUP 54A, Diagnosis – Diagnostic Trouble Code Chart <Vehicles without KOS>P.54A-277 .
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0167 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and KOS&OSS-ECU/ETACS-ECU (immobilizer). Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0167 set?**

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

## DTC U0168: KOS&OSS-ECU Time-out

**⚠ CAUTION**
- **If the ECM sets DTC U0168, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Condition**
- Battery positive voltage is between 10 and 16.5 volts.

**Judgment Criterion**
- Unable to receive KOS&OSS-ECU signals through the CAN bus line for 4 seconds.

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## COMMENT

**Current Trouble**

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

**Past Trouble**

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and KOS&OSS-ECU, and a failure in the KOS&OSS-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are set in the ECUs, which are communicating on the CAN bus [Refer to GROUP 54C, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

None.

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

- CAN line harness damage or connector damage.
- KOS&OSS-ECU failed.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 6.

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**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ETACS-DTC set?**

**YES :** Refer to GROUP 54A, ETACS – Diagnostic Trouble Code Chart P.54A-218.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) Read the Combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0168 set?**

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

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0168 set?**

**YES :** Replace the KOS&OSS-ECU. Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and KOS&OSS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 5. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0168 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 6.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and KOS&OSS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**
(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC U0168 set?**
**YES :** Retry the troubleshooting.
**NO :** The inspection is complete.

## DTC U0415: Invalid Data Received from ASC-ECU

**⚠ CAUTION**
- **If the ECM output the DTC U0415, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

### DTC SET CONDITIONS

**Check Conditions**
- After 5 seconds have passed since the ignition switch was turned to "ON" position.
- While engine is running.

**Judgment Criterion**
- When the communication error is judged between the ECM and the ASC-ECU.

### COMMENT

**Current Trouble**
- Some of the possible causes are a harness or connector damage between the ECM and the ASC-ECU on the CAN bus line, a failure in the ASC-ECU power supply system, a failure in the ASC-ECU, or a failure in the ECM.

**Past Trouble**
- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the ECM and ASC-ECU, and a failure in the ASC-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Treat Past Trouble P.00-14).

*NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the scan tool (M.U.T.-III) CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13. 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, Explanation about the Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-7].*

### FAIL-SAFE AND BACKUP FUNCTION
- Torque requested by active stability control (ASC) is ignored.

### TROUBLESHOOTING HINTS (The most likely causes for this code to be stored are:)
- CAN line harness damage or connector damage.
- ASC-ECU failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then go to Step 4.

**STEP 2. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

(1) Turn the ignition switch to the "ON" position.
(2) Read the ASC-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the ASC-DTC stored?**

**YES :** Refer to GROUP 35C, Diagnosis – Diagnostic Trouble Code Chart P.35C-16.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0415 stored?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then go to Step 4.
**NO :** It can be assumed that this malfunction is intermittent of CAN bus line between ECM and ASC-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

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

**Q: Is DTC U0415 stored?**

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

## SYMPTOM PROCEDURES

**Inspection procedure 1: Communication with ECM is not possible**

### CIRCUIT OPERATION

- Battery voltage is applied to the data link connector terminal.
- The data link connector terminal is grounded to the vehicle body.

### COMMENT

- When the communication between scan tool (M.U.T.-III) and ECM is impossible, it can be suspected that the CAN bus line, power supply circuit of the data link connector, and/or grounding circuit are defective.
- Communication can not be achieved either, if a wrong vehicle type is selected on scan tool (M.U.T.-III).

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

- Battery failed.
- Open or shorted data link connector circuit, harness damage or connector damage.
- CAN communication failed.
- Scan tool (M.U.T.-III) failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the vehicle communication interface (V.C.I.) MB992744 or MB991824 operations.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.

(2) When the power of V.C.I. is turned to ON, the indicator lamp of the V.C.I. illuminates in green.
- The indicator lamp of the V.C.I. illuminates in green.

**Q: Is the indicator lamp of the V.C.I. illuminates in green?**

**YES :** Go to Step 6.
**NO :** Go to Step 2.

**STEP 2. Check the battery.**

Refer to GROUP 54A, Battery – On-vehicle Service – Battery Test P.54A-5.

**Q: Are there any abnormalities?**

**YES :** Replace the battery. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 3.

**STEP 3. Measure the power supply voltage at data link connector harness side connector.**

Measure the voltage between terminal power supply line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in power supply line between data link connector and battery. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check the continuity at data link connector harness side connector.**

Check for the continuity between terminal ground line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and damage in ground line between data link connector and body ground. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check of harness damage in power supply line between battery and data link connector.**

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

**YES :** Refer to the scan tool (M.U.T.-III) reference manual.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Using scan tool (M.U.T.-III), diagnose CAN bus line.**

(1) Turn the ignition switch to the "ON" position.
(2) Diagnose CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the CAN bus line normal?**

**YES :** Refer to, Inspection Procedure 22 – Power Supply System and Ignition Switch-IG System P.13A-556.
**NO :** Repair the CAN bus line. Refer to GROUP 54C, Diagnosis – CAN Bus Diagnostics Table P.54C-12. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 2: The malfunction indicator lamp (SERVICE ENGINE SOON or check engine lamp) does not illuminate right after the ignition switch is turned to the "ON" position

### CIRCUIT OPERATION

- The combination meter causes the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) to illuminate immediately after the ignition switch is turned to the "ON" position occurred.

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

- Combination meter failed.

### DIAGNOSIS

**STEP 1. Check the trouble symptoms.**

(1) Turn the ignition switch to the "ON" position.
- The malfunction indicator lamp (SERVICE ENGINE SOON or 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 (SERVICE ENGINE SOON or 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.00-13.
**NO :** Check the combination meter system. Refer to GROUP 54A, Combination Meter – Trouble Symptom Chart P.54A-35.

**Inspection procedure 3: The malfunction indicator lamp (SERVICE ENGINE SOON or check engine lamp) remains illuminated and never goes out**

## COMMENT

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

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

- Combination meter failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

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

(1) Turn the ignition switch to the "ON" position.
  - The malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) should go out after the engine was started.

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

**Q: Does the malfunction indicator lamp (SERVICE ENGINE SOON or 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.00-13.
**NO :** Check the combination meter system. Refer to GROUP 54A, Combination Meter – Trouble Symptom Chart P.54A-35.

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**Inspection procedure 4: Cranks, won't start**

## Cranks, Won't Start Circuit

- Refer to Inspection Procedure 26 – Ignition Circuit System P.13A-577.

## CIRCUIT OPERATION

- Refer to Inspection Procedure 26 – Ignition Circuit System P.13A-577.

## COMMENT

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

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

- Battery failed.
- Fuel pump system failed.
- Ignition system failed.
- Injector system failed.
- Poor compression.
- Contaminated fuel.
- Timing chain in out of place.
- ETACS-ECU (immobilizer) failed <vehicles without KOS>.
- KOS&OSS-ECU failed <vehicles with KOS>.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position after cranking the engine for at least 2 sec.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is any DTC set?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Check the injector.**

- Injector check (Refer to P.13A-648).

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

**YES :** Go to Step 3.
**NO :** Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.

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**STEP 3. Measure the power supply voltage at injector harness side connector.**

(1) Disconnect the injector connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal power supply line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short to ground in power supply line between MFI relay connector and injector connector. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check of harness damage in power supply line between MFI relay connector and injector connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
a. Item 1: Power Supply Voltage
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 6.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
a. Item 9: Fuel pump
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the fuel pressure.**
Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**
**YES :** Go to Step 8.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check the ignition system.**
(1) Connect the timing light to terminal power supply line of the ignition coil connectors in order.
(2) Crank the engine.
- The timing light flashes.

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

**Q: Does the timing light flash?**
**YES :** Go to Step 9.
**NO :** Refer to Inspection Procedure 26 – Ignition Circuit System P.13A-577.

**STEP 9. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**
**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 10.

**STEP 10. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**
**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 11.

**STEP 11. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**
**YES :** Go to Step 12.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 12. Check the ignition timing.**
Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Check if the injectors are clogged.
b. Check if fuel is contaminated.
Then confirm that the malfunction symptom is eliminated.

**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 5: 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:)

- Fuel pump system failed.
- Ignition system failed.
- Injector system failed.
- Poor compression.
- Contaminated fuel.
- Dirtiness around throttle valve.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), 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-599.
  a. Item 1: Power Supply Voltage
  b. Item 6: Engine Coolant Temperature Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
  a. Item 9: Fuel Pump
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**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. Inspection of throttle body (throttle valve area) for dirtiness.**

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

**YES :** Refer to, Throttle Body (throttle valve area) Cleaning P.13A-638.
**NO :** Go to Step 5.

**STEP 5. Check the ignition timing.**
Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**
**YES :** Go to Step 6.
**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check the fuel pressure.**
Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**
**YES :** Go to Step 7.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the injector.**
- Injector check (Refer to P.13A-648).

**Q: Is the measured resistance normal?**
**YES :** Go to Step 8.
**NO :** Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check of harness damage in power supply line between MFI relay connector and injector connector.**

**Q: Are the harness wires in good condition?**
**YES :** Go to Step 9.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**
**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 10.

**STEP 10. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**
**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 11.

**STEP 11. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Check fuel lines for clogging.
b. Check if fuel is contaminated.
c. Check if the injectors are clogged.
Then confirm that the malfunction symptom is eliminated.

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

**Inspection procedure 6: 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:)

- Fuel pump system failed.
- Ignition system failed.
- Injector system failed.
- Poor compression.
- Contaminated fuel.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), 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-599.
  a. Item 1: Power Supply Voltage
  b. Item 6: Engine Coolant Temperature Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
  a. Item 9: Fuel Pump
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**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. Check the ignition timing.**

Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 5.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check the fuel pressure.**
Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**
**YES :** Go to Step 6.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check the injector.**
- Injector check (Refer to P.13A-648).

**Q: Is the measured resistance normal?**
**YES :** Go to Step 7.
**NO :** Replace the faulty injector. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check of harness damage in power supply line between MFI relay connector and injector connector.**

**Q: Are the harness wires in good condition?**
**YES :** Go to Step 8.
**NO :** Repair them. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check of open circuit, short circuit to ground and harness damage in control line between injector connector and ECM connector.**

**Q: Are the harness wires in good condition?**
**YES :** Go to Step 9.
**NO :** Repair them. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the ignition system.**
(1) Connect the timing light to terminal power supply line of the ignition coil connectors in order.
(2) Crank the engine.
- The timing light flashes.

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

**Q: Does the timing light flash?**
**YES :** Go to Step 10.
**NO :** Refer to Inspection Procedure 26 – Ignition Circuit System P.13A-577.

**STEP 10. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**
**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 11.

**STEP 11. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 12.

**STEP 12. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Check if fuel is contaminated.
b. Check if the injectors are clogged.
Then confirm that the malfunction symptom is eliminated.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 7: Unstable idle (rough idle, hunting)

### COMMENT

- In cases such as the above, the cause is probably the air/fuel mixture. Other systems affecting idle quality include the ignition system and compression.

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

- Fuel pump system failed.
- Ignition system failed.
- Injector system failed.
- Poor compression.
- Evaporative emission control system failed.
- Improper operation of the PCV valve.
- Charging system failed.
- Vacuum leak.
- Contaminated fuel.
- Variable valve timing control (MIVEC) system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC)**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), 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-618.
   a. Item 1: Injectors
   b. Item 10: Evaporative Emission Purge Solenoid
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), 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-599.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item 10: Mass Airflow Sensor
   d. Item 36: Intake V.V.T. Phase Angle
   e. Item 76: A/C Switch
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 4.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check the fuel pressure.**

Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 5.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check the ignition timing.**
Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**
**YES :** Go to Step 6.
**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Measure the output voltage at ECM connector by backprobing.**
(1) Do not disconnect the connector.
(2) Start the engine and run at idle.
*NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.*
(3) Measure the voltage between terminal ALTG line and ground by backprobing.
a. Engine: warming up, idling
b. Radiator fan: stopped
c. Headlight: OFF to ON
d. Stop light: OFF to ON
e. Rear defogger switch: OFF to ON
- Voltage should increase.

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

**Q: Did the measured voltage increase?**
**YES :** Go to Step 7.
**NO :** Replace the generator. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**
**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 8.

**STEP 8. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**
**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 9.

**STEP 9. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Go to Step 10.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 10. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Go to Step 11.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 11. Check the evaporative emission control system.**
Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Control System Check (purge flow check) P.17-55.

**Q: Is the evaporative emission control system normal?**

**YES :** Check the following items, and repair or replace the defective items.
1. Vacuum leak.
2. Check if fuel is contaminated.
3. Check if the injectors are clogged.

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

## Inspection procedure 8: Idle speed is high (improper idle speed)

### COMMENT

- In such cases as the above, the cause is probably that the intake air volume during idle is too great.

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

- Engine coolant temperature sensor signal failed.
- Accelerator pedal position sensor (main) signal failed.
- Accelerator pedal position sensor (sub) signal failed.
- A/C switch signal failed.
- Evaporative emission control system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A

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- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), 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-599.
  a. Item 6: Engine Coolant Temperature Sensor
  b. Item 11: Accelerator Pedal Position Sensor (main)
  c. Item 12: Accelerator Pedal Position Sensor (sub)
  d. Item 76: A/C Switch
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Purge Solenoid Check P.17-56.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 9: Idle speed is low (improper idle speed) <M/T>**

## COMMENT

- In cases such as the above, the cause is probably that the intake air volume during idle is too small.

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

- Engine coolant temperature sensor signal failed.
- Dirtiness around throttle valve.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
a. Item 6: Engine Coolant Temperature Sensor
Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 9: Idle speed is low (improper idle speed) <CVT>**

## COMMENT

- In cases such as the above, the cause is probably that the intake air volume during idle is too small.

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

- Engine coolant temperature sensor signal failed.
- Torque converter failed.
- Dirtiness around throttle valve.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)

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- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 6: Engine Coolant Temperature Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Refer to GROUP 23A, Diagnosis – Torque Converter Stall Test P.23A-128.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 10: When the engine is cold, it stalls at idle (die out)

### COMMENT

- In such cases as the above, the air/fuel mixture may be inappropriate when the engine is cold.

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

- Fuel pump system failed.
- Ignition system failed.
- Poor compression.
- Improper engine oil viscosity.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable

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- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
   a. Item 1: Injectors
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. STEP 1. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
   a. Item 6: Engine Coolant Temperature Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 4.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check the ignition timing.**

Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 5.
**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check the fuel pressure.**
Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 6.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 7.

**STEP 7. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 8.

**STEP 8. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Check the engine oil viscosity, and replace the engine oil. Then confirm that the malfunction symptom is eliminated.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 11: When the engine is hot, it stalls at idle (die out)

### COMMENT

- In cases such as the above, the ignition system, air/fuel mixture or compression pressure may be faulty. In addition, if the engine suddenly stalls, the cause may also be a connector damage.

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

- Fuel pump system failed.
- Ignition system failed.
- Poor compression.
- Improper operation of the PCV valve.
- Vacuum leak.
- Dirtiness around throttle valve.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)

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- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
   a. Item 1: Injectors
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), 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-599.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item 13: Throttle Position Sensor (main)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 4.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Inspection of throttle body (throttle valve area) for dirtiness.**

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

**YES :** Refer to, Throttle Body (throttle valve area) Cleaning P.13A-638.

**NO :** Go to Step 5.

**STEP 5. Check the fuel pressure.**

Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 6.

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

**STEP 6. Check the ignition timing.**

Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 7.

**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 8.

**STEP 8. Check the ignition coil.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 9.

**STEP 9. Check the compression pressure.**

Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Go to Step 10.

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

**STEP 10. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Go to Step 11.

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

**STEP 11. Engine stall reproduction test.**

**Q: Is it easy to reproduce the engine stall?**

**YES :** Check the following items, and repair or replace the defective items.

a. Vacuum leak.
b. Check if fuel is contaminated.
c. Check if the injectors are clogged.
d. Check if the foreign materials (water, diesel fuel, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

**NO :** Check if the following signals change suddenly by wiggling the circuit harness and connectors.

a. Crankshaft position sensor signal.
b. Mass airflow sensor signal.
c. Injector drive signal.
d. Primary and secondary ignition signal.
e. Fuel pump drive signal.
f. ECM power supply voltage.

Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 12: The engine stalls when accelerating (pass out)

### COMMENT

- In case such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed.

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

- Ignition system failed.
- Evaporative emission control system failed.
- Improper operation of the PCV valve.
- Vacuum leak.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicles Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC)**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
   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 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 4.

**STEP 4. Check the ignition coil.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 5.

**STEP 5. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Check the following item, and repair or replace the defective item.
a. Vacuum leak.
Then confirm that the malfunction symptom is eliminated.

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

**Inspection procedure 13: The engine stalls when decelerating**

## COMMENT

- Abnormal air/fuel ratio or other similar defects due to insufficient intake air volume is suspected to be the causes.

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

- Ignition system failed.
- Dirtiness around throttle valve.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**
**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Inspection of throttle body (throttle valve area) for dirtiness.**

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

**YES :** Refer to, Throttle Body (throttle valve area) Cleaning P.13A-638.

**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), 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-599.
  a. Item 11: Accelerator Pedal Position Sensor (main)
  b. Item 12: Accelerator Pedal Position Sensor (sub)
  c. Item 13: Throttle Position Sensor (main)
  d. Item 15: Throttle Position Sensor (sub)
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 4.

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

**STEP 4. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.

**NO :** Check the ignition coil (Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27). Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 14: Hesitation, sag, stumble, poor acceleration or surge

### COMMENT

- Defective ignition system, abnormal air/fuel ratio, poor compression pressure, etc. are suspected.

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

- Fuel pump system failed.
- Ignition system failed.
- Poor compression.
- Improper operation of the PCV valve.
- Vacuum leak.
- Clogged air cleaner.
- Clogged exhaust system.
- CVT system failed. <CVT>
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

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- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

*NOTE: To protect the CVT, the TCM outputs, into the ECM, the request signal to reduce the engine torque according to the operation condition. Based on the signal, the ECM closes the throttle valve, retards the ignition or carries out fuel cut. At that time, the engine output seems to temporarily reduce, but there is no malfunction. <CVT>*

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 3. <M/T>
**NO :** Go to Step 2. <CVT>

**STEP 2. Using scan tool (M.U.T.-III), read the other system diagnostic trouble code (DTC).**

*NOTE: When the CVT has a malfunction, the TCM might output the request signal of reducing the engine torque in order to protect the CVT.*

(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the TCM-DTC stored?**

**YES :** Refer to GROUP 23A, Diagnosis – Diagnostic Trouble Code Chart P.23A-16.
**NO :** Go to Step 3.

**STEP 3. Using scan tool (M.U.T.-III), check actuator test.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-618.
   a. Item 1: Injectors
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are thy operating properly?**

**YES :** Go to Step 4.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

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**STEP 4. Check the ignition timing.**

(1) Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 5.

**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 5 Using scan tool (M.U.T.-III), 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-599.

a. Item 5: Intake Air Temperature Sensor
b. Item 6: Engine Coolant Temperature Sensor
c. Item 11: Accelerator Pedal Position Sensor (main)
d. Item 12: Accelerator Pedal Position Sensor (sub)
e. Item 13: Throttle Position Sensor (main)
f. Item 15: Throttle Position Sensor (sub)

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

**Q: Are they operating properly?**

**YES :** Go to Step 6.

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

**STEP 6. Check the fuel pressure.**

Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 7.

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

**STEP 7. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 8.

**STEP 8. Check the ignition coil.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 9.

**STEP 9. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Vacuum leak.
b. Clogged air cleaner.
c. Clogged exhaust system.
d. Check if fuel is contaminated.
e. Check if the injectors are clogged.
f. Check compression pressure.
g. Check if the foreign materials (water, diesel fuel, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

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

**Inspection procedure 15: Acceleration shock**

## COMMENT

- There may be an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.

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

- Ignition system failed.
- CVT system failed. <CVT>
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

*NOTE: To protect the CVT, the TCM outputs, into the ECM, the request signal to reduce the engine torque according to the operation condition. Based on the signal, the ECM closes the throttle valve, retards the ignition or carries out fuel cut. At that time, the engine output seems to temporarily reduce, but there is no malfunction. <CVT>*

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 3. <M/T>
**NO :** Go to Step 2. <CVT>

**STEP 2. Using scan tool (M.U.T.-III), read the other system diagnostic trouble code (DTC).**

*NOTE: When the CVT has a malfunction, the TCM might output the request signal of reducing the engine torque in order to protect the CVT.*

(1) Turn the ignition switch to the "ON" position.
(2) Read the TCM-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the TCM-DTC stored?**

**YES :** Refer to GROUP 23A, Diagnosis – Diagnostic Trouble Code Chart P.23A-16.
**NO :** Go to Step 3.

**STEP 3. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 4.

**STEP 4. Check the ignition coil.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Check for occurrence of ignition leak. Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 16: Knocking**

## COMMENT

- Incases such as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate.

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

- Defective knock sensor.
- Incorrect heat value of the spark plug.
- Poor compression.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 32: Knock Retard
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.
**NO :** Refer to, DTC P0327 – Knock Sensor Circuit Low P.13A-255, DTC P0328 – Knock Sensor Circuit High P.13A-258.

**STEP 3. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 4.

**STEP 4. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Check if fuel is contaminated.
b. Check if the foreign materials (water, diesel fuel, etc.) got into fuel.
Then confirm that the malfunction symptom is eliminated.

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

## Inspection procedure 17: Dieseling (run-on)

### COMMENT
- Fuel leakage from injectors is suspected, or carbon build up.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)
- Fuel leakage from injectors.

### DIAGNOSIS
Replace the leaking injector. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 18: Too high CO and HC concentration when idling

### COMMENT
- Abnormal air/fuel ratio is suspected.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)
- Fuel pump system failed.
- Heated oxygen sensor failed.
- Ignition system failed.
- Poor compression.
- Improper operation of the PCV valve.
- Evaporative emission control system failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 2.

**STEP 2. Check the ignition timing.**

Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 3.
**NO :** Check for installed conditions of the timing chain. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), 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-599.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item AD: Heated Oxygen Sensor (rear)
   d. Item E1: Linear Air-fuel Ratio Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Are they operating properly?**

**YES :** Go to Step 4.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check the fuel pressure.**

Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 5.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check the spark plugs.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 6.

**STEP 6. Check the ignition coil.**
Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 7.

**STEP 7. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Go to Step 8.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Go to Step 9.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the evaporative emission control system.**
Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Control System Check (purge flow check) P.17-55.

**Q: Is the evaporative emission control system normal?**

**YES :** Check the following item, and repair or replace the defective item.
a. Check if the injectors are clogged.
Then confirm that the malfunction symptom is eliminated.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 19: Transient, mass emission tailpipe test failure**

## COMMENT

- The test is failed when the air/fuel ratio is not controlled to the ideal air/fuel ratio. This occurs due to the feedback control by heated oxygen sensor signals, or deteriorated catalyst.

*NOTE: If the three-way catalyst temperature is low when checking the exhaust gas, the three-way catalyst cannot sufficiently clean the emissions. Warm up the engine sufficiently before checking the exhaust, and check immediately.*

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

- Air/fuel ratio control system failed.
- Fuel pump system failed.
- Ignition system failed.
- Poor compression.
- Improper operation of the PCV valve.
- Evaporative emission control system failed.
- Deteriorated catalyst.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check the exhaust gas with the engine at normal operating temperature.**

**Q: Was the exhaust gas checked with engine warmed sufficiently?**

**YES :** Go to Step 2.
**NO :** Check it again after enough warm up.

**STEP 2. Check the following items.**

(1) Check the following items.
  a. Check all vacuum hoses and connectors.
  b. Check electrical wires and connectors for obvious problems.

**Q: Are they normal?**

**YES :** Go to Step 3.
**NO :** Repair or replace it. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Check the driveability.**

**Q: Is the driveability normal?**

**YES :** Go to Step 4.
**NO :** Refer to, Symptom Chart P.13A-52.

**STEP 4. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Go to Step 5.

**STEP 5. Check the ignition timing.**

Refer to GROUP 11A, On-vehicle Service – Ignition Timing Check P.11A-11.

**Q: Is the ignition timing normal?**

**YES :** Go to Step 6.
**NO :** Check that the crankshaft position sensor and timing chain case are in the correct position. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Using scan tool (M.U.T.-III), 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-599.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item BB: Barometric Pressure Sensor
   d. Item E1: Linear Air-fuel Ratio Sensor
(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 scan tool (M.U.T.-III), check data list item AD: Heated Oxygen Sensor (rear).**

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item AD, Heated Oxygen Sensor (rear).
  a. Transaxle: 2nd speed
  b. Drive with wide open throttle
  c. Engine: 3,500 r/min or more
    - The output voltages should be between 0.6 and 1.0 volt.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 8.
**NO :** Refer to, P0137 – Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-172, DTC P0138 – Heated Oxygen Sensor (rear) Circuit High Voltage P.13A-177, DTC P0139 – Heated Oxygen Sensor (rear) Circuit Slow Response P.13A-180, DTC P0140 – Heated Oxygen Sensor (rear) Circuit No Activity Detected P.13A-183.

**STEP 8. Check the fuel pressure.**

Refer to, Fuel Pressure Test P.13A-639.

**Q: Is the fuel pressure normal?**

**YES :** Go to Step 9.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the spark plugs.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Spark Plug Check and Cleaning P.16-28.

**Q: Are there any abnormalities?**

**YES :** Replace the spark plug. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 10.

**STEP 10. Check the ignition coil.**

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 11.

**STEP 11. Check the compression pressure.**
Refer to GROUP 11A, On-vehicle Service – Compression Pressure Check P.11A-16.

**Q: Is the compression pressure normal?**

**YES :** Go to Step 12.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 12. Check the positive crankcase ventilation system.**
Refer to GROUP 17, Emission Control – Positive Crankcase Ventilation System – Crankcase Ventilation System Check P.17-52.

**Q: Is the positive crankcase ventilation system normal?**

**YES :** Go to Step 13.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 13. Check the evaporative emission control system.**
Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Control System Check (purge flow check) P.17-55.

**Q: Is the evaporative emission control system normal?**

**YES :** Go to Step 14.
**NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

**STEP 14. Check the following items.**
(1) Check the following items.
a. Check the injectors for fuel leakage.
b. Check if the injectors are clogged.

**Q: Are there any abnormalities?**

**YES :** Replace it. Then confirm that the malfunction symptom is eliminated.
**NO :** Replace the catalytic converter. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 20: Purge flow test of the evaporative emission canister failure

### COMMENT

- The test fails when the purge line or purge port is clogged or if the evaporative emission purge solenoid fails.

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

- Purge line or purge port is clogged.
- Evaporative emission purge solenoid failed.
- Evaporative emission canister is clogged.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A

- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(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 any DTC stored?**

**YES :** Refer to, Diagnostic Trouble Code Chart P.13A-47.
**NO :** Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Control System Check (purge flow check) P.17-55.

## Inspection procedure 21: Pressure test of the evaporative system failure

### COMMENT

- The test fails if there is a leak from the fuel tank or vapor line.

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

- Loose fuel tank filler tube cap.
- Broken seal in fuel tank, vapor line evaporative emission canister.

### DIAGNOSIS

**STEP 1. Check the evaporative emission purge solenoid.**

Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Purge Solenoid Check P.17-56.

**Q: Is the evaporative emission purge solenoid normal?**

**YES :** Go to Step 2.
**NO :** Replace the evaporative emission purge solenoid. Then confirm that the malfunction symptom is eliminated.

**STEP 2. Check the evaporative emission ventilation solenoid.**

Refer to GROUP 17, Emission Control – Evaporative Emission Canister and Fuel Tank Pressure Relief Valve – Inspection P.17-58.

**Q: Is the evaporative emission ventilation solenoid normal?**

**YES :** Check the following items, and repair or replace the defective items.
a. Check for leaks from the vapor line or evaporative emission canister.
b. Check for leaks from the fuel tank.
Then confirm that the malfunction symptom is eliminated.

**NO :** Replace the evaporative emission ventilation solenoid. Then confirm that the malfunction symptom is eliminated.

**Inspection procedure 22: Power supply system and ignition switch-IG system**

## CIRCUIT OPERATION

- Battery positive voltage is applied to the MFI relay.
- When the ignition switch is turned to the "ON" position, battery positive voltage is applied to the ECM terminal IGN. When battery positive voltage is applied, the ECM terminal C/R turns the power transistor in the ECM "ON" and grounds the MFI relay coil. With this, the MFI relay turns "ON" the battery positive voltage is supplied to the ECM terminal BAT1 from the MFI relay.
- A battery positive voltage is constantly supplied to the ECM terminal BACK as the backup power.
- The ECM terminals GNDB and GNDE are grounded to the vehicle body.

## COMMENT

- When the ignition switch "ON" signal is input into the ECM via ETACS-ECU, the ECM turns "ON" the MFI relay. This causes battery positive voltage to be supplied to the ECM, sensor and actuator.

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

- Ignition switch failed <Vehicles without KOS>
- IG1 relay failed <Vehicles with KOS>.
- MFI relay failed.
- Open or shorted ignition switch-IG circuit, harness damage or connector damage.
- Open or shorted MFI relay control circuit, harness damage or connector damage.
- Open or shorted power supply circuit, harness damage or connector damage.
- Open or shorted battery backup line, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**STEP 1. Check the MFI relay.**
Refer to MFI Relay Continuity Check P.13A-644.

**Q: Is the MFI relay normal?**

**YES :** Go to Step 2.
**NO :** Replace the MFI relay. Then confirm that the malfunction symptom is eliminated.

**STEP 2. Measure the power supply voltage at MFI relay harness side connector.**
(1) Disconnect the MFI relay and measure at the relay box side.
(2) Measure the voltage between terminals power supply line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 3.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in power supply line between fusible link and MFI relay connector. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Measure the ignition switch-IG signal voltage at ECM harness side connector.**
(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal IGN line and ground.
- Voltage should be battery positive voltage.

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

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

**YES <Vehicles without KOS> :** Go to Step 6.
**YES <Vehicles with KOS> :** Go to Step 7.
**NO <Vehicles without KOS> :** Go to Step 4.
**NO <Vehicles with KOS> :** Go to Step 5.

**STEP 4. Check the ignition switch**
Refer to GROUP 54A, ignition switch – Inspection – Ignition Switch Continuity Check P.54A-12.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition switch. Then confirm that the malfunction symptom is eliminated.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in power supply line between ignition switch connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check of open circuit and short circuit to ground between IG1 relay connector and ECM connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in power supply line between IG1 relay connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check of harness damage in IGN line between ignition switch connector and ECM connector.**

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

**YES :** Go to Step 8.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check for harness damage in IGN line between IG1 relay connector and ECM connector.**

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

**YES :** Go to Step 8.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Measure the voltage between terminal BACK and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 9.

**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in BACK line between fusible link and ECM connector. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the continuity at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Check for the continuity between terminals GNDB, GNDE and ground.
- Continuity (2 ohms or less).

**Q: Does continuity exist?**

**YES :** Go to Step 10.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and damage in GNDB, GNDE line between ECM connector and body ground. Then confirm that the malfunction symptom is eliminated.

**STEP 10. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Measure the voltage between terminal C/R and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 11.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in C/R line between MFI relay connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**STEP 11. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Short-circuit the terminal C/R line of the ECM harness connector to the ground.
(3) Measure the voltage between terminal BAT1 and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 14.
**NO :** Go to Step 12.

**STEP 12. Check of open circuit and short circuit to ground in BAT1 line between MFI relay connector and ECM connector.**

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

**YES :** Go to Step 13.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 13. Check of harness damage in power supply line between fusible link and MFI relay connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of damage in C/R line between MFI relay connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 14. Check of harness damage in BAT1 line between MFI relay connector and ECM connector.**

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 23: Fuel pump system

### CIRCUIT OPERATION

- The fuel pump drive power is supplied from MFI relay to fuel pump relay.
- The battery positive voltage is applied by the ignition switch <Vehicles without KOS> or the IG1 relay <Vehicles with KOS> to the fuel pump relay coil. The ECM connector terminal FP/R turns "ON" the relay by turning "ON" the power transistor in the unit so as to conduct power to the fuel pump relay coil.
- When the fuel pump relay is turned "ON", the battery positive voltage will be supplied from the fuel pump relay to the fuel pump.

### COMMENT

- When the ignition switch ON signal is inputted into the ECM, the ECM turns ON the fuel pump relay. This causes the battery voltage to be supplied to the fuel pump.

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

- Fuel pump relay failed.
- Fuel pump failed.
- Open or shorted fuel pump circuit, harness damage or connector damage.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check actuator test item 9: Fuel Pump.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the actuator test mode for item 9, Fuel Pump.
- An operation sound of the fuel pump should be heard.

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

**Q: Is the fuel pump operating properly?**

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Check the fuel pump relay.**

Refer to Fuel Pump Relay Continuity Check P.13A-644.

**Q: Is the fuel pump relay normal?**

**YES :** Go to Step 3.
**NO :** Replace the fuel pump relay. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Measure the power supply voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal FP/R line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 4. Check of open circuit and short circuit to ground in FP/R line between fuel pump relay connector and ECM connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit and short circuit to ground in coil power supply line between J/B connector IG1 terminal and fuel pump relay connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Measure the power supply voltage at fuel pump relay harness side connector.**

(1) Disconnect the fuel pump relay and measure at the J/B side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal switch side power supply line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 6.

**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in power supply line between MFI relay connector and fuel pump relay connector. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check the fuel pump operation.**

Refer to Fuel Tank pomp Operation Check P.13A-642.

**Q: Is the fuel pump operating properly?**

**YES :** Go to Step 7.

**NO :** Replace the fuel pump module. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check the continuity at fuel pump harness side connector.**

(1) Disconnect the fuel pump module connector and measure at the harness side.
(2) Check for the continuity between terminal ground line and body ground.
- Continuity (2 ohms or less).

**Q: Does continuity exist?**

**YES :** Go to Step 8.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and damage in ground line between fuel pump module connector and body ground. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Measure the power supply voltage at fuel pump harness side connector.**

(1) Disconnect the fuel pump module connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal power supply line and ground.
- Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 12.
**NO :** Go to Step 9.

**STEP 9. Check of open circuit and short circuit to ground in power supply line between fuel pump relay connector and fuel pump module connector.**

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

**YES :** Go to Step 10.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 10. Check of harness damage in FP/R line between fuel pump relay connector and ECM connector.**

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

**YES :** Go to Step 11.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 11. Using scan tool (M.U.T.-III), check actuator test item 9: Fuel Pump.**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the actuator test mode for item 9, Fuel Pump.
- An operation sound of the fuel pump should be heard.

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

**Q: Is the fuel pump operating properly?**

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**STEP 12. Check of harness damage between MFI relay connector and fuel pump relay connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of damage in switch side power supply line between MFI relay connector and fuel pump relay connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

## Inspection procedure 24: Ignition switch-ST system and starter relay system <M/T>

### CIRCUIT OPERATION

- If the clutch interlock switch is ON (when the clutch pedal is depressed.) and the ignition switch is turned to "START" position, battery positive voltage is supplied to starter relay coil. With this, the starter relay turns "ON" the battery positive voltage is supplied to the starter motor terminal from the battery.

### COMMENT

- Faulty starting system and the related circuit are suspected to be the causes.

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

- Battery failed.
- Ignition switch failed. <Vehicles without KOS>
- KOS&OSS-ECU failed. <Vehicles with KOS>
- Starter relay failed.
- Starter motor failed.
- Open or shorted starting system circuit, harness damage or connector damage.
- Clutch interlock switch failed.
- ECM failed.

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long

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- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list item 79: Cranking Signal.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 79, Cranking Signal.
  - When the engine is stopped, "OFF" should be displayed.
  - When the engine is cranked, "ON" should be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the operating properly?**

**YES :** Go to Step 8.
**NO :** Go to Step 2.

**STEP 2. Measure the ignition switch-ST signal voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal ST line and ground.
  - Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5. <Vehicles without KOS>
**YES :** Go to Step 6. <Vehicles with KOS>
**NO :** Go to Step 3. <Vehicles without KOS>
**NO :** Go to Step 4. <Vehicles with KOS>

**STEP 3. Check the ignition switch.**

Refer to GROUP 54A, Ignition Switch – Inspection – Ignition Switch Continuity Check P.54A-12.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition switch. Then confirm that the malfunction symptom is eliminated.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in ST line between ignition switch connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check of open circuit and short circuit to ground in ST line between KOS&OSS-ECU connector and ETACS-ECU connector.**

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

**YES :** Perform troubleshooting of KOS System (Refer to GROUP 42B – Troubleshooting – Trouble Symptom Chart P.42B-77).

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check of harness damage in ST line between ignition switch connector and ECM connector.**

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

**YES :** Go to Step 7.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check of harness damage in ST line between KOS&OSS-ECU connector and ECM connector.**

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

**YES :** Go to Step 7.

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

**STEP 7. Using scan tool (M.U.T.-III), check data list item 79: Cranking Signal.**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the data reading mode for item 79, Cranking Signal.
- When the engine is stopped, "OFF" should be displayed.
- When the engine is cranked, "ON" should be displayed.

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

**Q: Is the operating properly?**

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check the starter relay.**

(1) Remove the starter relay.
(2) Check for continuity between the starter relay coil terminals.
- There should be continuity.

(3) Use jumper wires to connect starter relay terminal STRL line side to the positive battery terminal and terminal ground line side to the negative battery terminal.
(4) Check for continuity between the starter relay switch side terminals while connecting and disconnecting the jumper wire at the negative battery terminal.
- Continuity (2 ohms or less). <Negative battery terminal connected>
- Should be open loop. <Negative battery terminal disconnected>

(5) Install the starter relay.

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

**YES :** Go to Step 9.
**NO :** Replace the starter relay. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the continuity at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) Check for the continuity between terminal coil ground line and ground.
- Continuity (2 ohms or less).

**Q: Does continuity exist?**

**YES :** Go to Step 10.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and harness damage in coil ground line between starter relay connector and body ground. Then confirm that the malfunction symptom is eliminated.

**STEP 10. Measure the power supply voltage at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) The clutch pedal is depressed.
(3) Turn the ignition switch to the "START" position.
(4) Measure the voltage between terminal STRL line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 15.
**NO :** Go to Step 11.

**STEP 11. Check the clutch interlock switch.**
Refer to GROUP 21A, On-vehicle Servicer – Interlock Switch Check and Adjustment P.21A-3.

**Q: Is the clutch interlock switch normal?**

**YES :** Go to Step 12.
**NO :** Replace the clutch interlock switch. Then confirm that the malfunction symptom is eliminated.

**STEP 12. Measure the power supply voltage at clutch interlock switch harness side connector.**
(1) Disconnect the clutch interlock switch connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal STRL line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in power supply line between clutch interlock relay and starter relay. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 13.

**STEP 13. Check of open circuit and short circuit to ground in STRL line between ECM connector and clutch interlock switch connector.**

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

**YES :** Go to Step 14.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 14. Using scan tool (M.U.T.-III), check data list item 102: Starter Relay.**
(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the data reading mode for item 102, Starter Relay.
- When the engine is stopped, "OFF" should be displayed.
- When the engine is cranked, "ON" should be displayed.

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

**Q: Is the operating properly?**

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.
**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

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**STEP 15. Measure the power supply voltage at starter harness side connector.**

(1) Disconnect the starter motor magnetic switch connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal starter relay output line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 16. Measure the power supply voltage at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 17.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in power supply line between fusible link and starter relay connector. Then confirm that the malfunction symptom is eliminated.

**STEP 17. Check of open circuit and short circuit to ground in starter relay output line between starter relay connector and starter connector.**

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

**YES :** Go to Step 18.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 18. Check of short circuit to ground in STCD line between starter relay connector and ECM connector.**

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

**YES :** Go to Step 19.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 19. Check of harness damage in STRL line between ECM connector and clutch interlock switch connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of damage in power supply line between clutch interlock switch connector and starter relay connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 20. Check of harness damage in output line between starter relay connector and starter connector.**

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

**YES :** Go to Step 21.

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

**STEP 21. Check of harness damage in power supply line between fusible link and starter relay connector.**

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

**YES :** Go to Step 22.

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

**STEP 22. Check of open circuit, short circuit to ground and harness damage in battery line between battery and starter connector.**

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

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

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

## Inspection procedure 25: Ignition switch-ST system and starter relay system <CVT>

### CIRCUIT OPERATION

- If the transmission range switch is ON (when the clutch pedal is depressed.) and the ignition switch is turned to "START" position, battery positive voltage is supplied to starter relay coil. With this, the starter relay turns "ON" the battery positive voltage is supplied to the starter motor terminal from the battery.

### COMMENT

- Faulty starting system and the related circuit are suspected to be the causes.

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

- Battery failed.
- Ignition switch failed. <Vehicles without KOS>
- KOS&OSS-ECU failed. <Vehicles with KOS>
- Starter relay failed.
- Starter motor failed.
- Open or shorted starting system circuit, harness damage or connector damage.
- Transmission range switch failed.
- ECM failed.

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## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list item 79: Cranking Signal.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 79, Cranking Signal.
  - When the engine is stopped, "OFF" should be displayed.
  - When the engine is cranked, "ON" should be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the operating properly?**

**YES :** Go to Step 8.
**NO :** Go to Step 2.

**STEP 2. Measure the ignition switch-ST signal voltage at ECM harness side connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal ST line and ground.
  - Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5. <Vehicles without KOS>
**YES :** Go to Step 6. <Vehicles with KOS>
**NO :** Go to Step 3. <Vehicles without KOS>
**NO :** Go to Step 4. <Vehicles with KOS>

**STEP 3. Check the ignition switch.**

Refer to GROUP 54A, Ignition Switch – Inspection – Ignition Switch Continuity Check P.54A-12.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition switch. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in ST line between ignition switch connector and ECM connector. Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check of open circuit and short circuit to ground in ST line between KOS&OSS-ECU connector and ETACS-ECU connector.**

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

**YES :** Perform troubleshooting of KOS System (Refer to GROUP 42B – Troubleshooting – Trouble Symptom Chart P.42B-77).

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check of harness damage in ST line between ignition switch connector and ECM connector.**

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

**YES :** Go to Step 7.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 6. Check of harness damage in ST line between KOS&OSS-ECU connector and ECM connector.**

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

**YES :** Go to Step 7.

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

**STEP 7. Using scan tool (M.U.T.-III), check data list item 79: Cranking Signal.**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the data reading mode for item 79, Cranking Signal.
- When the engine is stopped, "OFF" should be displayed.
- When the engine is cranked, "ON" should be displayed.

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

**Q: Is the operating properly?**

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check the starter relay.**

(1) Remove the starter relay.
(2) Check for continuity between the starter relay coil terminals.
- There should be continuity.

(3) Use jumper wires to connect starter relay terminal STRL line side to the positive battery terminal and terminal ground line side to the negative battery terminal.
(4) Check for continuity between the starter relay switch side terminals while connecting and disconnecting the jumper wire at the negative battery terminal.
- Continuity (2 ohms or less). <Negative battery terminal connected>
- Should be open loop. <Negative battery terminal disconnected>

(5) Install the starter relay.

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

**YES :** Go to Step 9.

**NO :** Replace the starter relay. Then confirm that the malfunction symptom is eliminated.

**STEP 9. Check the continuity at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) Check for the continuity between terminal coil ground line and ground.
- Continuity (2 ohms or less).

**Q: Does continuity exist?**

**YES :** Go to Step 10.

**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit and harness damage in coil ground line between starter relay connector and body ground. Then confirm that the malfunction symptom is eliminated.

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**STEP 10. Measure the power supply voltage at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) The clutch pedal is depressed.
(3) Turn the ignition switch to the "START" position.
(4) Measure the voltage between terminal STRL line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 15.
**NO :** Go to Step 11.

**STEP 11. Check the transmission range switch.**

Refer to GROUP 23A, On-vehicle Service – Essential Service – Transmission Range Switch Check P.23A-123.

**Q: Are there any abnormalities?**

**YES :** Replace the transmission range switch. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 12.

**STEP 12. Measure the power supply voltage at transmission range switch harness side connector.**

(1) Disconnect the transmission range switch connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal STRL line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in power supply line between transmission range relay and starter relay. Then confirm that the malfunction symptom is eliminated.
**NO :** Go to Step 13.

**STEP 13. Check of open circuit and short circuit to ground in STRL line between ECM connector and transmission range switch connector.**

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

**YES :** Go to Step 14.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 14. Using scan tool (M.U.T.-III), check data list item 102: Starter Relay.**

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool (M.U.T.-III) to the data reading mode for item 102, Starter Relay.
- When the engine is stopped, "OFF" should be displayed.
- When the engine is cranked, "ON" should be displayed.

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

**Q: Is the operating properly?**

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**STEP 15. Measure the power supply voltage at starter harness side connector.**

(1) Disconnect the starter motor magnetic switch connector and measure at the harness side.
(2) Turn the ignition switch to the "START" position.
(3) Measure the voltage between terminal starter relay output line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 16. Measure the power supply voltage at starter relay harness side connector.**

(1) Disconnect the starter relay connector and measure at the harness side.
(2) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 17.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short to ground in power supply line between fusible link and starter relay connector. Then confirm that the malfunction symptom is eliminated.

**STEP 17. Check of open circuit and short circuit to ground in starter relay output line between starter relay connector and starter connector.**

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

**YES :** Go to Step 18.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 18. Check of short circuit to ground in STCD line between starter relay connector and ECM connector.**

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

**YES :** Go to Step 19.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 19. Check of harness damage in STRL line between ECM connector and transmission range switch connector.**

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

**YES :** Repair or replace the connector(s), or check and repair the harness of damage in power supply line between transmission range switch connector and starter relay connector. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 20. Check of harness damage in output line between starter relay connector and starter connector.**

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

**YES :** Go to Step 21.

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

**STEP 21. Check of harness damage in power supply line between fusible link and starter relay connector.**

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

**YES :** Go to Step 22.

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

**STEP 22. Check of open circuit, short circuit to ground and harness damage in battery line between battery and starter connector.**

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

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

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

**Inspection procedure 26: Ignition circuit system**

## CIRCUIT OPERATION

- The battery positive voltage is applied from the ignition switch <vehicles without KOS> or the IG1 relay <vehicles with KOS> to the ignition coil and is grounded to the vehicle body via the ignition coil.
- A power voltage of 5 V is applied to the ignition coil from the ECM connector terminals CIL1, CIL2 and CIL3.

## COMMENT

- When the ECM turn the power transistor in the unit to OFF, the battery positive voltage is applied to the power transistor in the ignition coil, resulting that the power transistor is ON. And, when the ECM turns the power transistor in the unit to ON, the power transistor in the ignition coil will be turned OFF.
- When the power transistor in the ignition coil is turned to ON with any signal from the ECM, the primary voltage will be applied through the ignition coil. When the power transistor in the ignition coil is turned OFF, the primary current is blocked and high voltage is generated in the secondary coil.

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

- Ignition coil failed.
- Open or shorted ignition circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tool:**

- MB9919658: Test Harness

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

Refer to GROUP 16, Ignition System – On-vehicle Service – Ignition Coil Check P.16-27.

**Q: Are there any abnormalities?**

**YES :** Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.

**NO :** Go to Step 2.

**STEP 2. Measure the power supply voltage at ignition coil harness side connectors.**

(1) Disconnect the ignition coil connectors and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal power supply line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 3.
**NO <Vehicles without KOS> :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in power supply line between ignition coil connector and ignition switch connector.
**NO <Vehicles with KOS> :** Repair or replace the connector(s), or check and repair the harness of open circuit, and short circuit in power supply line between ignition coil connector and IG1 relay connector.

**STEP 3. Check the circuit at ignition coil harness side connector.**

(1) Disconnect the ignition coil connectors and connect test harness special tool MB991658 between the separated connector (All terminals should be connected).
(2) Engine: 3,000 r/min
(3) Measure the voltage between terminal signal line (CIL1, CIL2 or CIL3) and ground.
- Voltage should be between 0.3 and 3.0 volts.

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

**Q: Is the measured voltage between 0.3 and 3.0 volts?**

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

**STEP 4. Check of open circuit and short circuit to ground in signal line between ignition coil connector and ECM connector.**

a. Check the harness wire in CIL1 line between ignition coil connector and ECM connector at ignition coil 1.
b. Check the harness wire in CIL2 line between ignition coil connector and ECM connector at ignition coil 2.
c. Check the harness wire in CIL3 line between ignition coil connector and ECM connector at ignition coil 3.

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.
**NO :** Repair them. Then confirm that the malfunction symptom is eliminated.

**STEP 5. Check the continuity at ignition coil harness side connector.**

(1) Disconnect the connectors and measure at the harness side.
(2) Check for the continuity between terminal ground line and ground.
- Continuity (2 ohms or less).

**Q: Does continuity exist?**

**YES <vehicles without KOS> :** Go to Step 6.
**YES <vehicles with KOS> :** Go to Step 7.
**NO :** Repair or replace the connector(s), or check and repair the harness of open circuit, and damage in ground line between ignition coil connectors and body ground.

**STEP 6. Check of harness damage between ignition coil connector and ignition coil connector.**

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

**YES :** Go to Step 8.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 7. Check of harness damage between IG1relay connector and ignition coil connector.**

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

**YES :** Go to Step 8.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 8. Check for harness damage in signal line between ignition coil connector and ECM connector.**

a. Check the harness wire in CIL1 line between ignition coil connector and ECM connector at ignition coil 1.
b. Check the harness wire in CIL2 line between ignition coil connector and ECM connector at ignition coil 2.
c. Check the harness wire in CIL3 line between ignition coil connector and ECM connector at ignition coil 3.

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.
**NO :** Repair them. Then confirm that the malfunction symptom is eliminated.

## Inspection Procedure 27: A/C Switch System <Manual A/C>

### CIRCUIT OPERATION

- Battery voltage is applied to the A/C switch connector terminal from the ECM connector terminal AC/S.

### COMMENT

- When the air conditioning switch is turned on, the ECM will receive the A/C ON signal from the switch. The ECM uses this signal to control the A/C compressor relay.

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

- Failed A/C switch of heater control unit
- Open/short circuit or harness damage in A/C switch circuit or loose connector contact
- Failed ECM

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 76: A/C switch
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the A/C switch condition 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 Malfunctions P.00-13.
**NO :** Go to Step 2.

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**STEP 2. Check the A/C switch of the heater control unit.**
Check the A/C switch (Refer to GROUP 55A – Heater Control Unit – Air Conditioning Switch Continuity Check P.55A-32).

**Q: Is the A/C switch condition normal?**

**YES :** Go to Step 3.
**NO :** Replace the heater control unit.

**STEP 3. Measure the voltage at heater control unit connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal AC/S line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 4. Check of open circuit, and short to ground in AC/S line between heater control unit connector and ECM connector.**

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

**YES :** Replace the ECM.
**NO :** Repair the connector(s) or wiring harness.

**STEP 5. Check of open circuit, short circuit, and damage in ground line between heater control unit connector and body ground.**

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

**YES :** Go to Step 6.
**NO :** Repair the connector(s) or wiring harness.

**STEP 6. Check of damage in AC/S line between heater control unit connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness.

**STEP 7. Using scan tool (M.U.T.-III), check data list.**
(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 76: A/C switch
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the A/C switch condition 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 Malfunctions P.00-13.
**NO :** Replace the ECM.

## Inspection Procedure 28: A/C Compressor Relay System

### CIRCUIT OPERATION
- Battery voltage is applied to the A/C compressor relay.
- ECM connector terminal AC/R applies current to the A/C compressor relay coil by turning ON the power transistor in the unit in order to turn the relay ON.
- When the A/C compressor relay turns ON, battery voltage is supplied by the A/C compressor relay to the A/C compressor.

### COMMENT
- When the A/C switch ON signal is input into the ECM, the ECM turns ON the A/C compressor relay. This causes battery voltage to be supplied to the A/C compressor assembly and the A/C compressor clutch actuates.

### TROUBLESHOOTING HINTS (The most likely causes for this case:)
- Failed A/C compressor relay
- Failed A/C compressor assembly
- Open/short circuit or harness damage in A/C compressor relay circuit, or loose connector contact.
- Failed ECM

### DIAGNOSIS

**STEP 1. Check A/C compressor relay itself.**
Check A/C compressor relay itself (Refer to GROUP 55A – On-vehicle Service – Relay Check P.55A-21).

**Q: Is the A/C compressor relay condition normal?**
**YES :** Go to Step 2.
**NO :** Replace the A/C compressor relay.

**STEP 2. Measure the voltage at A/C compressor relay.**

(1) Disconnect the connector and measure at relay box side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 3.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in power supply line between battery and A/C compressor relay connector.

**STEP 3. Measure the voltage at A/C compressor relay connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal IG2 line and ground.
- Voltage should be battery positive voltage.

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

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

**YES <Vehicles without KOS> :** Go to Step 4.
**YES <Vehicles with KOS> :** Go to Step 5.
**NO <Vehicles without KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between ignition switch and A/C compressor relay connector.
**NO <Vehicles with KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between IG2 relay and A/C compressor relay connector.

**STEP 4. Check of damage in IG2 line between ignition switch connector and A/C compressor relay connector.**

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

**YES :** Go to Step 6.
**NO :** Repair the connector(s) or wiring harness.

**STEP 5. Check of damage in IG2 line between IG2 relay connector and A/C compressor relay connector.**

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

**YES :** Go to Step 6.
**NO :** Repair the connector(s) or wiring harness.

**STEP 6. Measure the voltage at ECM connector.**
(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal AC/R line and ground.
- Voltage should be battery positive voltage.

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

**Q: Is battery positive voltage (approximately 12 volts) present?**
**YES :** Go to Step 7.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in AC/R line between A/C compressor relay connector and ECM connector.

**STEP 7. Check of damage in AC/R line between A/C compressor relay connector and ECM connector.**

**Q: Is the harness wire in good condition?**
**YES :** Go to Step 8.
**NO :** Repair the connector(s) or wiring harness.

**STEP 8. Check of open circuit, short circuit, and damage in power supply line between A/C compressor relay connector and A/C compressor assembly connector.**

**Q: Is the harness wire in good condition?**
**YES :** Go to Step 9.
**NO :** Repair the connector(s) or wiring harness.

**STEP 9. Check A/C compressor clutch operating conditions.**
Disconnect ECM connector, and short-circuit harness side terminal AC/R to the ground.
- A/C compressor clutch operates.

**Q: Is the actuator operating properly?**
**YES :** Replace the ECM.
**NO :** Replace the A/C compressor assembly.

## Inspection Procedure 29: Fan Control Relay System

### CIRCUIT OPERATION

- The battery voltage is applied to the cooling fan control relay (low) coil and cooling fan control relay (high) coil from the ignition switch <Vehicles without KOS> or IG2 relay <Vehicles with KOS>.
- The ECM connector terminal F/LO and F/HI turns on the switch of the power transistor on the unit, and then turns on the switch of the relay by applying the electrical current to the cooling fan control relay (low) coil or cooling fan control relay (high) coil.
- When the cooling fan control relay (low) is in ON position, the battery voltage is applied to the cooling fan motor from the cooling fan control relay (low).

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- When the cooling fan control relay (low) and cooling fan control relay (high) are in ON position, the battery voltage is applied to the cooling fan motor from the cooling fan control relay (high).

## COMMENT

- When the cooling fan control relay (low) is in ON position, the fan motor rotates with the low speed.
- When the cooling fan control relay (low) and the cooling fan control relay (high) are in ON position, the fan motor rotates with the high speed.

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

- Failed cooling fan control relay
- Failed cooling fan motor
- Open/short circuit in or damage to the cooling fan control relay circuit or loose connector contact
- Failed ECM

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Check cooling fan control relay (low) and cooling fan control relay (high).**

Check cooling fan control relay (Refer to GROUP 14 – On-vehicle Service – Fan Control Relay Continuity Check P.14-8).

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

**YES :** Go to Step 2.
**NO :** Replace cooling fan control relay.

**STEP 2. Check cooling fan motor itself.**

Check cooling fan motor (Refer to GROUP 14 – On-vehicle Service – Cooling Fan Motor Check P.14-9).

**Q: Is the fan motor operating properly?**

**YES :** Go to Step 3.
**NO :** Replace fan motor.

**STEP 3. Measure the voltage at cooling fan control relay (low) connector.**

(1) Disconnect the connector and measure at relay box side.
(2) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 4.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in power supply line between battery and cooling fan control relay (low) connector.

**STEP 4. Perform voltage measurement at cooling fan control relay (low) connector.**

(1) Disconnect the connector and measure at relay box side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal IG2 line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 5.
**NO <Vehicles without KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between ignition switch and cooling fan control relay (low) connector.
**NO <Vehicles with KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between IG2 relay and cooling fan control relay (low) connector.

**STEP 5. Measure the voltage at cooling fan control relay (high) connector.**

(1) Disconnect the connector and measure at relay box side.
(2) Measure the voltage between terminal battery line and ground.
- Voltage should be battery positive voltage.

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

**YES :** Go to Step 6.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in power supply line between battery and cooling fan control relay (high) connector.

**STEP 6. Measure the voltage at cooling fan control relay (high) connector.**

(1) Disconnect the connector and measure at relay box side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal IG2 line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 7.
**NO <Vehicles without KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between ignition switch and cooling fan control relay (high) connector.
**NO <Vehicles with KOS> :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in IG2 line between IG2 relay and cooling fan control relay (high) connector.

**STEP 7. Check of damage in power supply line between battery and cooling fan control relay (low) connector.**

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

**YES :** Go to Step 8.
**NO :** Repair the connector(s) or wiring harness.

**STEP 8. Check of damage in power supply line between battery and cooling fan control relay (high) connector.**

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

**YES :** Go to Step 9 <Vehicles without KOS>.
**YES :** Go to Step 11 <Vehicles with KOS>.
**NO :** Repair the connector(s) or wiring harness.

**STEP 9. Check of damage in IG2 line between ignition switch connector and cooling fan control relay (low) connector.**

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

**YES :** Go to Step 10.
**NO :** Repair the connector(s) or wiring harness.

**STEP 10. Check of damage in IG2 line between ignition switch connector and cooling fan control relay (high) connector**

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

**YES :** Go to Step 11.
**NO :** Repair the connector(s) or wiring harness.

**STEP 11. Check of damage in IG2 line between IG2 relay connector and cooling fan control relay (low) connector.**

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

**YES :** Go to Step 12.
**NO :** Repair the connector(s) or wiring harness.

**STEP 12. Check of damage in IG2 line between IG2 relay connector and cooling fan control relay (high) connector.**

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

**YES :** Go to Step 13.
**NO :** Repair the connector(s) or wiring harness.

**STEP 13. Measure the voltage at ECM connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal F/LO line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 14.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in F/LO line between cooling fan control relay (low) connector and ECM connector.

**STEP 14. Perform voltage measurement at ECM connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal F/HI line and ground.
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 15.
**NO :** Repair or replace the connector(s), or check and repair the harness of short circuit to ground, and open circuit in F/HI line between cooling fan control relay (high) connector and ECM connector.

**STEP 15. Check of damage in F/LO line between cooling fan control relay (low) connector and ECM connector.**

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

**YES :** Go to Step 16.
**NO :** Repair the connector(s) or wiring harness.

**STEP 16. Check of damage in F/HI line between cooling fan control relay (high) connector and ECM connector.**

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

**YES :** Go to Step 17.
**NO :** Repair the connector(s) or wiring harness.

**STEP 17. Measure the resistance at cooling fan motor connector.**

(1) Disconnect the connector and measure at the relay box side.
(2) Measure the resistance between terminal ground line and ground.
- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 18.
**NO :** Check and repair harness between cooling fan motor connector and body ground. Repair or replace the connector, or check and repair the harness of damage in ground line between cooling fan motor connector and body ground.

**STEP 18. Check of open circuit, short circuit, and damage in power supply line between cooling fan control relay (low) connector and cooling fan motor connector.**

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

**YES :** Go to Step 19.
**NO :** Repair the connector(s) or wiring harness.

**STEP 19. Check of open circuit, short circuit, and damage in power supply line between cooling fan control relay (high) connector and cooling fan motor connector.**

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

**YES :** Go to Step 20.
**NO :** Repair the connector(s) or wiring harness.

**STEP 20. Using scan tool (M.U.T.-III), check actuator test.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T.-III) to the actuator test mode for item 12, Radiator fan relay (high).
- Cooling fan motor rotates at high speed.

(4) Set scan tool (M.U.T.-III) to the actuator test mode for item 13, Radiator fan relay (low).
- Cooling fan motor rotates at low speed.

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

**Q: Are the fan motors operating properly?**

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

## Inspection Procedure 30: Blower Fan Signal System <Manual A/C>

### CIRCUIT OPERATION

- The air volume stage 3 terminal in the blower switch connector sends voltage signal according to the blower switch position (OFF, 1, 2, 3 or 4) to the ECM connector terminal BFAN.

### COMMENT

- The ECM adjusts voltage, which the generator generated, according to the blower switch position.

### PROBABLE CAUSES

- Failed blower switch
- Open/short circuit or harness damage in blower circuit or loose connector contact
- Open/short circuit or harness damage in blower switch position signal circuit or loose connector contact
- Failed ECM

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short

- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
   a. Item 176: Blower fan signal
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the blower switch condition 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 Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Measure the sensor output voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal BFAN line and ground by backprobing.
   - Voltage should be battery positive voltage when blower switch is OFF position.
   - Voltage should be between 3 and 9 volts when blower switch position is "1" or "2".
   - Voltage should be 1 volt or less when blower switch position is "3" or "4".
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**STEP 3. Check of open circuit, short circuit, and damage in BFAN line between ECM connector and blower switch connector.**

**Q: Is the check result normal?**

**YES :** Go to Step 4.
**NO :** Repair the connector(s) or wiring harness.

**STEP 4. Check the blower function..**
The blower speed should correspond to the blower switch position.

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

**YES :** Go to Step 5.
**NO :** Check the blower-related circuit (Refer to GROUP 55A – Troubleshooting – Trouble symptom Chart P.55A-5).

**STEP 5. Using scan tool (M.U.T.-III), check data list.**
(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
  a. Item 176: Blower fan signal
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the switch condition normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13).
**NO :** Replace the ECM.

## Inspection Procedure 31: Defogger Switch Signal System <Manual A/C>

### CIRCUIT OPERATION

- Battery voltage is applied to the defogger switch connector terminal from the ECM connector terminal FDFO.

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

- Failed defogger switch of heater control unit
- Open/short circuit or harness damage in defogger switch circuit or loose connector contact
- Failed ECM

### DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Using scan tool (M.U.T.-III), check data list.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
   a. Item 153: defogger switch
(4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the Defogger switch condition 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 Malfunctions P.00-13.
**NO :** Go to Step 2.

**STEP 2. Check the defogger switch of the heater control unit.**

Check the defogger switch (Refer to GROUP 55A – Heater Control Unit – Defogger Switch Continuity Check P.55A-32).

**Q: Is the Defogger switch condition normal?**

**YES :** Go to Step 3.
**NO :** Replace the heater control unit.

**STEP 3. Measure the voltage at heater control unit connector.**

(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal FDFO line and ground.
   • Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**STEP 4. Check of open circuit, and short to ground in FDFO line between heater control unit connector and ECM connector.**

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

**YES :** Replace the ECM.
**NO :** Repair the connector(s) or wiring harness.

**STEP 5. Check of open circuit, short circuit, and damage in ground line between heater control unit connector and body ground.**

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

**YES :** Go to Step 6.
**NO :** Repair the connector(s) or wiring harness.

**STEP 6. Check of damage in FDFO line between heater control unit connector and ECM connector.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness.

**STEP 7. Using scan tool (M.U.T.-III), check data list.**

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-599.
   a. Item 153: defogger switch
(3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the Defogger switch condition 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 Malfunctions P.00-13.
**NO :** Replace the ECM.

**Inspection Procedure 32: Brake Monitoring Switch System**

## CIRCUIT OPERATION

- Battery voltage is applied to the stop light switch from the ECM connector terminal BRK.

## COMMENT

- The brake monitoring switch detects whether the brake pedal is depressed or not, and sends a signal to the ECM. The ECM compares the stop light signal sent from the ETACS-ECU via the CAN with the brake monitoring switch input signal, and determines whether the input information is reliable. In addition, it sends the brake monitoring switch signal information to other ECUs (such as ETACS-ECU or CVT-ECU) via the CAN.

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

- Failed brake monitoring switch
- Open/short circuit or harness damage in brake monitoring switch circuit or loose connector contact
- Failed ECM

## DIAGNOSIS

**STEP 1. Check for height of brake pedal.**
Check for height of brake pedal (Refer to GROUP 35A – On-vehicle Service – Brake Pedal Check And Adjustment P.35A-13).

**Q: Is the brake pedal condition normal?**

**YES :** Go to Step 2.
**NO :** Adjust the brake pedal height.

**STEP 2. Check the brake monitoring switch.**
Check the stop light switch (Refer to GROUP 35A – Brake Pedal – Inspection – Stop Light Switch Check P.35A-26).

**Q: Is the switch condition normal?**

**YES :** Go to Step 3.
**NO :** Replace the stop light switch.

**STEP 3. Measure the voltage at brake monitoring switch connector**
(1) Disconnect the connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal BRK line and ground.
- Voltage should be battery positive voltage.

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

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

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

**STEP 4. Check of short to ground, and open circuit in BRK line between stop light switch connector and ECM connector.**

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

**YES :** Go to Step 5.
**NO :** Repair the connector(s) or wiring harness.

**STEP 5. Check the trouble symptom.**

**Q: Does the trouble symptom persist?**

**YES :** Replace the ECM.
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-13.

**STEP 6. Check of open circuit, short circuit, and damage in ground line between stop light switch connector and body ground.**

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

**YES :** Go to Step 7.
**NO :** Repair the connector(s) or wiring harness.

**STEP 7. Measure the sensor output voltage at ECM connector by backprobing.**

(1) Do not disconnect the connector.
(2) Start the engine.
(3) Measure the voltage between terminal BRK line and ground by backprobing.
- Voltage should be 1 volt or less when brake pedal released.
- Voltage should be battery positive voltage when brake pedal depressed.

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

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

**YES :** Go to Step 5.
**NO :** Go to Step 8.

**STEP 8. Check of damage in BRK line between brake monitoring switch connector and ECM connector.**

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

**YES :** Replace the stop light switch.
**NO :** Repair the connector(s) or wiring harness.

**Inspection procedure 33: Engine oil pressure switch system**

## CIRCUIT OPERATION

- Battery voltage is applied to the engine oil pressure switch terminal from the ECM terminal OPSW.

## COMMENT

- Detect the engine oil pressure conditions and enter the result into the ECM. After starting the engine if the engine oil pressure rises to higher than the given pressure, the engine oil pressure switch turns OFF. Under this condition the ECM sends the command of turning off the oil warning light to the combination meter via CAN.

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

- Engine oil pressure switch failed.
- Open or shorted engine oil pressure switch circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

**Required Special Tools:**

- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**STEP 1. Measure the power supply voltage at engine oil pressure switch harness side connector.**

(1) Disconnect the engine oil pressure switch connector and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal OPSW line and ground.
  - Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

**STEP 2. Check of open circuit and short circuit to ground in OPSW line between ECM connector and engine oil pressure switch connector.**

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

**YES :** Go to Step 3.
**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

**STEP 3. Using scan tool (M.U.T.-III), check data list item 90: Engine Oil Pressure Switch.**

**⚠ CAUTION**

**To prevent damage to scan tool (M.U.T.-III), always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool (M.U.T.-III).**

(1) Connect scan tool (M.U.T-III). Refer to HOW TO CONNECT THE SCAN TOOL (M.U.T.-III) P.13A-10.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool (M.U.T-III) to the data reading mode for item 90, Engine Oil Pressure Switch.
- When the engine is stopped, "ON" should be displayed.
- When the engine is idling, "OFF" should be displayed.

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

**Q: Is the operating properly?**

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

**NO :** Replace the ECM (Refer to, Removal and Installation P.13A-656). Then confirm that the malfunction symptom is eliminated.

**STEP 4. Check of harness damage in OPSW line between ECM connector and engine oil pressure switch connector.**

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

**YES :** Replace the engine oil pressure switch. Then confirm that the malfunction symptom is eliminated.

**NO :** Repair the connector(s) or wiring harness. Then confirm that the malfunction symptom is eliminated.

## DATA LIST REFERENCE TABLE

M1131152005570

**⚠ CAUTION**

- **When shifting the selector lever to D range, the brakes should be applied so that the vehicle does not move forward.**
- **Driving tests always need two persons: one driver and one observer.**

*NOTE: *1: In a new vehicle [driven approximately 500 km (311 mile) or less], the mass airflow sensor output value is sometimes 10% higher than the standard value.*

*NOTE: *2: The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 volts.*

*NOTE: *3: In a new vehicle [driven approximately 500 km (311 mile) or less], the injector drive time is sometimes 10% longer than the standard time.*

*NOTE: *4: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.*

*NOTE: *5: Data items are displayed on scan tool display, but the in-line 4 engine is not applicable and its data is displayed as "N/A".*

*NOTE: *6: Data items are displayed on the scan tool display, but the hydraulic power steering is not mounted. The data are displayed as "OFF".*

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| A/C compressor relay | 93 | A/C compressor clutch relay | • Engine: warming up, idling<br>• A/C switch: "OFF" | | OFF |
| | | | • Engine: warming up, idling<br>• A/C switch: "ON" | A/C compressor clutch is not operating | OFF |
| | | | | A/C compressor clutch is operating | ON |
| A/C SW | 76 | A/C switch | • Engine: warming up, idling<br>• A/C switch: "OFF" | | OFF |
| | | | • Engine: warming up, idling<br>• A/C switch: "ON" | A/C compressor clutch is not operating | OFF |
| | | | | A/C compressor clutch is operating | ON |
| Absolute load value | 72 | Absolute load value | Engine: warming up | Engine is idling | 10 – 20 % |
| | | | | 2,500 r/min | 10 – 20 % |
| | | | | Revving engine | Load value increases according to amount of revving. |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| Airflow sensor | 10 | Mass airflow sensor*1 | • Engine coolant temperature: 80 – 95°C (176 – 203°F)<br>• Lights, electric cooling fan and all accessories: "OFF"*4<br>• Transaxle: Neutral (CVT: "P" range) | Engine is idling | 760 – 1,080 mV |
| | | | | 2,500 r/min | 1,130 – 1,530 mV |
| | | | | Engine is revved | Increases in response to revving |
| Airflow sensor | AA | Mass airflow sensor*1 | • Engine coolant temperature: 80 – 95°C (176 – 203°F)<br>• Lights, electric cooling fan and all accessories: "OFF"*4<br>• Transaxle: Neutral (CVT: "P" range) | Engine is idling | 0.45 – 2.2 g/s |
| | | | | 2,500 r/min | 2.5 – 6.0 g/s |
| | | | | Engine is revved | Increases in response to revving |
| APP sensor (main) | 11 | Accelerator pedal position sensor (main) | Ignition switch: "ON" | Release the accelerator pedal | 900 – 1,100 mV |
| | | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke |
| | | | | Depress the accelerator pedal fully | 4,000 mV or more |
| APP sensor (main) | BE | Accelerator pedal position sensor (main) | Ignition switch: "ON" | Release the accelerator pedal | 16 – 24 % |
| | | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke |
| | | | | Depress the accelerator pedal fully | 80 % or more |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| APP sensor (sub) | 12 | Accelerator pedal position sensor (sub) | Ignition switch: "ON" | Release the accelerator pedal | 400 – 600 mV |
| | | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke |
| | | | | Depress the accelerator pedal fully | 2,000 mV or more |
| APP sensor (sub) | BF | Accelerator pedal position sensor (sub) | Ignition switch: "ON" | Release the accelerator pedal | 6 – 14 % |
| | | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke |
| | | | | Depress the accelerator pedal fully | 40 – 50 % or more |
| A/C compressor fluid pressure | 172 | A/C pressure sensor (voltage) | Refer to GROUP 55A – On-vehicle Service – Simple Inspection of The A/C Pressure Sensor P.55A-17. | | Nearly corresponds with the characteristic diagram. |
| A/C thermo sensor | 174 | Fin thermo sensor | Ignition switch: "ON" | | Evaporator outlet temperature is the same as M.U.T.-III displayed temperature |
| Barometric pressure sensor | BB | Barometric pressure sensor | Ignition switch: "ON" | Engine stopped [At altitude of 0 m (0 ft.)] | 101 kPa (29.8 in.Hg) |
| | | | | Engine stopped [At altitude of 600 m (1,969 ft.)] | 95 kPa (28.1 in.Hg) |
| | | | | Engine stopped [At altitude of 1,200 m (3,937 ft.)] | 88 kPa (26.0 in.Hg) |
| | | | | Engine stopped [At altitude of 1,800 m (5,906 ft.)] | 81 kPa (23.9 in.Hg) |
| Blower fan signal | 176 | Blower switch <Manual A/C> | Blower switch position: OFF | | OFF |
| | | | Blower switch position: 1 or 2 | | Low |
| | | | Blower switch position: 3 or 4 | | High |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| Brake booster pressure sensor | 171 | Brake booster pressure sensor | • Start up the engine and let it idle for several minutes.<br>• Stop the engine, and turn the ignition switch to the ON position.<br>• Depress the brake pedal several times. | | The more frequently the brake pedal is depressed, the more the voltage rises. |
| Brake light switch | 74 | Brake light switch | Ignition switch: "ON" | Depress the brake pedal fully | ON |
| | | | | Release the brake pedal | OFF |
| Calculated load value | 73 | Calculated load value | Engine: warming up | Engine is idling | 15 – 30 % |
| | | | | 2,500 r/min | 12 – 22 % |
| Closed throttle position switch | 84 | Closed throttle position signal | Ignition switch: "ON" | Release the accelerator pedal | ON |
| | | | | Depress the accelerator pedal fully | OFF |
| Cranking signal | 79 | Cranking signal (ignition switch-ST) | Ignition switch: "ON" | Engine: stopped | OFF |
| | | | | Engine: cranking | ON |
| Crankshaft position sensor | 2 | Crankshaft position sensor | • Engine: cranking<br>• Tachometer: connected | | Engine speeds displayed on the scan tool and tachometer are identical. |
| | | | Engine: idling | Engine coolant temperature is –20°C (–4°F) | 1,300 – 1,500 r/min |
| | | | | Engine coolant temperature is 0°C (32°F) | 1,250 – 1,450 r/min |
| | | | | Engine coolant temperature is 20°C (68°F) | 1,040 – 1,240 r/min |
| | | | | Engine coolant temperature is 40°C (104°F) | 850 – 1,050 r/min |
| | | | | Engine coolant temperature is 80°C (176°F) | 600 – 800 r/min |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| ECT sensor | 6 | Engine coolant temperature sensor | Ignition switch: "ON" or with engine running | Engine coolant temperature is −20°C (−4°F) | −20°C (−4°F) |
| | | | | Engine coolant temperature is 0°C (32°F) | 0°C (32°F) |
| | | | | Engine coolant temperature is 20°C (68°F) | 20°C (68°F) |
| | | | | Engine coolant temperature is 40°C (104°F) | 40°C (104°F) |
| | | | | Engine coolant temperature is 80°C (176°F) | 80°C (176°F) |
| Electric power steering current | 21 | Electric power steering current value | • Engine: Idle operation after warm-up<br>• Turn the steering wheel to the left and right with a vehicle stationary | | Approximately 30A or less |
| Engine control relay | 95 | MFI relay | Ignition switch: "ON" | | ON |
| Engine oil pressure switch | 90 | Engine oil pressure switch | Ignition switch: "ON" | | ON |
| | | | Engine is idling | | OFF |
| Equivalence Ratio (LAFS) | E0 | Linear air-fuel ratio sensor equivalence ratio | Engine: warming up (Air/fuel mixture is made leaner when decelerating and is made richer when revving) | When the engine is running at 4,000 r/min, decelerate suddenly. | 1.3 or more → 0.96 or less (After several seconds have elapsed) |
| | | | | When engine is suddenly revved | 0.96 or less |
| | | | Engine: warming up (the linear air-fuel ratio sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECM.) | Engine is idling | Equivalence ratio changes repeatedly between 0.99 or less and 1.005 or more. |
| | | | | 2,500 r/min | |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| ETV relay | 96 | Throttle actuator control motor relay | Ignition switch: "ON" | | ON |
| EVAP. emission purge SOL. duty | 49 | Evaporative emission purge solenoid duty | Engine: warming up with Open loop drive condition, without EVAP leak monitor | | 1 % or more |
| Front defroster switch | 153 | Defogger switch <Manual A/C> | Defogger switch: OFF | | OFF |
| | | | Defogger switch: ON | | ON |
| Fuel level gauge | 51 | Fuel level gauge | Ignition switch: "ON"<br>• The residual fuel amount in the tank is shown.<br>• "0 %" means "Empty" and "100 %" means "Full". | | 0 – 100 % (Display range) |
| Fuel level input | 121 | Fuel level input | Ignition switch: "ON"<br>• The residual fuel amount in the tank is shown.<br>• "0 %" means "Empty" and "100 %" means "Full". | | 0 – 100 % (Display range) |
| Fuel pump relay | 97 | Fuel pump relay | Ignition switch: "ON" | | OFF |
| | | | Engine: cranking | | ON |
| Fuel system status (bank 1) | 105 | Fuel control system status | Engine: warming up | 2,500 r/min | CL: Using O2S |
| | | | | When engine is suddenly revved | OL: DRV condition |
| Fuel system status (bank 2)*5 | 106 | – | – | | – |
| Fuel tank differential PRS. SNSR | 52 | Fuel tank differential pressure sensor | • Ignition switch: "ON"<br>• Fuel cap removal | | 1,500 – 3,500 mV |
| Fuel tank temperature sensor | 53 | Fuel tank temperature sensor | • In cooled state<br>• Ignition switch: "ON" | | Approximately the same as the outdoor temperature |
| Ignition switch | 85 | Ignition switch (IG1) | Ignition switch: "ON" | | ON |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| Injectors | 17 | Injectors*2 | Engine: cranking | When engine coolant temperature is 0°C (32°F) | 74 – 94 ms |
| | | | | When engine coolant temperature is 20°C (68°F) | 26.9 – 46.9 ms |
| | | | | When engine coolant temperature is 80°C (176°F) | 7 – 13 ms |
| | | Injectors*3 | • Engine coolant temperature: 80 – 95°C (176 – 203°F)<br>• Lights, electric cooling fan and all accessories: "OFF"*4<br>• Transaxle: Neutral (CVT: "P" range) | Engine is idling | 1.5 – 3.5 ms |
| | | | | 2,500 r/min | 1.0 – 3.3 ms |
| | | | | When engine is suddenly revved | Increases |
| Intake air temperature sensor 1 | 5 | Intake air temperature sensor | Ignition switch: "ON" or with engine running | Intake air temperature is –20°C (–4°F) | –20°C (–4°F) |
| | | | | Intake air temperature is 0°C (32°F) | 0°C (32°F) |
| | | | | Intake air temperature is 20°C (68°F) | 20°C (68°F) |
| | | | | Intake air temperature is 40°C (104°F) | 40°C (104°F) |
| | | | | Intake air temperature is 80°C (176°F) | 80°C (176°F) |
| Intake VVT angle (bank 1) | 36 | MIVEC phase angle | Engine: warming up, idle | | 0 –16°CA (ATDC) |
| | | | Engine: warming up, sudden revving | | Decreases (advances) |
| ISC learned value (A/C OFF) | 68 | Idle speed control learned value (A/C OFF) | Ignition switch: "ON"<br>• Indicates the learning value to compensate for the opening angle of idling speed control (opening angle of throttle valve).<br>• The negative side shows "close" side, while the positive side shows "open" side. | | –1 to 3 L/s (Display range) |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| ISC learned value (A/C ON) | 69 | Idle speed control learned value (A/C ON) | Ignition switch: "ON"<br>• Indicates the learning value to compensate for the opening angle of idling speed control (opening angle of throttle valve) with the air conditioning turned ON.<br>• The negative side shows "close" side, while the positive side shows "open" side. | | −1 to 3 L/s (Display range) |
| Knock retard | 32 | Knock retard | Engine: warming up, sudden revving | | According to acceleration, knock retard is increased. |
| LAFS (front) | E1 | Linear air-fuel ratio sensor | Engine: warming up (Air/fuel mixture is made leaner when decelerating and is made richer when revving) | When the engine is running at 4,000 r/min, decelerate suddenly. | 3.5 V or more → 2.0 V or less (After several seconds have elapsed) |
| | | | | When engine is suddenly revved | 2.0 V or less |
| | | | Engine: warming up (the linear air-fuel ratio sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECM.) | Engine is idling | Voltage changes repeatedly between 2.25 V or less and 2.35 V or more. |
| | | | | 2,500 r/min | |
| Learned knock retard | 33 | Knock control learned value | Ignition switch: "ON"<br>• The learning value is shown, which compensates the ignition time based on the knock sensor.<br>• "0 %" means "retard angle" and "100 %" means "advance angle". | | 0 – 100 % (Display range) |
| Long term fuel trim (bank 1) | 26 | Long-term fuel trim | Engine: warming up, 2,500 r/min without any load (during closed loop) | | – 10 to 10 % |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| MAP sensor | 8 | Manifold absolute pressure sensor | Ignition switch: "ON" | Engine stopped [At altitude of 0 m (0 ft.)] | 101 kPa (29.8 in.Hg) |
| | | | | Engine stopped [At altitude of 600 m (1,969 ft.)] | 95 kPa (28.1 in.Hg) |
| | | | | Engine stopped [At altitude of 1,200 m (3,937 ft.)] | 88 kPa (26.0 in.Hg) |
| | | | | Engine stopped [At altitude of 1,800 m (5,906 ft.)] | 81 kPa (23.9 in.Hg) |
| | | | Engine: warming up, idling | | 22 – 42 kPa (6.5 – 12.4 in.Hg) |
| | | | When engine is suddenly revved | | Manifold pressure varies |
| Neutral switch | 87 | Neutral switch <CVT> | Ignition switch: "ON" | Shift lever: "P" or "N" | ON |
| | | | | Shift lever: except "P" and "N" | OFF |
| Normally closed brake switch | 89 | Normally closed brake switch | Ignition switch: "ON" | Depress the brake pedal | ON |
| | | | | Release the brake pedal | OFF |
| Oxygen sensor (bank1 sensor2) | AD | Heated oxygen sensor (rear) | • Transaxle: 2nd<br>• Drive with wide open throttle<br>• Engine: 3,500 r/min or more | | 0.6 – 1.0 V |
| Power supply voltage | 1 | Power supply voltage | Ignition switch: "ON" | | Battery positive voltage |
| Radiator fan control relay (high) | 100 | Cooling fan relay (high) | Cooling fan inactive state | | OFF |
| | | | Cooling fan high-speed rotation state | | ON |
| Radiator fan control relay (low) | 101 | Cooling fan relay (low) | Cooling fan inactive state | | OFF |
| | | | Cooling fan low-speed rotation state | | ON |
| Refrigerant pressure sensor | 175 | A/C pressure sensor | Refer to GROUP 55A – On-vehicle Service – Simple Inspection of The A/C Pressure Sensor P.55A-17. | | Nearly corresponds with reading on the gauge manifold. |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| Relative APP sensor | DD | Relative accelerator pedal position sensor | Ignition switch: "ON" | Release the accelerator pedal | 0 – 5 % |
| | | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke |
| | | | | Depress the accelerator pedal fully | 95 % or more |
| Relative TP sensor | BC | Relative throttle position sensor | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 0 – 5 % |
| | | | | Fully open the throttle valve with your finger | 88 – 100 % |
| Short term fuel trim (bank 1) | 28 | Short-term fuel trim | Engine: warming up, 2,500 r/min without any load (during closed loop) | | –25 to 25 % |
| Spark advance | 16 | Ignition timing advance | • Engine: warming up<br>• Timing light is set (to check actual ignition timing)<br>• Transaxle: neutral (CVT: "P" range) | Engine is idling | 0 – 18° CA (BTDC) |
| | | | | 2,500 r/min | 31 – 51° CA (BTDC) |
| Starter relay | 102 | Starter relay | Ignition switch: "ON" | | OFF |
| | | | Engine: Cranking | | ON |
| Target ETV value | 59 | Throttle actuator control motor target value | Engine: warming up<br>• The target opening degree of the throttle valve is shown.<br>• "0 V" means "fully closed throttle valve" and "5 V" means "fully opened throttle valve". | | 0 – 5 V (Display range) |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| Target idle speed | 3 | Target idle speed | Engine: idling | Engine coolant temperature is –20°C (–4°F) | 1,300 – 1,500 r/min |
| | | | | Engine coolant temperature is 0°C (32°F) | 1,250 – 1,450 r/min |
| | | | | Engine coolant temperature is 20°C (68°F) | 1,040 – 1,240 r/min |
| | | | | Engine coolant temperature is 40°C (104°F) | 850 – 1,050 r/min |
| | | | | Engine coolant temperature is 80°C (176°F) | 600 – 800 r/min |
| Throttle actuator | 58 | Throttle actuator control motor | Engine: warming up<br>• The target opening degree of the throttle valve is shown.<br>• "0 %" means "fully closed throttle valve" and "100 %" means "fully opened throttle valve". | | 0 – 100 % (Display range) |
| TP sensor (main) | 13 | Throttle position sensor (main) | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 300 – 700 mV |
| | | | | Fully open the throttle valve with your finger | 4,300 – 4,800 mV |
| | | | Engine: warming up, idling | No load | 520 – 620 mV |
| | | | | A/C switch: "OFF" → "ON" | Voltage rises |
| | | | | Shift lever: "N" → "D" <CVT> | |

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| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| TP sensor (main) | AB | Throttle position sensor (main) | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 6 – 14 % |
| | | | | Fully open the throttle valve with your finger | 80 – 96 % |
| TP sensor (main) learned value | 14 | Throttle position sensor (main) mid opening learning value | This item shows the throttle valve opening learning value when the vehicle enters into the limp home mode. | | |
| TP sensor (sub) | 15 | Throttle position sensor (sub) | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 4,300 – 4,700 mV |
| | | | | Fully open the throttle valve with your finger | 200 – 700 mV |

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|
| TP sensor (sub) | BD | Throttle position sensor (sub) | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 6 – 14 % |
| | | | | Fully open the throttle valve with your finger | 87 – 96 % or more |
| Vehicle speed | 4 | Vehicle speed | Drive at 40 km/h (25 mph). | | Approximately 40 km/h (25 mph) |

## GENERAL SCAN TOOL (GST) MODE 01 REFERENCE TABLE

M1131156000629

The purpose of this service of to allow access to current emission-related data values, including analogue inputs and outputs, digital inputs and outputs, and system status information.
The request for information includes a parameter identification (PID) value that indicates to the on-board system the specific information requested.
The ECM will respond to this message by transmitting the requested data value last determined by the system. All data values returned for sensor readings will be actual readings, not default or substitute values used by the system because of a fault with that sensor.

*NOTE: GST MODE 01 can be accessed through the use of a general scan tool.*

| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 01 | Number of emission-related DTCs and MIL status | DTC and MIL status: | – | |
| | # of DTCs stored in this ECU | DTC_CNT: xxd | | |
| | Malfunction Indicator Lamp (MIL) Status | MIL: OFF or ON | | |
| | Supported tests which are continuous | Support status of continuous monitors: | | |
| | Misfire monitoring supported | MIS_SUP: YES | | |
| | Fuel system monitoring supported | FUEL_SUP: YES | | |
| | Comprehensive component monitoring supported | CCM_SUP: YES | | |
| | Status of continuous monitoring tests since DTC cleared | Completion status of continuous monitors since DTC cleared: | | |
| | Misfire monitoring ready | MIS_RDY: YES or NO | | |
| | Fuel system monitoring ready | FUEL_RDY: YES or NO | | |
| | Comprehensive component monitoring ready | CCM_RDY: YES or NO | | |
| | Supported tests run at least once per trip | Support status of non-continuous monitors: | | |
| | Catalyst monitoring supported | CAT_SUP: YES | | |
| | Heated catalyst monitoring supported | HCAT_SUP: NO | | |
| | Evaporative system monitoring supported | EVAP_SUP: YES | | |

| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 01 | Secondary air system monitoring supported | AIR_SUP: NO | – | |
| | Oxygen sensor monitoring supported | O2S_SUP: YES | | |
| | Oxygen sensor heater monitoring supported | HTR_SUP: YES | | |
| | EGR and/or VVT system monitoring supported | EGR_SUP: YES | | |
| | Status of tests run at least once per trip | Completion status of non-continuous monitors since DTC cleared: | | |
| | Catalyst monitoring ready | CAT_RDY: YES or NO | | |
| | Heated catalyst monitoring ready | HCAT_RDY: YES | | |
| | Evaporative system monitoring ready | EVAP_RDY: YES or NO | | |
| | Secondary air system monitoring ready | AIR_RDY: YES | | |
| | Oxygen sensor monitoring ready | O2S_RDY: YES or NO | | |
| | Oxygen sensor heater monitoring ready | HTR_RDY: YES or NO | | |
| | EGR and/or VVT system monitoring ready | EGR_RDY: YES or NO | | |
| 03 | Fuel system 1 status | FUELSYS1: OL/CL/OL-Drive/OL-Fault/CL-Fault | See M.U.T.-III item No. 105. | |
| 04 | Calculated LOAD Value | LOAD_PCT: xxx.x% | See M.U.T.-III item No. 73. | |
| 05 | Engine Coolant Temperature | ECT: xxx°C (xxx°F) | See M.U.T.-III item No. 6. | |
| 06 | Short Term Fuel Trim–Bank 1 | SHRTFT1: xxx.x% | See M.U.T.-III item No. 28. | |
| 07 | Long Term Fuel Trim–Bank 1 | LONGFT1: xxx.x% | See M.U.T.-III item No. 26. | |
| 0B | Intake Manifold Absolute Pressure | MAP: xxxx.x kPa (xxx.x inHg) | See M.U.T.-III item No. 8. | |
| 0C | Engine RPM | RPM: xxxxx min $^{-1}$ | See M.U.T.-III item No. 2. | |
| 0D | Vehicle Speed Sensor | VSS: xxx km/h (xxx mph) | See M.U.T.-III item No. 4. | |
| 0E | Ignition Timing Advance for #1 Cylinder | SPARKADV: xx.x° | See M.U.T.-III item No. 16. | |
| 0F | Intake Air Temperature | IAT: xxx°C (xxx°F) | See M.U.T.-III item No. 5. | |

| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 10 | Air Flow Rate from Mass Air Flow Sensor | MAF: xxxx.xx g/s (xxxx.x lb/min) | See M.U.T.-III item No. AA. | |
| 11 | Absolute Throttle Position | TP: xxx.x% | See M.U.T.-III item No. AB. | |
| 13 | Location of Oxygen Sensors | O2SLOC: O2Sxx | Ignition switch: "ON" | O2S11/O2S12 |
| 15 | Bank 1 – Sensor 2 | O2S12: x.xxx V | See M.U.T.-III item No. AD. | |
| 1C | OBD requirements to which vehicle or engine is certified | OBDSUP: OBD II | Ignition switch: "ON" | OBD II |
| 1F | Time Since Engine Start | RUNTM: xxxxx sec. | – | |
| 21 | Distance Traveled While MIL is Actived | MIL_DIST: xxxxx km (xxxxx miles) | – | |
| 24 | Bank 1 – Sensor 1 (wide range O2S) | LAMBDA11: xxx.xxx | See M.U.T.-III item No. E0. | |
| | | O2S11: xxx.xxx V | See M.U.T.-III item No. E1. | |
| 2E | Commanded Evaporative Purge | EVAP_PCT: xxx.x% | See M.U.T.-III item No. 49. | |
| 2F | Fuel Level Input | FLI: xxx.x% | See M.U.T.-III item No. 51. | |
| 30 | Number of warm-ups since DTCs cleared | WARM_UPS: xxx | – | |
| 31 | Distance traveled since DTCs cleared | CLR_DIST: xxxxx km (xxxxx miles) | – | |
| 32 | Evap System Vapor Pressure | EVAP_VP: xxxx.x Pa (xx.xxx in H2O) | • Ignition switch: "ON"<br>• Fuel cap removal | –3.3 to 3.3 kPa (–13.2 to 13.2 in.H2O) |
| 33 | Barometric Pressure | BARO: xxx kPa (xx.x inHg) | See M.U.T.-III item No. BB. | |

| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 41 | Monitor status this driving cycle | | – | |
| | Enable status of continuous monitors this monitoring cycle: | Enable status of continuous monitors this monitoring cycle: NO means disable for rest of this monitoring cycle or not supported in PID 01, YES means enable for this monitoring cycle. | | |
| | Misfire monitoring enabled | MIS_ENA: NO or YES | | |
| | Fuel system monitoring enabled | FUEL_ENA: NO or YES | | |
| | Comprehensive component monitoring enabled | CCM_ENA: NO or YES | | |
| | Completion status of continuous monitors this monitoring cycle: | Completion status of continuous monitors this monitoring cycle: | | |
| | Misfire monitoring completed | MIS_CMPL: YES or NO | | |
| | Fuel system monitoring completed | FUELCMPL: YES or NO | | |
| | Comprehensive component monitoring completed | CCM_CMPL: YES or NO | | |
| | Enable status of non-continuous monitors this monitoring cycle: | Enable status of non-continuous monitors this monitoring cycle: | | |
| | Catalyst monitoring | CAT_ENA: YES | | |
| | Heated catalyst monitoring | HCAT_ENA: NO | | |
| | Evaporative system monitoring | EVAP_ENA: YES | | |
| | Secondary air system monitoring | AIR_ENA: NO | | |
| | Oxygen sensor monitoring | O2S_ENA: YES | | |
| | Oxygen sensor heater monitoring | HTR_ENA: YES | | |
| | EGR and/or VVT system monitoring | EGR_ENA: YES | | |
| | Completion status of non-continuous monitors this monitoring cycle: | Completion status of non-continuous monitors this monitoring cycle: | | |

| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 41 | Catalyst monitoring completed | CAT_CMPL: YES or NO | | |
| | Heated catalyst monitoring completed | HCATCMPL: YES | | |
| | Evaporative system monitoring completed | EVAPCMPL: YES or NO | | |
| | Secondary air system monitoring completed | AIR_CMPL: YES | | |
| | Oxygen sensor monitoring completed | O2S_CMPL: YES or NO | | |
| | Oxygen sensor heater monitoring completed | HTR_CMPL: YES or NO | | |
| | EGR and/or VVT system monitoring completed | EGR_CMPL: YES or NO | | |
| 42 | Control module voltage | VPWR: xx.xx V | See M.U.T.-III item No. 1. | |
| 43 | Absolute Load Value | LOAD_ABS: xxxxx.x % | See M.U.T.-III item No. 72. | |
| 44 | Fuel/Air Commanded Equivalence Ratio | LAMBDA: xxx.xxx | Engine: running<br>• "1" means "stoichiometric air fuel ratio". The smaller air fuel ratio, the rich return. The more air fuel ratio, the lean return. | 0 – 1.999 (Display range) |
| 45 | Relative Throttle Position | TP_R: xxx.x% | See M.U.T.-III item No. BC. | |
| 46 | Ambient air temperature | AAT: xxx°C (xxx°F) | • Ignition switch: "ON"<br>• Engine is cold state | The value displayed approximately matches the ambient temperature |
| 47 | Absolute Throttle Position B | TP_B: xxx.x% | See M.U.T.-III item No. BD. | |
| 49 | Accelerator Pedal Position D | APP_D: xxx.x% | See M.U.T.-III item No. BE. | |
| 4A | Accelerator Pedal Position E | APP_E: xxx.x% | See M.U.T.-III item No. BF. | |
| 4C | Commanded Throttle Actuator Control | TAC_PCT: xxx.x% | See M.U.T.-III item No. 58. | |

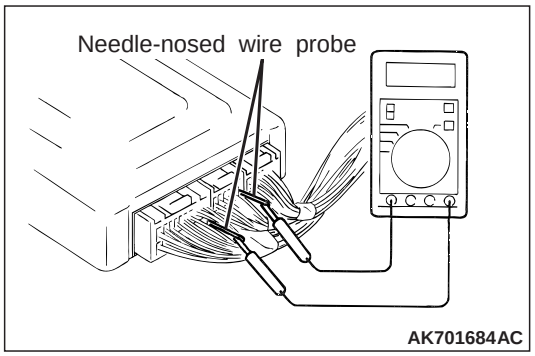
| PARAMETER IDENTIFICATION (PID) | DESCRIPTION | COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY | INSPECTION CONDITION | NORMAL CONDITION |
|---|---|---|---|---|
| 5A | Relative Accelerator Pedal Position | APP_R: xxx.x% | See M.U.T.-III item No. DD. | |

## ACTUATOR TEST REFERENCE TABLE

M1131152503610

*NOTE: *: Continues for 27 minutes. Can be released by pressing the CLEAR key.*

| M.U.T.-III SCAN TOOL DISPLAY | ITEM NO. | INSPECTION ITEM | DRIVE CONTENTS | INSPECTION REQUIREMENT | | NORMAL CONDITION |
|---|---|---|---|---|---|---|
| A/C relay | 16 | A/C compressor clutch relay | A/C compressor clutch relay turns from OFF to ON. | Ignition switch: "ON" | | Clicks when A/C compressor clutch is driven. |
| EVAP. emission purge SOL. valve | 10 | Evaporative emission purge solenoid | Solenoid valve turns from OFF to ON. | Ignition switch: "ON" | | Clicks when solenoid valve is driven. |
| EVAP. emission ventilation SOL. | 15 | Evaporative emission ventilation solenoid | Solenoid valve turns from OFF to ON. | Ignition switch: "ON" | | Clicks when solenoid valve is driven. |
| Fuel pump | 9 | Fuel pump | Fuel pump operates and fuel is recirculated. | Ignition switch: "ON" | Listen near the fuel tank for the sound of fuel pump operation. | Sound of operation is heard. |
| Ignition timing 5 BTDC | 11* | Basic ignition timing | Set to ignition timing adjustment mode. | • Engine: idling<br>• Connect timing light | | 5°BTDC |
| Injector stop | 1 | Injectors | Specified injector is stopped. | Engine: warm up, idle (cut the fuel supply to each injector in turn and check cylinders which don't affect idling.) | | Idle condition is changed by stopping selected cylinder: this can cause an unstable condition and the engine may stall. |
| Oil control valve | 17 | Intake engine oil control valve, exhaust engine oil control valve | Switch the intake engine oil control valve and exhaust engine oil control valve from OFF to ON. | Ignition switch: "ON" | | When the valve is actuated, operating noise is audible. |
| Radiator fan Hi RLY | 12 | Radiator fan relay (high) | Fan motor is driven at high speed | Ignition switch: "ON" | | Fan motor rotates at high speed |
| Radiator fan Lo RLY | 13 | Radiator fan relay (low) | Fan motor is driven at low speed | Ignition switch: "ON" | | Fan motor rotates at low speed |




## CHECK AT THE ENGINE CONTROL MODULE (ECM)

M1131153502568

1. Connect a needle-nosed wire probe to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the ECM connector terminals from the wire side, and measure the voltage while referring to the check chart.

   *NOTE:*
   1. *Make the voltage measurement with the ECM connector connected.*
   2. *You may find it convenient to pull out the ECM to make it easier to reach the connector terminals.*
   3. *The checks can be carried out off the order given in the chart.*

**⚠ CAUTION**

**Short-circuiting the positive (+) probe between a connector terminal and ground could damage the vehicle wiring, the sensor, ECM or all of them. Be careful to prevent this!**

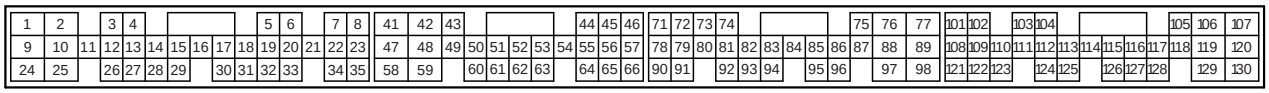
3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

## TERMINAL VOLTAGE CHECK CHART

*NOTE: *1: The average voltage through an analog voltmeter is described in this service manual (because the average voltage would be not constantly shown on a digital voltmeter).*

*NOTE: *2: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.*

ECM Connector Terminal Arrangement




AKX01368 AF

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | NORMAL CONDITION |
|---|---|---|---|---|
| 1 | ETV+ | Throttle actuator control motor (+) | Ignition switch: "ON"<br>Accelerator pedal: fully opened → fully closed | Decreases slightly (Approximately 2 V) from battery voltage. |
| 2 | ETV– | Throttle actuator control motor (–) | Ignition switch: "ON"<br>Accelerator pedal: fully closed → fully opened | Decreases slightly (Approximately 2 V) from battery voltage. |
| 3 | LHFL | Linear air-fuel ratio sensor heater | Engine: warming up, idling (1 minute after starting engine) | 8 – 11 V*1 |
| | | | Engine: revving | From 8 – 11 V*1, it is slightly reduced temporarily. |
| 4 | OHRL | Heated oxygen sensor (rear) heater | Engine warming up, idling (20 seconds after starting engine) | 2.5 – 4.5 V*1 |
| | | | Engine: revving | 2.5 – 4.5 V*1 → B+ (momentarily) |
| 5 | SGT | Crankshaft position sensor | Engine: cranking | 0.4 – 4.0 V*1 |
| | | | Engine: idling | 2.0 – 3.0 V*1 |
| 6 | SGC | Camshaft position sensor | Engine: cranking | 2.0 – 4.8 V*1 |
| | | | Engine: idling | 3.0 – 4.0 V*1 |
| 7 | ALTG | Generator G terminal | • Engine: warming up, idling<br>• Radiator fan: stopped<br>• Headlight: OFF to ON*2<br>• Stop light: OFF to ON<br>• Rear defogger switch: OFF to ON | Voltage increases |
| 8 | CIL1 | Ignition coil No. 1 | Engine: 3,000 r/min | 0.3 – 3.0 V*1 |
| 23 | CIL2 | Ignition coil No. 2 | | |
| 35 | CIL3 | Ignition coil No. 3 | | |

**TSB Revision**

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | | NORMAL CONDITION |
|---|---|---|---|---|---|
| 9 | INJ1 | No. 1 injector | Engine: While engine is idling after having warmed up, suddenly depress the accelerator pedal. | | From 9 – 15 V*1, it is slightly reduced temporarily. |
| 10 | INJ2 | No. 2 injector | | | |
| 24 | INJ3 | No. 3 injector | | | |
| 11 | PURG | Evaporative emission purge solenoid | Ignition switch: "ON" | | B+ |
| | | | Engine: warming up, 3,000 r/min (with 3 minutes after the engine starting sequence is completed) | | Voltage drops |
| 14 | MAP | Manifold absolute pressure sensor | Ignition switch: "ON" | At altitude of 0 m (0 ft.) | 3.8 – 4.2 V |
| | | | | At altitude of 600 m (1,969 ft.) | 3.5 – 3.9 V |
| | | | | At altitude of 1,200 m (3,937 ft.) | 3.3 – 3.7 V |
| | | | | At altitude of 1,800 m (5,906 ft.) | 3.0 – 3.4 V |
| | | | Engine: warming up, idling | | 0.6 – 1.4 V |
| | | | When engine is suddenly revved | | Voltage varies |
| 15 | 5V | Sensor supplied voltage | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 19 | TPS5 | Power supply voltage applied to throttle position sensor | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 21 | ALTF | Generator FR terminal | • Engine: warming up, idling<br>• Radiator fan: stopped<br>• Headlight: OFF to ON*2<br>• Stop light: OFF to ON<br>• Rear defogger switch: OFF to ON | | Voltage drops |
| 22 | ALTL | Generator L terminal | Ignition switch: "ON" | | 0.5 – 2.0 V |
| | | | Engine: idling | | B+ |
| 25 | OCV | Engine oil control valve | Ignition switch: "ON" | | B+ |
| | | | Engine: Warming up, under the high load operation. | | 4 – 10 V*1 |
| 26 | ORLE | Heated oxygen sensor (rear) offset voltage | Ignition switch: "ON" | | 0.4 – 0.6 V |
| 27 | O2RL | Heated oxygen sensor (rear) | • Transaxle: 2nd speed (CVT: B range)<br>• Drive with wide open throttle<br>• Engine: 3,500 r/min or more | | 1.0 – 1.5 V |

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | | NORMAL CONDITION |
|---|---|---|---|---|---|
| 28 | WTS | Engine coolant temperature sensor | Ignition switch: ON | When engine coolant temperature is –20°C | 3.9 – 4.5 V |
| | | | | When engine coolant temperature is 0°C | 3.2 – 3.8 V |
| | | | | When engine coolant temperature is 20°C | 2.3 – 2.9 V |
| | | | | When engine coolant temperature is 40°C | 1.3 – 1.9 V |
| | | | | When engine coolant temperature is 60°C | 0.7 – 1.3 V |
| | | | | When engine coolant temperature is 80°C | 0.3 – 0.9 V |
| 29 | ATS | Intake air temperature sensor | Ignition switch: "ON" | When the intake air temperature is –20°C | 3.8 – 4.4 V |
| | | | | When the intake air temperature is 0°C | 3.2 – 3.8 V |
| | | | | When the intake air temperature is 20°C | 2.3 – 2.9 V |
| | | | | When the intake air temperature is 80°C | 0.4 – 1.0 V |

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | | NORMAL CONDITION |
|---|---|---|---|---|---|
| 30 | TPSM | Throttle position sensor (main) | • Remove the intake air hose at the throttle body<br>• Disconnect electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 0.3 – 0.7 V |
| | | | | Fully open the throttle valve with your finger | 4.3 – 4.8 V |
| 31 | TPSS | Throttle position sensor (sub) | • Remove the intake air hose at the throttle body<br>• Disconnect the electronic-controlled throttle valve connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658.<br>• Ignition switch: "ON" | Fully close the throttle valve with your finger | 4.3 – 4.7 V |
| | | | | Fully open the throttle valve with your finger | 0.2 – 0.7 V |
| 34 | OPSW | Engine oil pressure switch | Ignition switch: "ON" | | 1.0 V or less |
| | | | Engine: idling | | B+ |
| 55 | AFS | Mass airflow sensor | Engine is revved | | Voltage increases in response to revving |
| 56 | AFS5 | Applied voltage to the mass airflow sensor | Ignition switch: ON | | 4.9 – 5.1 V |

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | | NORMAL CONDITION |
|---|---|---|---|---|---|
| 71 | P/VT | Evaporative emission ventilation solenoid | Ignition switch: "ON" | | B+ |
| | | | Carry out the actuator test to drive the solenoid valve. | | 1.0 V or less (Approximately 6 seconds) |
| 72 | FP/R | Fuel pump relay | Ignition switch: "ON" | | B+ |
| | | | Engine: idling | | 1.0 V or less |
| 77 | BACK | Backup power supply | Ignition switch: "LOCK" (OFF) | | B+ |
| 81 | FDFO | Defogger switch <Manual A/C> | • Ignition switch: ON<br>• Blower switch: Other than OFF | Defogger switch: OFF | B+ |
| | | | | Defogger switch: ON | 0 – 3 V |
| 82 | F/TM | Fuel tank temperature sensor | Ignition switch: "ON" | When fuel tank temperature is 0°C (32°F) | 2.7 – 3.1 V |
| | | | | When fuel tank temperature is 20°C (68°F) | 2.1 – 2.5 V |
| | | | | When fuel tank temperature is 40°C (104°F) | 1.6 – 2.0 V |
| | | | | When fuel tank temperature is 80°C (176°F) | 0.8 – 1.2 V |
| 83 | F/PR | Fuel tank differential pressure sensor | • Ignition switch: "ON"<br>• Fuel cap removal | | 1.5 – 3.5 V |
| 84 | BFAN | Blower switch <Manual A/C> | Blower switch position: OFF | | B+ |
| | | | Blower switch position: 1 or 2 | | 3 – 9 V |
| | | | Blower switch position: 3 or 4 | | 1 V or less |
| 88 | AC/S | A/C switch <Manual A/C> | • Ignition switch: ON<br>• Blower switch: Other than OFF | A/C switch: OFF | B+ |
| | | | | A/C switch: ON | 0 – 3 V |
| 89 | IGN | Ignition switch-IG | Ignition switch: "ON" | | B+ |
| 92 | FPR5 | Power supply voltage applied to fuel tank differential pressure sensor | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 95 | AC/T | Fin thermo sensor | Evaporator surface temperature: 25°C (1.5 kΩ) | | 1.1 – 1.3 V |
| 97 | ST | Ignition switch – ST | Engine: Cranking | | 8 V or more |
| 103 | STRL | Starter relay | Ignition switch: ON | | 1 V or less |
| | | | Engine: Cranking | | B+ |

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | | NORMAL CONDITION |
|---|---|---|---|---|---|
| 104 | AC/R | A/C compressor relay | • Engine: Idle operation<br>• A/C switch: OFF → ON (when the compressor is active) | | B+ → 1 V or less |
| 105 | F/HI | Cooling fan motor relay (high) | Cooling fan inactive state or low-speed rotation state | | B+ |
| | | | Cooling fan high-speed rotation state | | 1 V or less |
| 106 | BAT1 | Power supply | Ignition switch: "ON" | | B+ |
| 108 | F/L0 | Cooling fan motor relay (low) | Cooling fan inactive state | | B+ |
| | | | Cooling fan rotation state | | 1 V or less |
| 109 | C/RL | Throttle actuator control motor relay | Ignition switch: "ON" → "LOCK" (OFF) | | 1.0 V or less → B+ → 1.0 V or less |
| 110 | C/R | MFI relay (power supply) | Ignition switch: "LOCK" (OFF) | | B+ |
| | | | Ignition switch: "ON" | | 1.0 V or less |
| 111 | APSM | Accelerator pedal position sensor (main) | Ignition switch: "ON" | Release the accelerator pedal | 0.9 – 1.1 V |
| | | | | Depress the accelerator pedal fully | 4.0 V or more |
| 112 | APS5 | Power supply voltage applied to accelerator pedal position sensor (main) | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 114 | AC/ P | A/C pressure sensor | Refer to GROUP 55A – On-vehicle Service – Simple Inspection of The A/C Pressure Sensor P.55A-17. | | |
| 115 | BVS | Brake booster pressure sensor | • Start up the engine and let it idle for several minutes.<br>• Stop the engine, and turn the ignition switch to the ON position.<br>• Depress the brake pedal several times. | | The more frequently the brake pedal is depressed, the more the voltage rises. |
| 116 | ACP5&BVS5 | Sensor supplied voltage | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 118 | STCD | Starter active signal | Engine: cranking | | B+ |
| | | | Engine: idling | | 1.0 V or less |
| 123 | APSS | Accelerator pedal position sensor (sub) | Ignition switch: "ON" | Release the accelerator pedal | 0.4 – 0.6 V |
| | | | | Depress the accelerator pedal fully | 2.0 V or more |
| 124 | AP5 | Power supply voltage applied to accelerator pedal position sensor (sub) | Ignition switch: "ON" | | 4.9 – 5.1 V |

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | INSPECTION CONDITION (ENGINE CONDITION) | NORMAL CONDITION |
|---|---|---|---|---|
| 129 | RSB | Power supply voltage applied to throttle actuator control motor | Ignition switch: "ON" | B+ |

## CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the ECM connector.
3. Measure the resistance and check for continuity between the terminals of the ECM harness-side connector while referring to the check chart.

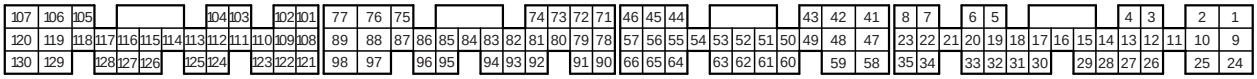
   *NOTE:*
   1. *When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.*
   2. *Checking need not be carried out in the order given in the chart.*

**⚠ CAUTION**

**If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to ground, damage may be caused to the vehicle wiring, sensors, ECM and/or ohmmeter. Be careful to prevent this!**

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

ECM Harness Side Connector Terminal Arrangement

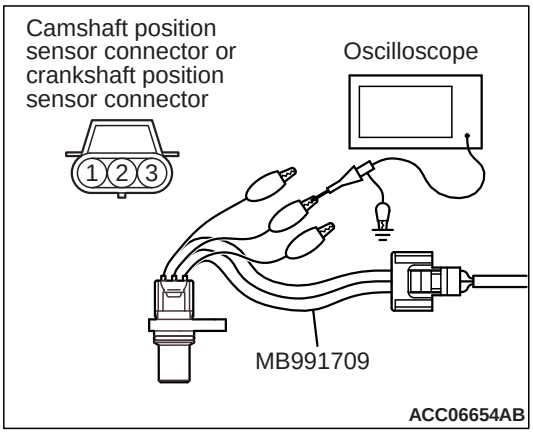



AKX01369AE

| TERMINAL NO. | TERMINAL CODE | INSPECTION ITEM | NORMAL CONDITION (INSPECTION CONDITION) |
|---|---|---|---|
| 1 – 2 | ETV– – ETV+ | Throttle valve control servo | 0.3 – 100 Ω (at 20°C) |
| 25 – 106 | OCV – BAT1 | Oil feeder control valve | 6.9 – 7.9 Ω (at 20°C) |
| 28 – 16 | WTS – SENG | Engine coolant temperature sensor | 14 – 17 kΩ [when engine coolant temperature is –20°C (–4°F)] |
| | | | 2.1 – 2.7 kΩ [when engine coolant temperature is 20°C (68°F)] |
| | | | 0.26 – 0.36 kΩ [when engine coolant temperature is 80°C (176°F)] |
| 29 – 64 | ATS – AFSE | Intake air temperature sensor | 13 – 18 kΩ [when intake air temperature is –20°C (–4°F)] |
| | | | 5.3 – 6.7 kΩ [when intake air temperature is 0°C (32°F)] |
| | | | 2.3 – 3.0 kΩ [when intake air temperature is 20°C (68°F)] |
| | | | 0.30 – 0.45 kΩ [when intake air temperature is 80°C (176°F)] |
| 3 – 106 | LHFL-BAT1 | Linear air-fuel ratio sensor heater | 2.3 – 4.2 Ω [at 20°C (68°F)] |
| 4 – 106 | OHRL-BAT1 | Heated oxygen sensor (rear) heater | 4.5 – 8.0 Ω [at 20°C (68°F)] |
| 11 – 106 | PURG-BAT1 | Evaporative emission purge solenoid | 30 – 34 Ω [at 20°C (68°F)] |
| 119 – body ground | GNDB – body ground | ECM ground | Continuity (2 Ω or less) |
| 120 – body ground | GNDE – body ground | | |
| 130 – body ground | RSG – body ground | | |

## INSPECTION PROCEDURE USING AN OSCILLOSCOPE

M1131154503489




### CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR

**Required Special Tool:**

- MB991709: Test Harness

#### Measurement Method

1. Disconnect the camshaft position sensor connector, and connect the test harness special tool (MB991709) between the separated connector (All terminals should be connected).
2. Connect the oscilloscope probe to camshaft position sensor connector terminal No. 2.
3. Disconnect the crankshaft position sensor connector, and connect the test harness special tool (MB991709) between the separated connector (All terminals should be connected).
4. Connect the oscilloscope probe to crankshaft position sensor connector terminal No. 2.

#### Alternate Method (Test harness not available)

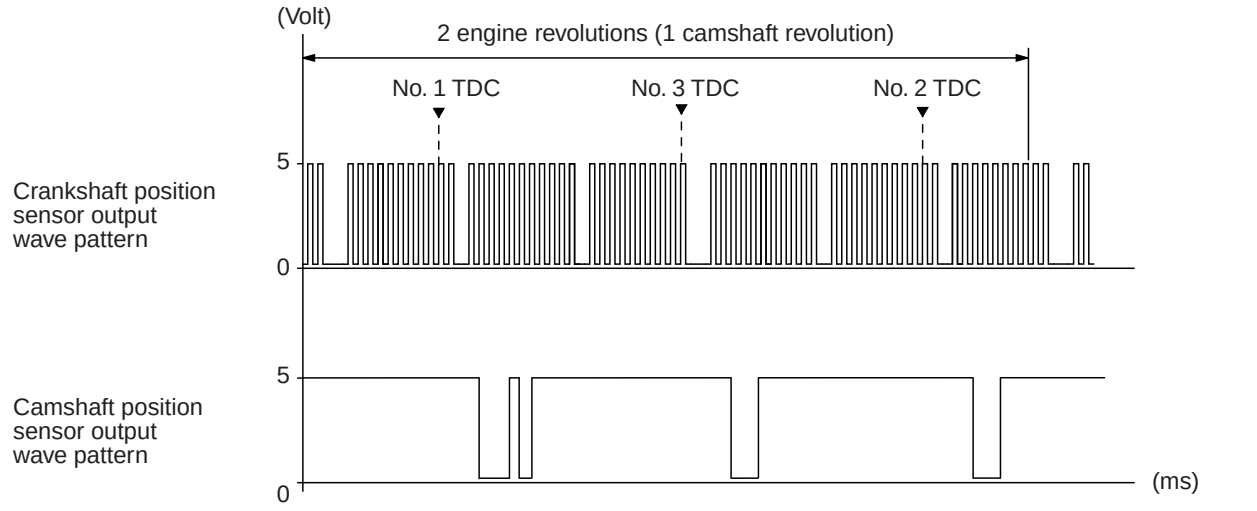
1. Connect the oscilloscope special patterns pickup to ECM terminal SGC (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to ECM terminal SGT (When checking the crank angle sensor signal wave pattern).

**Standard Wave Pattern**

| **Observation condition** | |
|---|---|
| **Function** | **Special pattern** |
| Pattern height | Low |
| Pattern selector | Display |
| Engine condition | Idle |

**TSB Revision**

**Standard wave pattern**

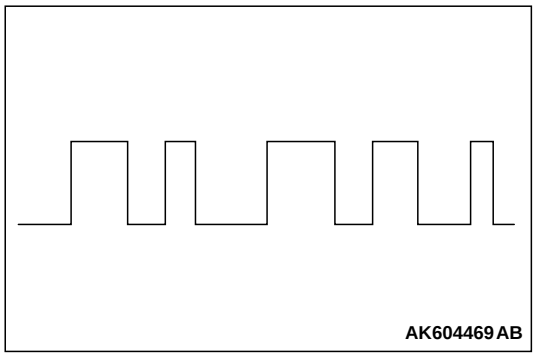



AK305673AE

**Wave Pattern Observation Points**

1. Verify that the sensor signal frequency increase as the engine speed rises.

## Examples of Abnormal Wave Patterns



AK604469AB

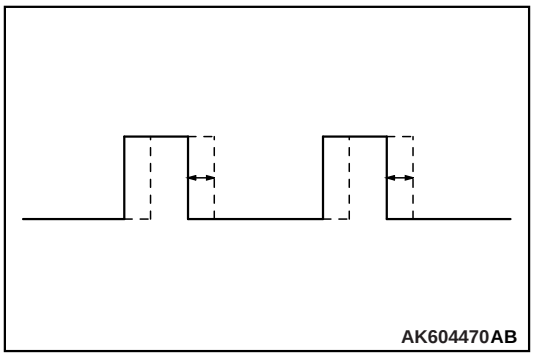
**Example 1**

Cause of problem

- Sensor interface malfunction.

Wave pattern characteristics

- Rectangular wave pattern is output even when the engine is not started.



AK604470AB

**Example 2**

Cause of problem

- Loose timing chain.
- Abnormality in sensor disc.

Wave pattern characteristics

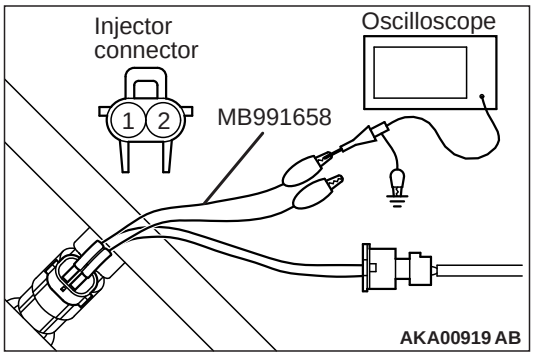
- Wave pattern is displaced to the left or right.

## INJECTOR

**Required Special Tool:**

- MB991658: Test Harness

| TSB Revision |
|---|




**Measurement Method**

1. Disconnect the injector connector, and connect the test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)
2. Connect the oscilloscope probe to injector connector terminal No. 2.

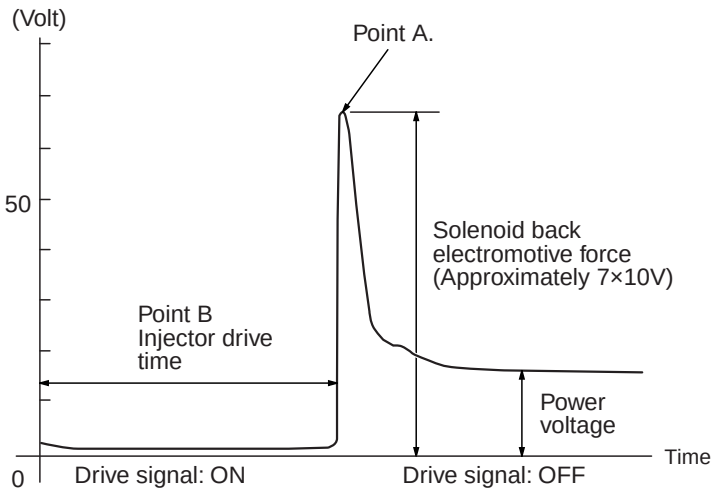
**Alternate method (Test harness not available)**

1. Connect the oscilloscope special patterns pickup to ECM terminal INJ1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to ECM terminal INJ2 (When checking the No. 2 cylinder).
3. Connect the oscilloscope special patterns pickup to ECM terminal INJ3 (When checking the No. 3 cylinder).

**Standard Wave Pattern**

| **Observation conditions** | |
|---|---|
| **Function** | **Special pattern** |
| Pattern height | Variable |
| Variable knob | Adjust while viewing the wave pattern |
| Pattern selector | Display |
| Engine condition | Idle |

**Standard wave pattern**




**TSB Revision**

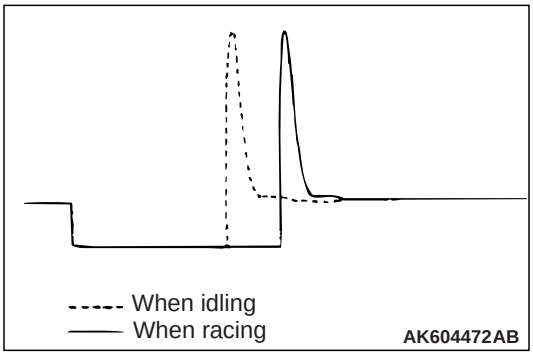
**Wave Pattern Observation Points**

Point A: Height of injector coil induced voltage.

| CONTRAST WITH STANDARD WAVE PATTERN | PROBABLE CAUSE |
|---|---|
| Injector coil induced voltage is low or doesn't appear at all | Short in the injector solenoid |

Point B: Injector drive time

1. The injector drive time should be synchronized with the scan tool tester display.
2. When the engine is suddenly revved, the drive time will be greatly extended at first, but the drive time will soon return to original length.



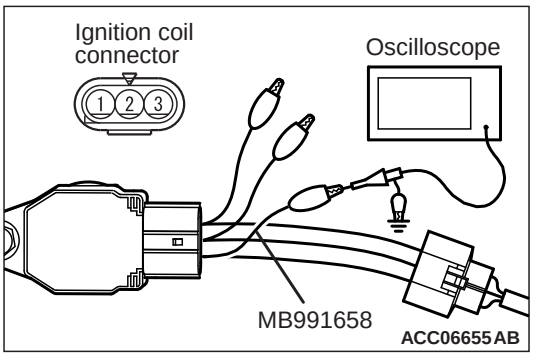

## IGNITION COIL AND IGNITION POWER TRANSISTOR

**Required Special Tool:**

- MB991658: Test Harness

**Measurement Method**

1. Disconnect the ignition coil connector, and connect test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)
2. Connect the oscilloscope probe to ignition coil connector terminal No. 1.



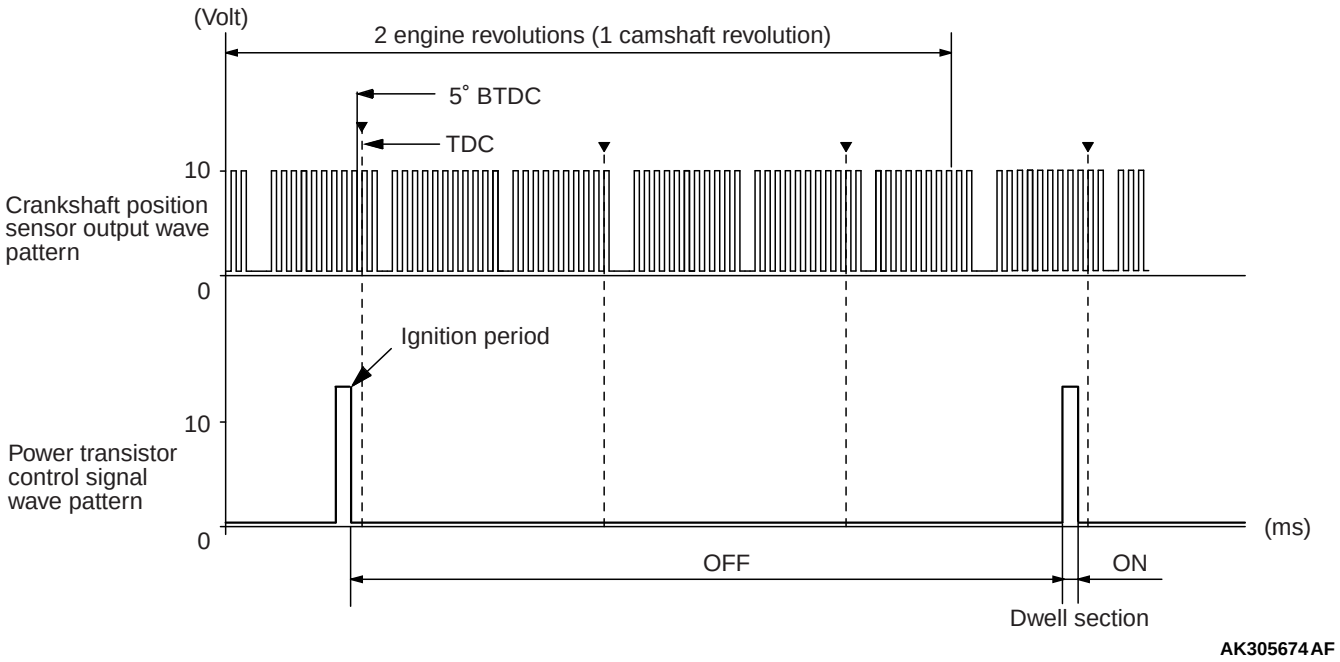

## Alternate method

1. Connect the oscilloscope special patterns pickup to ECM terminal CIL1. (When checking the No. 1 cylinder.)
2. Connect the oscilloscope special patterns pickup to ECM terminal CIL2. (When checking the No. 2 cylinder.)
3. Connect the oscilloscope special patterns pickup to ECM terminal CIL3. (When checking the No. 3 cylinder.)

**Standard Wave Pattern**

| Observation condition | |
|---|---|
| **Function** | **Special pattern** |
| Pattern height | Low |
| Pattern selector | Display |
| Engine condition | Idle |

**Standard wave pattern**

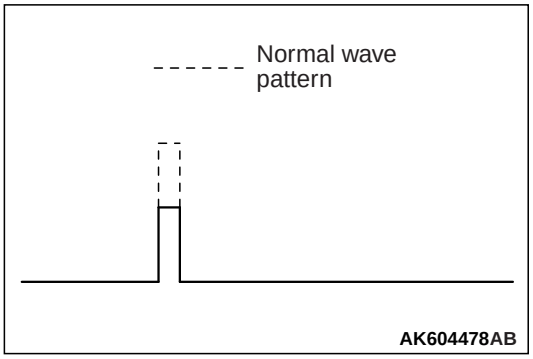



**Wave Pattern Observation Points**

Point: The power transistor control signal (ignition timing) is advanced when the engine speed is increased.

| CONDITION OF WAVE PATTERN BUILD-UP SECTION AND MAXIMUM VOLTAGE | PROBABLE CAUSE |
|---|---|
| Voltage value is too low | Open-circuit in ignition primary circuit |

**TSB Revision**




## Examples of Abnormal Wave Patterns

**Example 1 (Wave pattern during engine cranking)**

Cause of problem

- Open-circuit in ignition primary circuit

Wave pattern characteristics

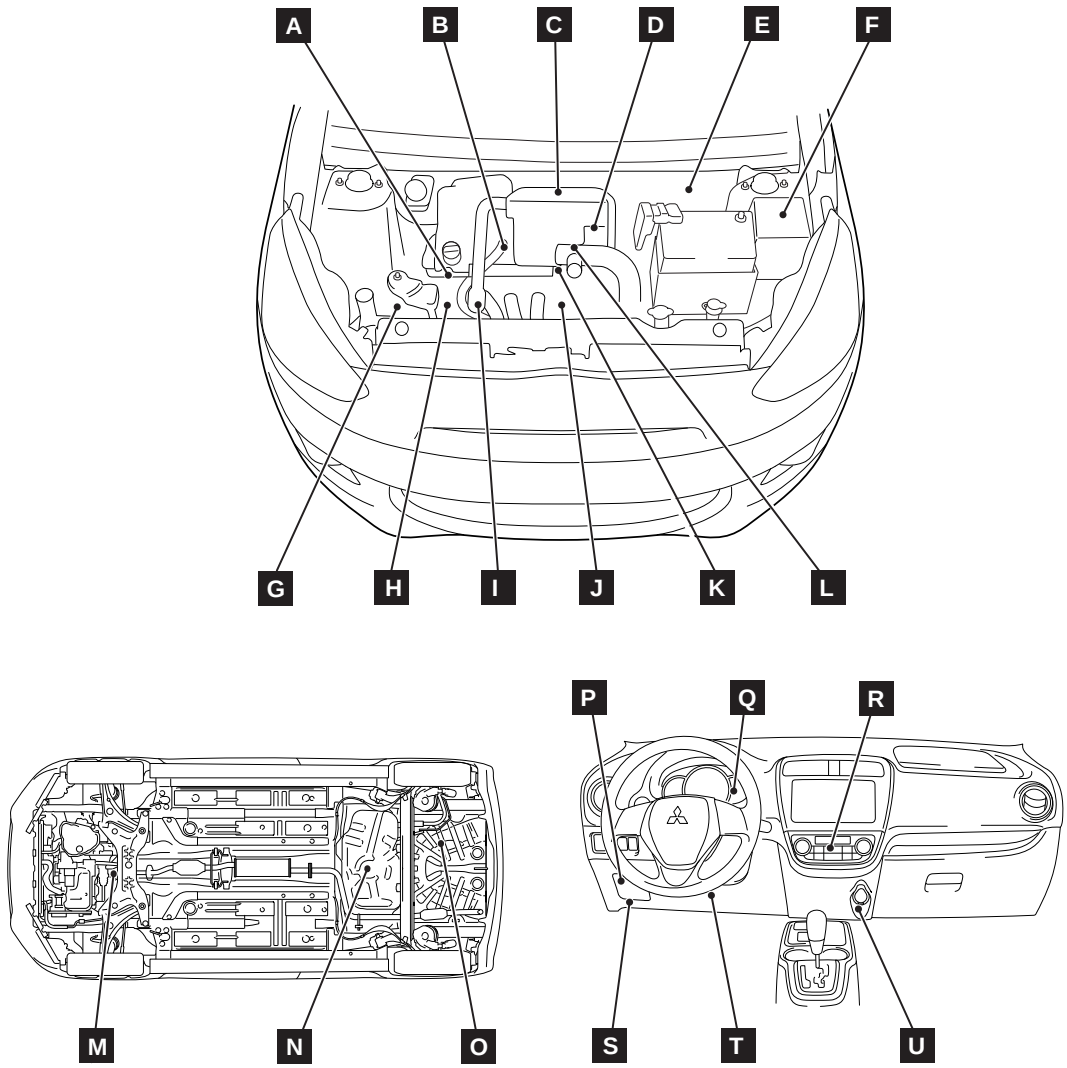
- Voltage value is too low.

# ON-VEHICLE SERVICE

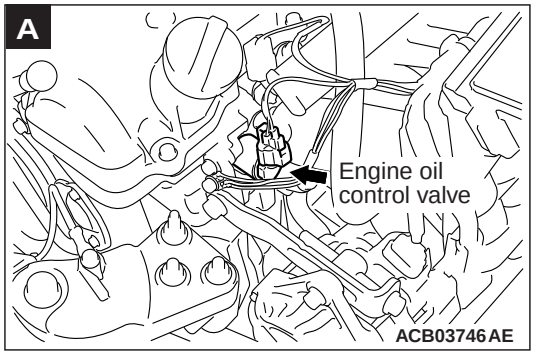
## COMPONENT LOCATION

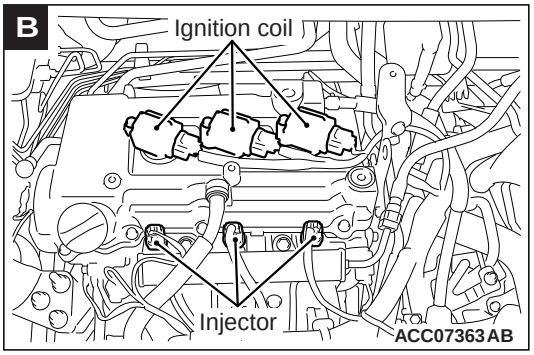
M1131002103955

| NAME | SYMBOL | NAME | SYMBOL |
|---|---|---|---|
| Accelerator pedal position sensor | T | Fin thermo sensor | U |
| A/C compressor clutch relay | F | Fuel pump module [incorporating fuel level sensor and fuel tank temperature sensor] | N |
| A/C-ECU <automatic A/C> | R | Fuel pump relay | P |
| A/C pressure sensor | G | Fuel tank differential pressure sensor | N |
| A/C switch <manual A/C> | R | Heated oxygen sensor (rear) | M |
| Brake booster pressure sensor | E | Ignition coil | B |
| Brake monitoring switch | T | Injector | B |
| Camshaft position sensor | K | Knock sensor | I |
| Cooling fan control relay (high, low) | F | Linear air-fuel ratio sensor | C |
| Crankshaft position sensor | H | Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) | Q |
| Data link connector | S | Manifold absolute pressure sensor | K |
| Engine control module | P | Mass airflow sensor (incorporating intake air temperature sensor) | L |
| Engine coolant temperature sensor | D | MFI relay | F |
| Engine oil control valve | A | Starter relay | F |
| Evaporative emission purge solenoid | D | Throttle actuator control motor relay | F |
| Evaporative emission ventilation solenoid | O | Throttle body assembly (incorporating throttle actuator control motor and throttle position sensor) | J |



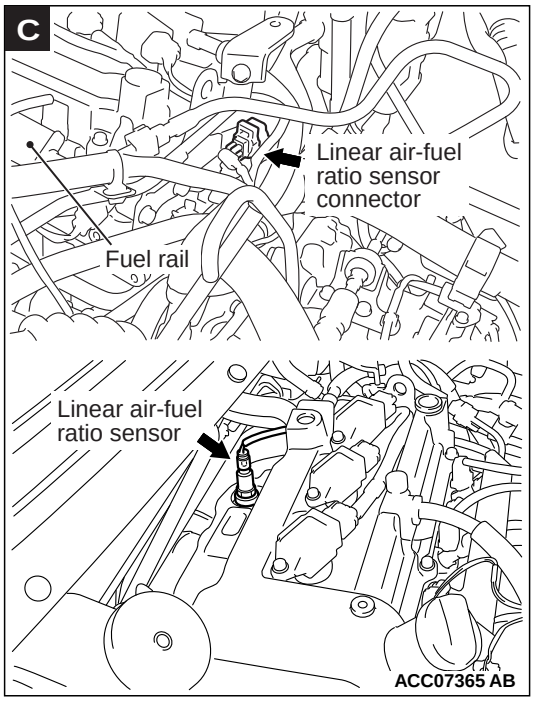

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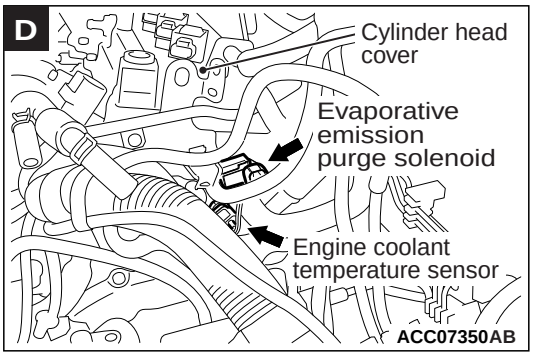




**TSB Revision**

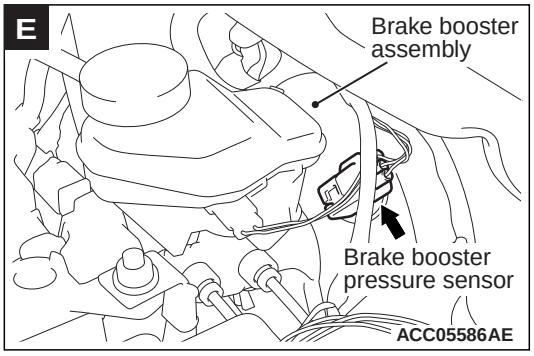
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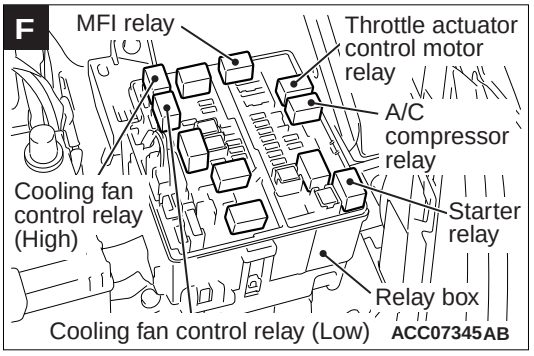

D



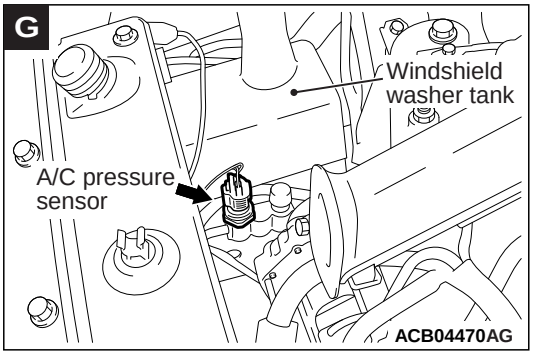

E



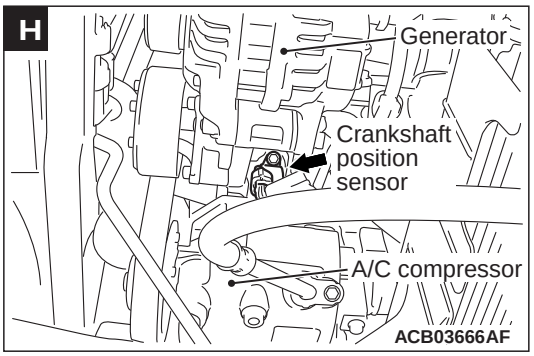

F



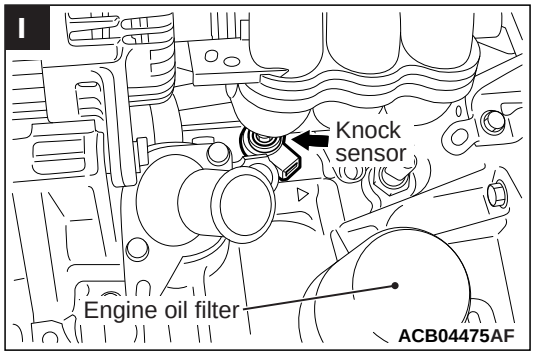

G



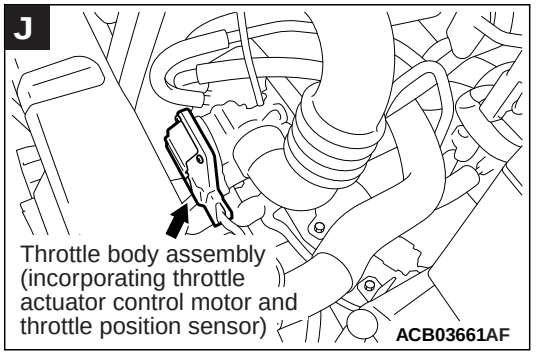

H




I

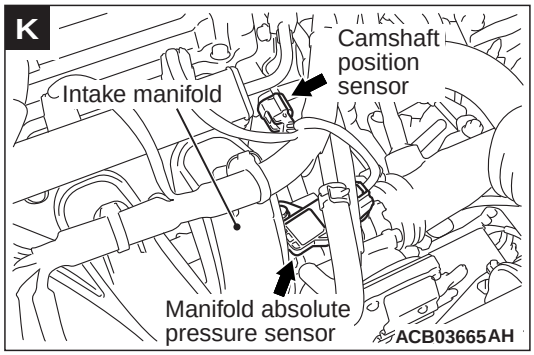



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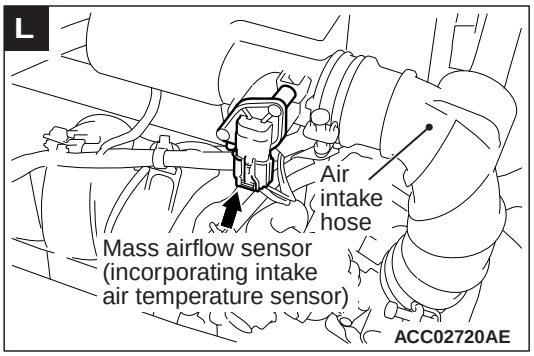



**TSB Revision**

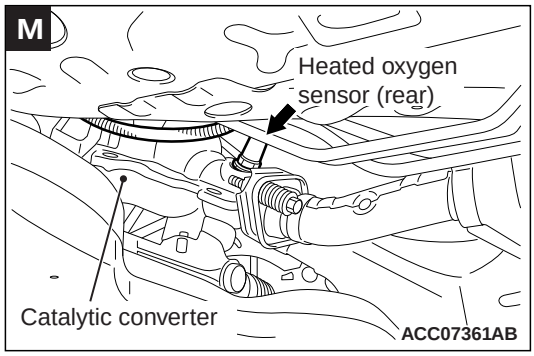
K



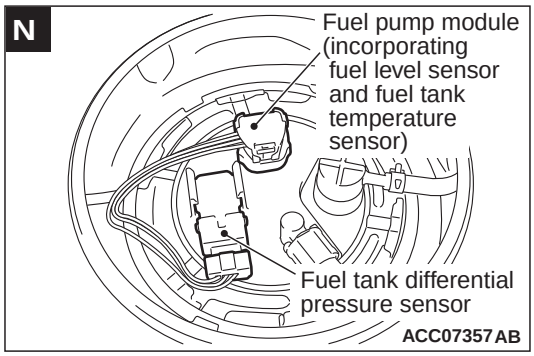

L



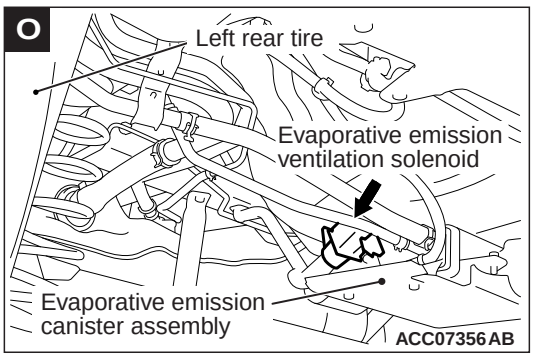

M



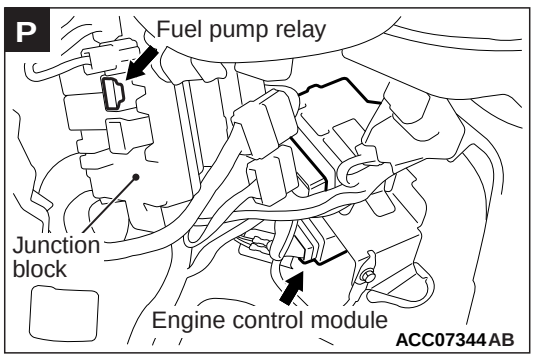

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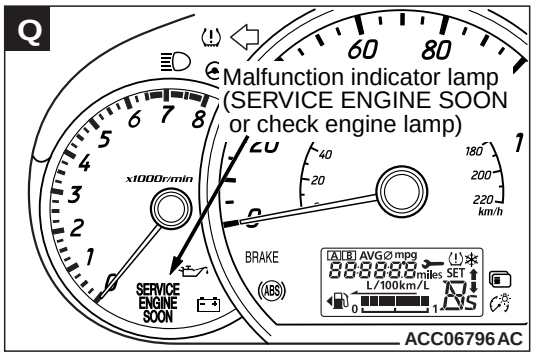

O



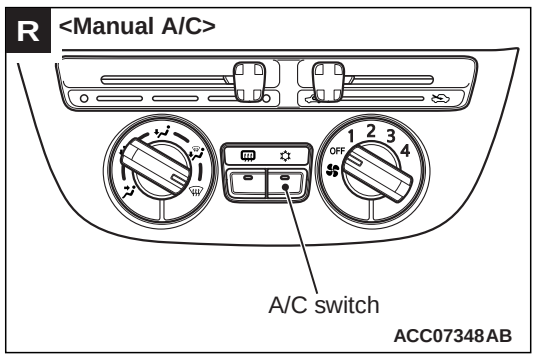

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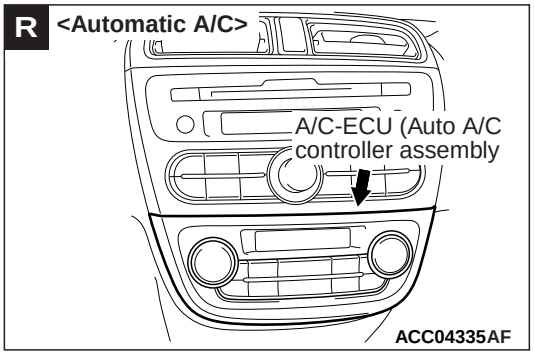

Q

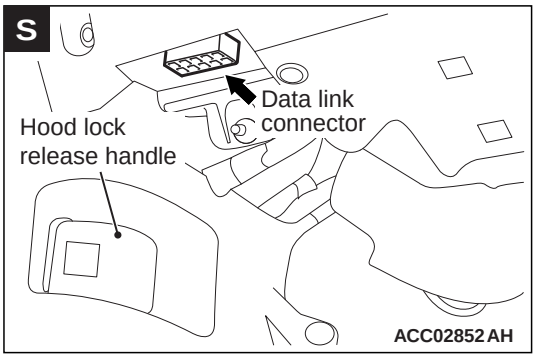



R <Manual A/C>




TSB Revision




## THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001002576

⚠ ***WARNING***

***When touching the throttle valve, surely shut off the driving circuits of the throttle valve. In the event that the throttle valve is operated, a finger might be injured as the result of being caught by the throttle valve.***

⚠ **CAUTION**

**When the throttle body cleaning is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Precautions Before Service – Initialization Procedure for Learning Value in MFI Engine P.00-41).**

1. Disconnect the electronic-controlled throttle valve connector.
2. Remove the air intake hose from the throttle body.
3. Remove the throttle body.

⚠ **CAUTION**

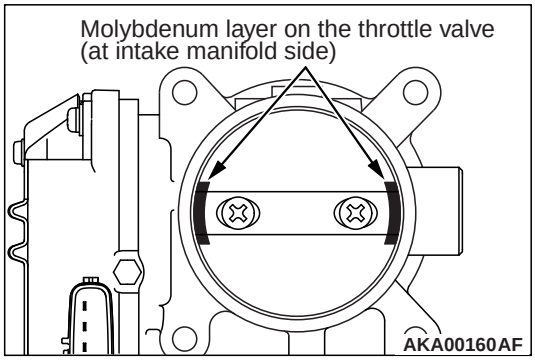
**Do not spray the cleaning solvent directly to the throttle valve.**

4. Spray cleaning solvent on a clean cloth.

⚠ **CAUTION**

- **Make sure the cleaning solvent does not enter the motor and the sensor through the shaft.**
- **Do not remove molybdenum. which is applied around the throttle valve of the throttle body.**

5. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning solvent.
6. Install the throttle body.
7. Install the air intake hose.
8. Connect electronic-controlled throttle valve connector.



## FUEL PRESSURE TEST

M1131001903055

**Required Special Tools:**

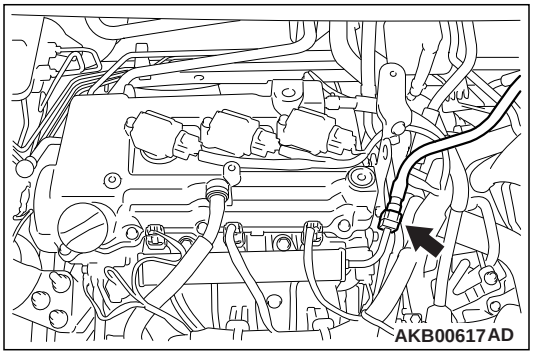
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991981: Fuel Pressure Gauge Set
- MB992001: Hose Adapter
- MB992049: Quick Connector
- MB992076: Injector Test Set
- MD998709: Hose Adapter

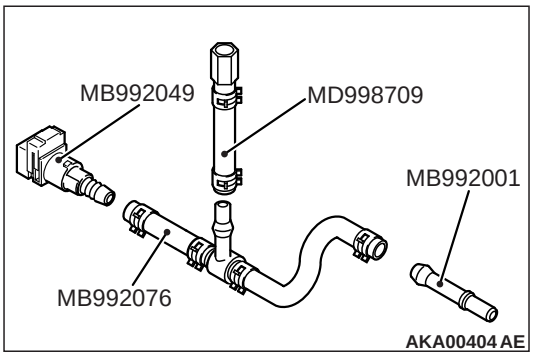
1. Release residual pressure from the fuel pipe line to prevent fuel spray. (Refer to P.13A-641.)

***⚠ WARNING***

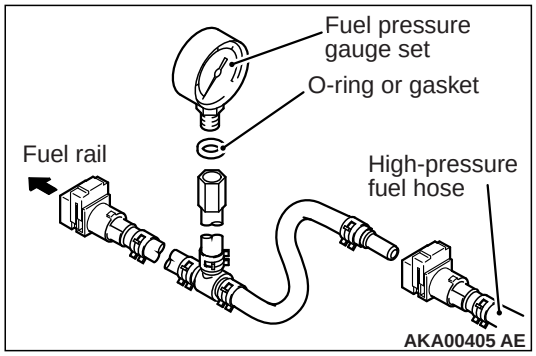
***To prevent a fire, cover the hose connection with shop towels to prevent splashing of fuel that could be caused by some residual pressure in the fuel pipe line.***

2. Disconnect the fuel high-pressure hose at the fuel rail side.



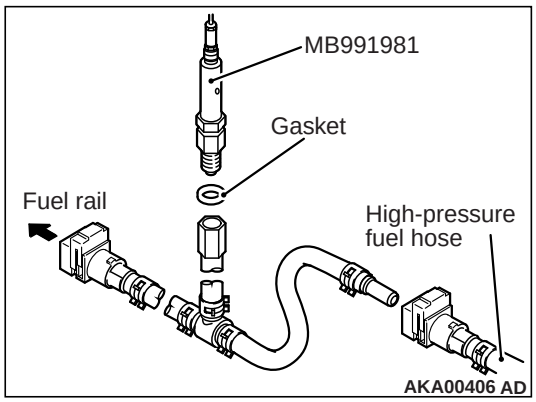




3. Assemble the special tool MB992076 (injector test set) as shown in figure according to the following procedure.
   (1) Remove the injector installation adapter from the hose. Remove another hose together with the adapter and remove the adapter from the remaining hose.
   (2) Install the special tool MB992049 (quick connector) and the special tool MB992001 (hose adapter) to the hose without the adapter.
   (3) Remove the nipple of the bolt of the special tool MD998709 (hose adapter).
   (4) Install the special tool prepared in the procedure (3) to the nipple that was removed together with hose in the procedure (1).
4. Install the special tool assembled in Step 3 between the fuel rail and the fuel high-pressure hose.




**<When using the fuel pressure gauge>**

a. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described.




**<When using the special tool MB991981 (fuel pressure gauge set)>**

a. Via a gasket, install the special tool MB991981 (fuel pressure gauge set) into the special tool that has already assembled as described.
b. Connect the leads from the fuel pressure gauge set to the power supply (cigarette lighter socket) and special tool MB991824 (V.C.I).

**⚠ CAUTION**

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

5. Connect scan tool (M.U.T.-III) to the data link connector.
6. Turn the ignition switch to the ON position (But do not start the engine).
7. Use Actuator test "item number 9" to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.
8. Finish the actuator test or turn the ignition switch to the LOCK (OFF) position.
9. Start the engine and run at idle.
10. Measure fuel pressure while the engine is running at idle.

    **Standard value: Approximately 324 kPa (47 psi) at curb idle**

11. Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
12. If any of fuel pressure measured in Step 10 to 11 is out of specification, troubleshoot and repair according to the table below.

| SYMPTOM | PROBABLE CAUSE | REMEDY |
|---|---|---|
| • Fuel pressure too low<br>• Fuel pressure drops after revving | Clogged fuel filter | Replace fuel filter |
| | Fuel leaking to return side due to poor fuel regulator valve seating or settled spring | Replace fuel pressure regulator (integrated in the fuel tank pump module) |
| | Low fuel pump delivery pressure | Replace fuel pump |
| Fuel pressure too high | Binding valve in fuel pressure regulator | Replace fuel pressure regulator (integrated in the fuel tank pump module) |

13. Stop the engine and observe fuel pressure gauge reading. It is normal if the reading does not drop within two minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below. Start, then stop the engine.

| SYMPTOM | PROBABLE CAUSE | REMEDY |
|---|---|---|
| Fuel pressure drops gradually after engine is stopped | Leaky injector | Replace injector |
| | Leaky fuel regulator valve seat | Replace fuel pressure regulator (integrated in the fuel tank pump module) |
| Fuel pressure drops sharply immediately after engine is stopped | Check valve in fuel pump is held open | Replace fuel pump |

14. Release residual pressure from the fuel pipe line. (Refer to P.13A-641.)

⚠ ***WARNING***
***To prevent a fire, cover the hose connection with shop towels to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.***

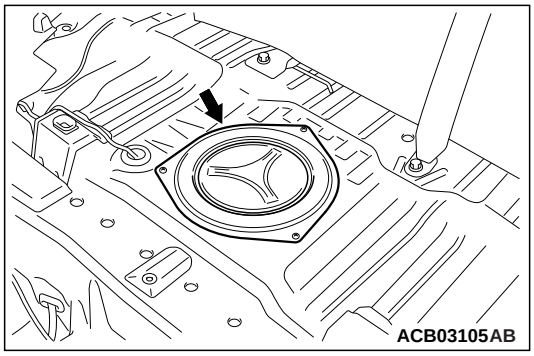
15. Remove the fuel pressure gauge and special tool from the fuel rail.
16. Fit the fuel high-pressure hose to the fuel rail.
17. Check for fuel leaks.
    (1) Use scan tool (M.U.T.-III) to operate the fuel pump.
    (2) Check the fuel line for leaks and repair as needed.
18. Disconnect scan tool (M.U.T.-III).

## REDUCE PRESSURIZED FUEL LINES

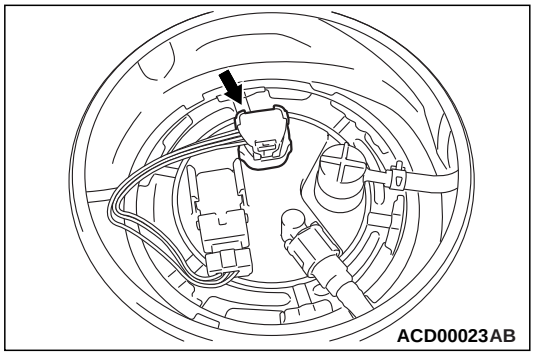
M1131000902844

⚠ ***WARNING***
***When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.***

1. Remove the rear seat cushion assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-23).


ACB03105AB

2. Remove the inspection lid.


ACD00023AB

3. Disconnect the fuel tank pump and gauge assembly connector.
4. Crank the engine for at least two seconds.
5. If the engine is not started, turn the ignition switch to the "LOCK" (OFF) position.
6. If the engine is started, turn the ignition switch to the "LOCK" (OFF) position after the engine stopped.
7. Connect the fuel tank pump and gauge assembly connector.
8. Install the inspection lid.
9. Install the rear seat cushion assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-23).

## FUEL TANK PUMP OPERATION CHECK

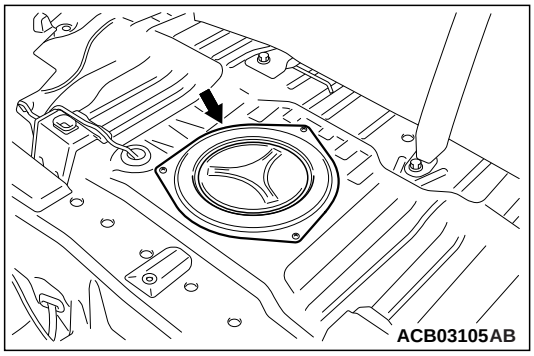
M1131002003088

**Required Special Tools:**

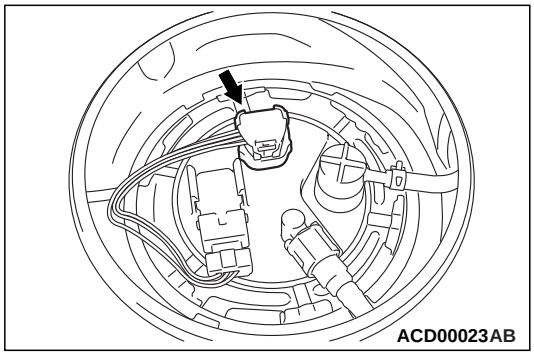
- MB992744: Vehicle communication interface-Lite (V.C.I.-Lite)
- MB992745: V.C.I.-Lite main harness A
- MB992747: V.C.I.-Lite USB cable short
- MB992748: V.C.I.-Lite USB cable long
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicles Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Remove the fuel tank cap.
2. Check the operating of the fuel tank pump by scan tool (M.U.T.-III) to force-drive the fuel tank pump.

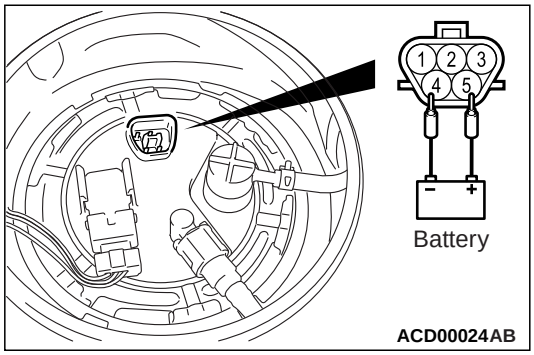
   *NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.*
3. Install the fuel tank cap.
4. If the fuel tank pump will not operate, check by using the following procedure. If normal, check the fuel tank pump drive circuit.
   (1) Turn the ignition switch to the "LOCK" (OFF) position.
   (2) Remove the rear seat cushion assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-23).




(3) Remove the inspection lid.




(4) Disconnect the fuel tank pump and gauge assembly connector.
(5) Remove the fuel tank cap.




(6) When the fuel tank pump and gauge assembly connector terminal is connected directly to the battery, check if the sound of the fuel tank pump operation can be heard. If no operating sound is heard, replace the fuel tank pump (Refer to GROUP 13B – On-vehicle Service, Fuel Tank Pump and Gauge Assembly Replacement P.13B-7).

*NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.*

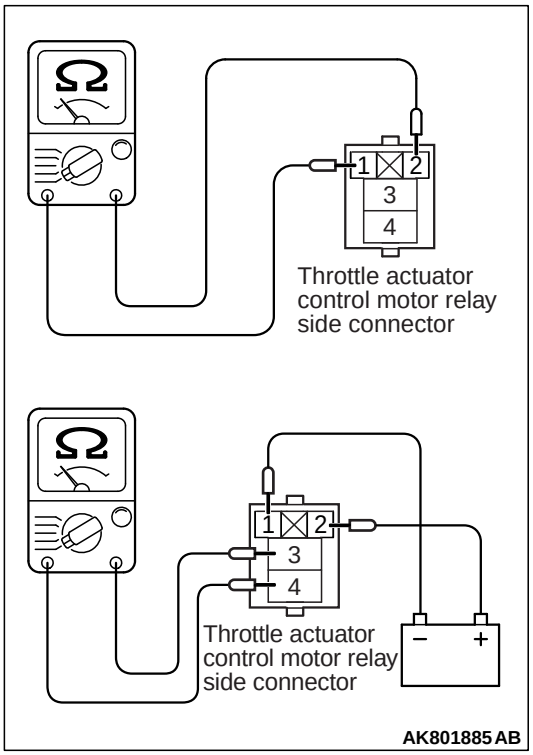
(7) Install the fuel tank cap.
(8) Check for fuel pressure by pinching the fuel hose with fingertips.
(9) Connect the fuel tank pump and gauge assembly connector.
(10) Install the inspection lid.
(11) Install the rear seat cushion assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-23).

## MULTIPORT FUEL INJECTION (MFI) RELAY CONTINUITY CHECK

M1131050002103

Inspect the MFI relay for continuity in accordance with the chart shown below.

| BATTERY VOLTAGE | TERMINAL NO. TO BE CONNECTED TO BATTERY | TERMINAL NO. TO BE CONDUCTED |
|---|---|---|
| Not supplied | – | 1 – 2 |
| Supplied | 1 – 2 | 3 – 4 |

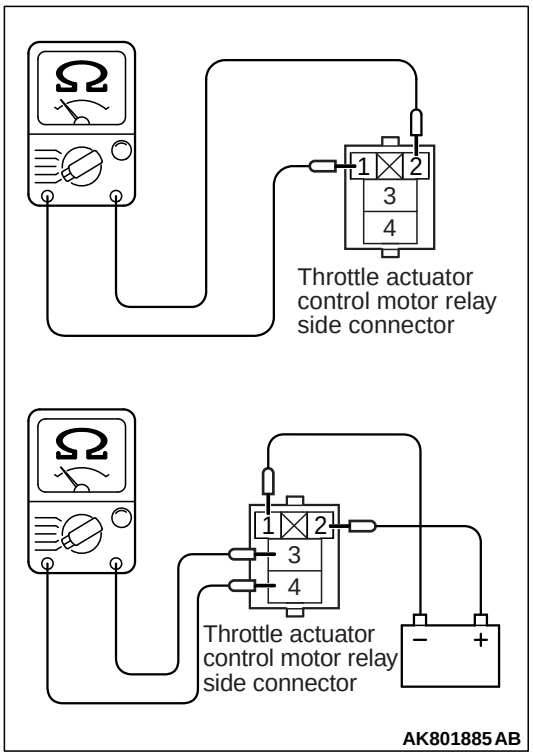



## FUEL PUMP RELAY CONTINUITY CHECK

M1131033002177

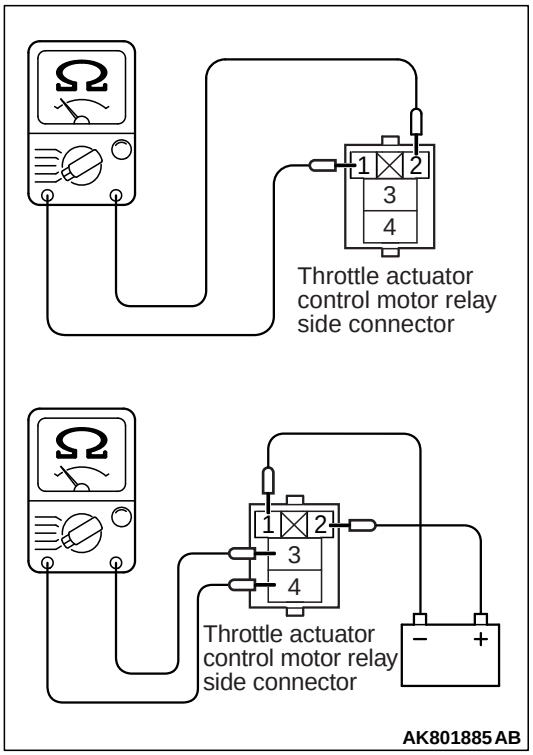
Inspect the fuel pump relay for continuity in accordance with the chart shown below.

| BATTERY VOLTAGE | TERMINAL NO. TO BE CONNECTED TO BATTERY | TERMINAL NO. TO BE CONDUCTED |
|---|---|---|
| Not supplied | – | 1 – 2 |
| Supplied | 1 – 2 | 3 – 4 |



## THROTTLE ACTUATOR CONTROL MOTOR RELAY CONTINUITY CHECK

M1131054900072

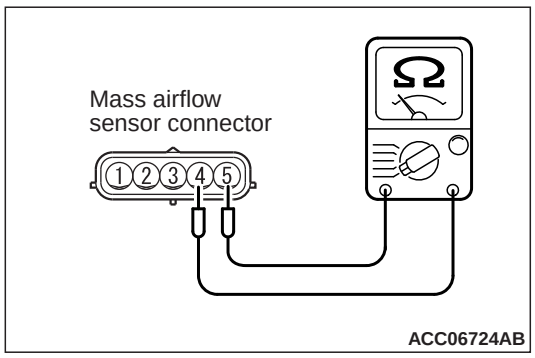



Inspect the throttle actuator control motor relay for continuity in accordance with the chart shown below.

| BATTERY VOLTAGE | TERMINAL NO. TO BE CONNECTED TO BATTERY | TERMINAL NO. TO BE CONDUCTED |
|---|---|---|
| Not supplied | – | 1 – 2 |
| Supplied | 1 – 2 | 3 – 4 |

## INTAKE AIR TEMPERATURE SENSOR CHECK

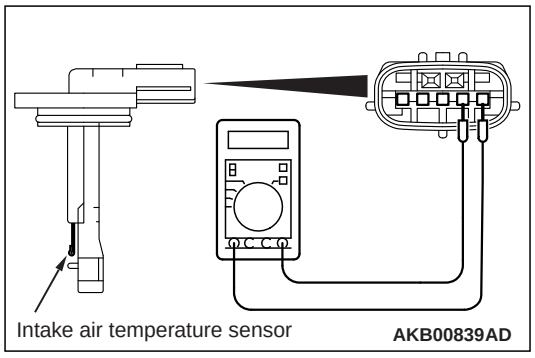
M1131002802423




1. Disconnect the mass airflow sensor connector.
2. Measure the resistance between terminal No. 4 and terminal No. 5.

**Standard value:**

**13 – 18 kΩ [at -20°C (-4°F)]**
**5.3 – 6.7 kΩ [at 0°C (32°F)]**
**2.3 – 3.0 kΩ [at 20°C (68°F)]**
**0.30 – 0.45 kΩ [at 80°C (176°F)]**




3. If not within specifications, replace the mass airflow sensor.
4. Measure the resistance while heating the sensor using a hair dryer.

**Normal condition:**

| TEMPERATURE | RESISTANCE (kΩ) |
|---|---|
| Higher | Smaller |

5. If the resistance does not decrease as heat increases, replace the mass airflow sensor.

## ENGINE COOLANT TEMPERATURE SENSOR CHECK

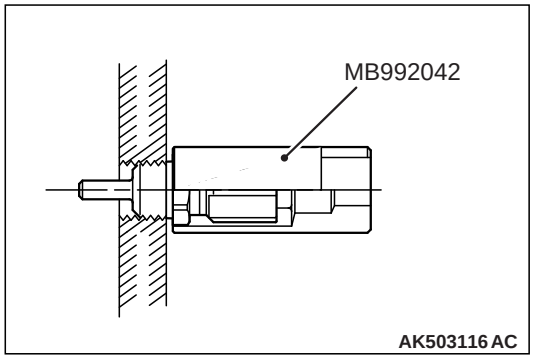
M1131003102438

**Required Special Tool:**

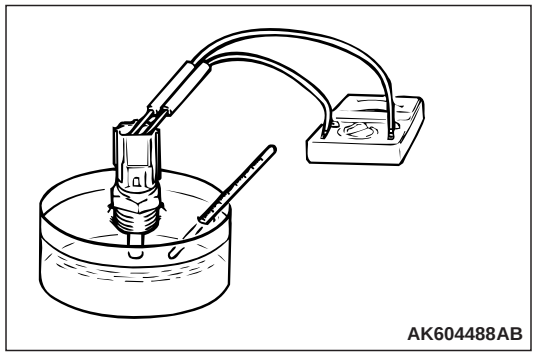
- MB992042: Engine coolant temperature sensor wrench

**⚠ CAUTION**

**Be careful not to touch the connector (resin section) with the tool when removing and installing.**



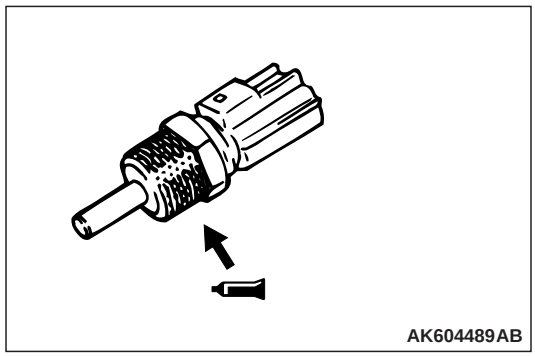

1. Drain engine coolant, then remove the engine coolant temperature sensor using the special tool MB992042 (engine coolant temperature sensor wrench).




2. With the temperature sensing portion of engine coolant temperature sensor immersed in hot water, check the resistance.

   **Standard value:**
   **14 – 17 kΩ [at -20°C (-4°F)]**
   **2.1 – 2.7 kΩ [at 20°C (68°F)]**
   **0.26 – 0.36 kΩ [at 80°C (176°F)]**

3. If the resistance deviates from the standard value greatly, replace the sensor.

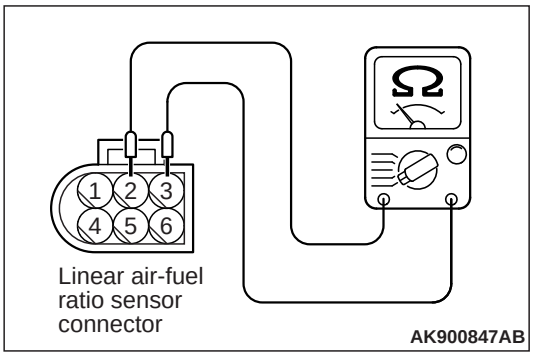



4. Apply LOCTITE 262, Three bond 1324N or equivalent to threaded portion.
5. With the special tool MB992042 (engine coolant temperature sensor wrench) tighten the engine coolant temperature sensor to the specified torque.

   **Tightening torque: 30 ± 9 N·m (22 ± 6 ft-lb)**

## LINEAR AIR-FUEL RATIO SENSOR CHECK

M1131055300084




1. Disconnect the linear air-fuel ratio sensor connector and connect special tool MB991658 to the connector on the linear air-fuel ratio sensor side.
2. Measure the resistance between terminal No. 2 and terminal No. 3.

   **Standard value: 2.3 – 4.2 Ω [at 20 °C (68°F)]**

3. If the resistance deviates from standard value, replace the linear air-fuel ratio sensor.

**TSB Revision**

*NOTE: For removal and installation of the linear air-fuel ratio sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler – Removal and Installation P.15-10.*

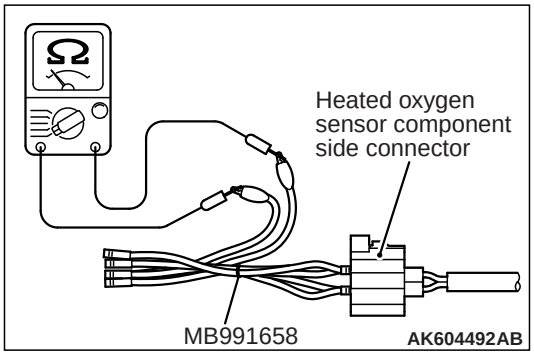
## HEATED OXYGEN SENSOR CHECK

M1131005004013

**Required Special Tools:**

- MB991658: Test Harness

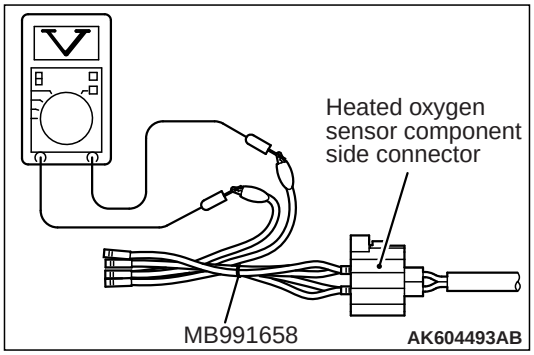
### Heated oxygen sensor (rear)




1. Disconnect the heated oxygen sensor connector and connect special tool MB991658 to the connector on the heated oxygen sensor side.
2. Measure the resistance between terminal No. 1 and terminal No. 2.

   **Standard value: 4.5 – 8.0 Ω [at 20°C (68°F)]**
3. If the resistance deviates from standard value, replace the heated oxygen sensor.
4. Warm up the engine until engine coolant is 80°C (176°F) or higher.
5. Drive at 50 km/h (31 mph) or more for 10 minutes.
6. Connect a digital voltage meter between terminal No. 3 and terminal No. 4.
7. Measure the output voltage of the heated oxygen sensor under the following driving.
   - Transaxle: 2nd speed (CVT: B range)
   - Drive with wide open throttle
   - Engine: 3,500 r/min or more

   **Standard value:**




| HEATED OXYGEN SENSOR OUTPUT VOLTAGE | REMARKS |
|---|---|
| 0.6 – 1.0 V | High load operation makes air/fuel ratio richer and normal heated oxygen sensor also can output voltage of 0.6 – 1.0 V. |

*NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.*

*NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.*

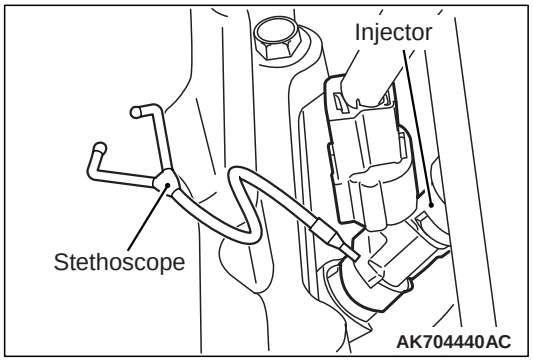
8. If the output voltage is not within the standard value, replace the heated oxygen sensor.

*NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler – Removal and Installation P.15-10.*

## INJECTOR CHECK

M1131005203047

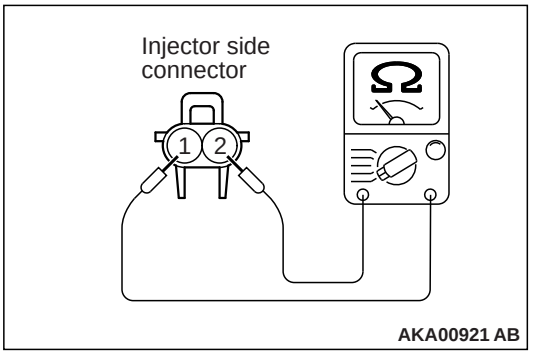
### <Checking the Operation Sound>




Using a stethoscope or long blade screwdriver, check the operation sound ("tick-tick-tick") of injectors during idling or during cranking. Check that as the engine speed increases, the frequency of the operating sound also increases.

1. If the injector you are checking is not operating, you may hear the operating sound of the other injectors.
2. If no operating sound is heard from the injector that is being checked, check the injector drive circuit. If there is nothing wrong with the circuit, a defective injector or engine control module (ECM) is suspected.

### <Checking the Coil Resistance>




1. Disconnect the injector connector.
2. Measure the resistance between terminals.
   **Standard value: 10.5 – 13.5 Ω [at 20°C (68°F)]**
3. If not within specification, replace the injector.
4. Connect the injector connector.

## THROTTLE ACTUATOR CONTROL MOTOR CHECK

M1131051001705

### <Operation Inspection>

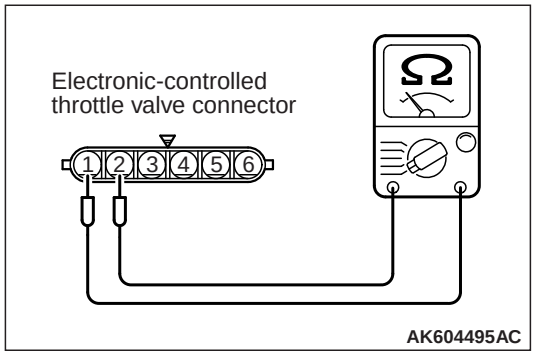
***⚠ WARNING***
***When checking the throttle valve operation, never insert fingers into the throttle valve. The extremely strong power of the throttle valve motor might trap and injure fingers.***

1. Remove the air intake hose from the throttle body.
2. Turn the ignition switch to the "ON" position.
3. Operate the accelerator pedal and confirm that the throttle valve is opening and closing accordingly.

### <Checking the Terminal Resistance>

⚠ ***WARNING***

***When touching the throttle valve, surely shut off the driving circuits of the throttle valve. In the event that the throttle valve is operated, a finger might be injured as the result of being caught by the throttle valve.***




1. Disconnect the electronic-controlled throttle valve connector.
2. Measure the resistance between terminal No. 1 and terminal No. 2.

   **Standard value: 0.3 – 100 Ω [at 20°C (68°F)]**

   *NOTE: If the measured resistance deviates from the standard value, fully open the throttle valve with your finger more than five times, then check the result again. If the throttle actuator control motor is not used for an extended period of time, the resistance may be increased as a result of internal forming of oxide film. Therefore, it means that the oxide film can be removed through a self cleaning capability of the throttle actuator control motor, if forcibly moved.*
3. If the resistance is outside the standard value, replace the throttle body assembly.

## ENGINE OIL CONTROL VALVE CHECK

M1131053201125

**Required Special Tool:**

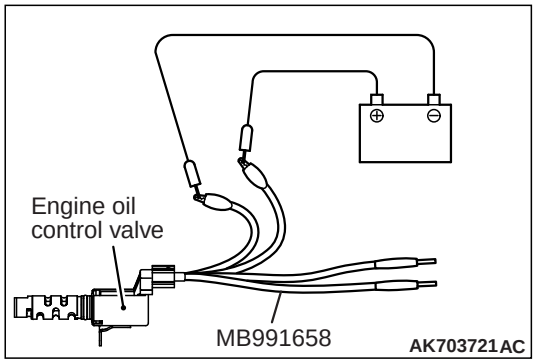
- MB991658: Test Harness

### <Checking the Operation Sound>

1. Disconnect the engine oil control valve connector.

⚠ **CAUTION**

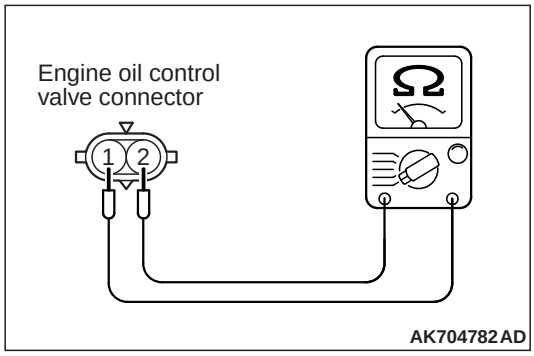
**To prevent the coil from burning, keep the duration of the voltage application as short as possible.**




2. Check that the operation sound of the engine oil control valve can be heard when the positive battery voltage is supplied to the engine oil control valve. (Use the special tool MB991658 to connect terminal No. 2 of the engine oil control valve connector to the positive battery terminal and terminal No. 1 to the negative battery terminal.)
3. If the operation sound cannot be heard, replace the engine oil control valve.

### <Checking the Coil Resistance>

1. Disconnect the engine oil control valve connector.




2. Measure the resistance between terminals.
   **Standard value: 6.9 – 7.9 Ω [at 20°C (68°F)]**
3. If the resistance is not within the standard value, replace the engine oil control valve.

## EVAPORATIVE EMISSION VENTILATION SOLENOID CHECK

M1131012800547

Refer to GROUP 17, Emission Control – Evaporative Emission Canister and Fuel Tank Pressure Relief Valve – Inspection P.17-58.

## EVAPORATIVE EMISSION PURGE SOLENOID CHECK

M1131005600552

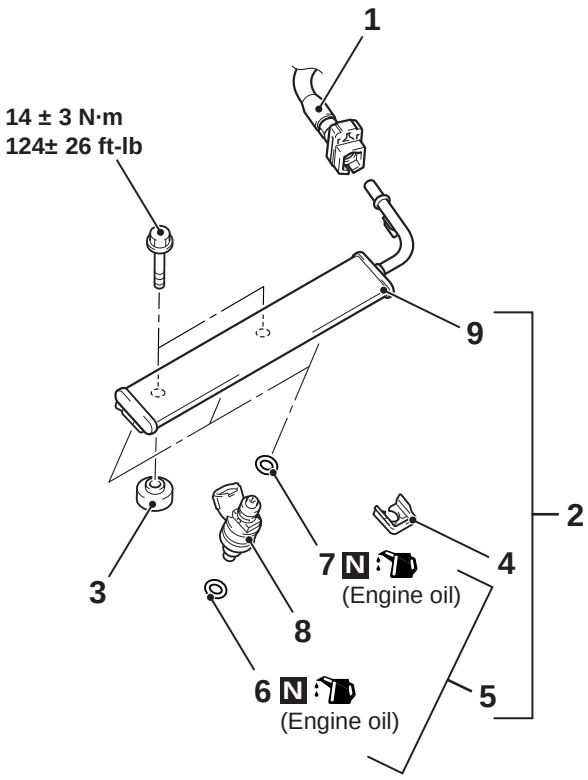
Refer to GROUP 17, Emission Control – Evaporative Emission Control System – Evaporative Emission Purge Solenoid Check P.17-56.

# INJECTOR

## REMOVAL AND INSTALLATION

M1131007104306

| Pre-removal operation | Post-installation operation |
|---|---|
| • Fuel Line Pressure Reduction (Refer to P.13A-641).<br>• Air Cleaner Assembly Removal (Refer to GROUP 15 – Air Cleaner P.15-5). | • Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner P.15-5).<br>• Fuel Leak Check. |




ACB02843AB

**Removal steps**

- PCV hose connection (Refer to GROUP 11A – Cylinder Head Cover Assembly P.11A-22).

<<A>> >>F<< 1. Fuel main pipe connection
<<B>> >>E<< 2. fuel rail and fuel injector assembly
3. Insulator

**Removal steps (Continued)**

>>D<< 4. Injector support
>>C<< 5. Fuel injector assembly
>>B<< 6. O-ring
>>A<< 7. O-ring
8. Fuel injector
9. Fuel rail

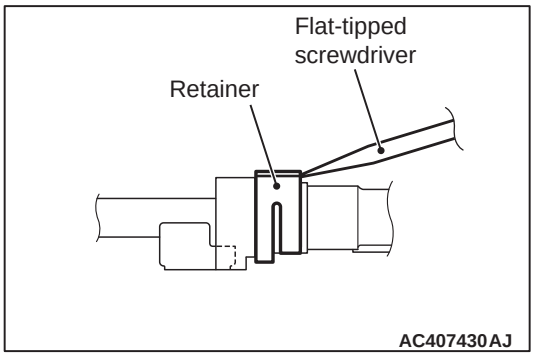
**Required Special Tool:**

- MB992106: O-ring Installer

## REMOVAL SERVICE POINTS

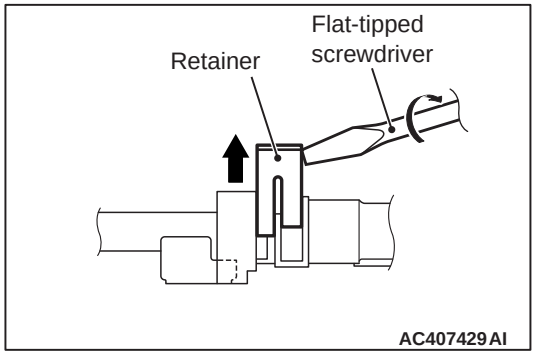
### <<A>> FUEL MAIN PIPE DISCONNECTION

Follow the steps below to unlock the fuel main pipe connector.




1. Insert a flat-tipped screwdriver [6 mm (0.24 inch) wide and 1 mm (0.04 inch) thick] into the retainer of the fuel main pipe connector.

**⚠ CAUTION**
**When pushing up the retainer of the fuel main pipe connector, pay attention to avoid damage to the retainer.**




2. Turn the flat-tipped screwdriver inserted into the retainer by 90 degrees to push up the retainer and unlock the fuel main pipe connector.
3. Disconnect the fuel main pipe.

## <<B>> FUEL RAIL AND FUEL INJECTOR ASSEMBLY REMOVAL

**⚠ CAUTION**
**Do not drop the fuel injector.**
Remove the fuel rail with the fuel injectors attached to it.

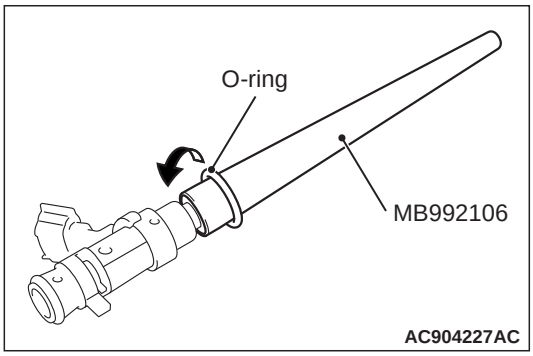
## INSTALLATION SERVICE POINTS

### >>A<< O-RING INSTALLATION

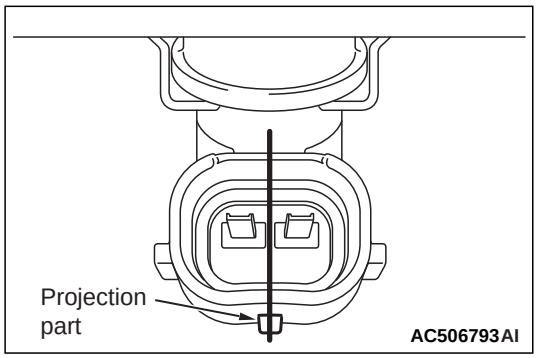
1. Apply a small amount of new engine oil to the O-ring.
2. While turning the fuel injector to right and left, install the O-ring to the fuel injector with care to avoid damage to the O-ring.

### >>B<< O-RING INSTALLATION

1. Apply a small amount of new engine oil to the O-ring.
2. Using special tool MB992106, install the fuel injector paying attention to avoid damage to the O-ring.

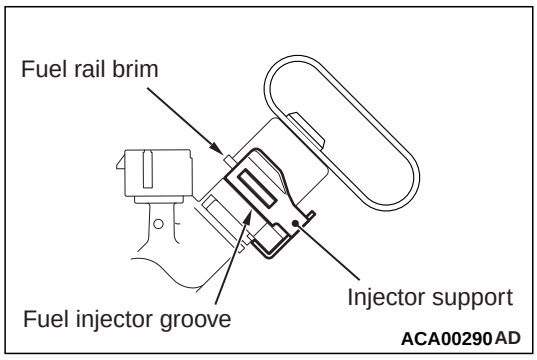


## >>C<< FUEL INJECTOR ASSEMBLY INSTALLATION




1. Apply a small amount of new engine oil to the O-ring.
2. Turning the fuel injector assembly to right and left, install it to the fuel rail with care not to damage the O-ring. After the installation, check for its smooth rotation. At this time, check that the projection part of the fuel injector assembly is in the center.
3. If the rotation is not smooth, the O-ring may be caught. Remove the fuel injector assembly and check the O-ring for damage. After this, re-insert it to the fuel rail and check for its smooth rotation.

## >>D<< FUEL INJECTOR SUPPORT INSTALLATION




Install the fuel injector support to the fuel injector groove and fuel rail brim, and fix the fuel injector assembly and fuel rail.

## >>E<< FUEL RAIL AND FUEL INJECTOR ASSEMBLY INSTALLATION

1. Apply a small amount of new engine oil to the O-ring at the end of fuel injector assembly.

**⚠ CAUTION**

**When installing the fuel rail and fuel injector assembly to the cylinder head, take care not to damage the O-ring at the tip of the fuel injector assembly.**

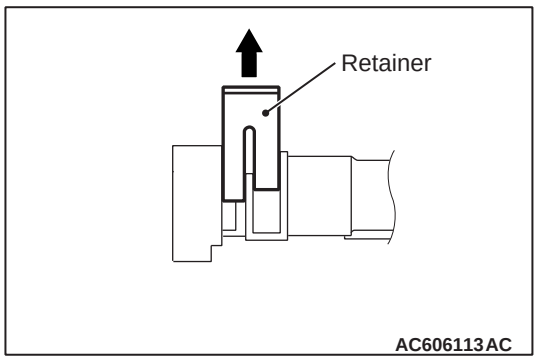
2. Install the fuel rail and fuel injector assembly to the cylinder head. Be careful not to damage the O-ring.
3. Tighten the fuel rail mounting bolts to the specified torque.

**Tightening torque: 14 ± 3 N·m (124 ± 26 ft-lb)**

## >>F<< FUEL MAIN PIPE CONNECTION

Follow the steps below to lock the fuel main pipe connector.

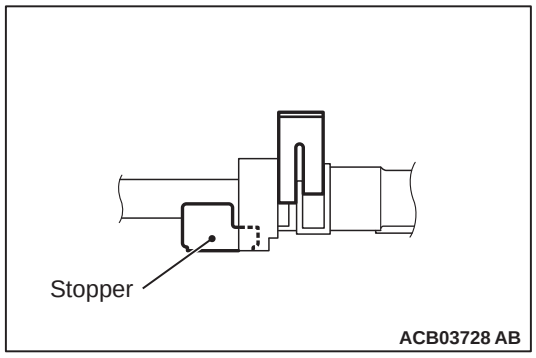
1. Pull up the retainer of fuel main pipe to unlock before installing.



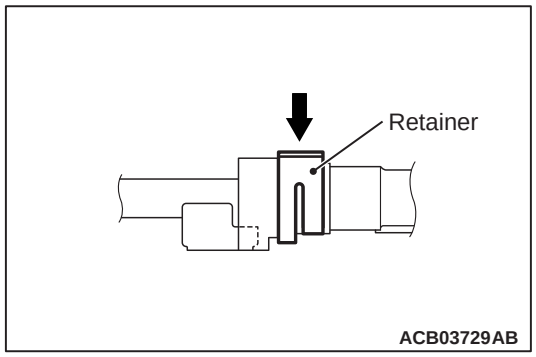

2. Securely insert the fuel rail stopper into the fuel main pipe connector groove to install the fuel main pipe to the fuel rail.

**⚠ CAUTION**

- **When pushing in the retainer of the fuel main pipe connector, pay attention to avoid damage to the retainer.**
- **After the installation of the fuel main pipe, slightly pull the fuel main pipe to check that it is connected securely. At this time, also check that there is approximately 1 mm play.**




3. Push in the retainer of the fuel main pipe connector to lock the fuel main pipe and fuel rail.



# THROTTLE BODY ASSEMBLY

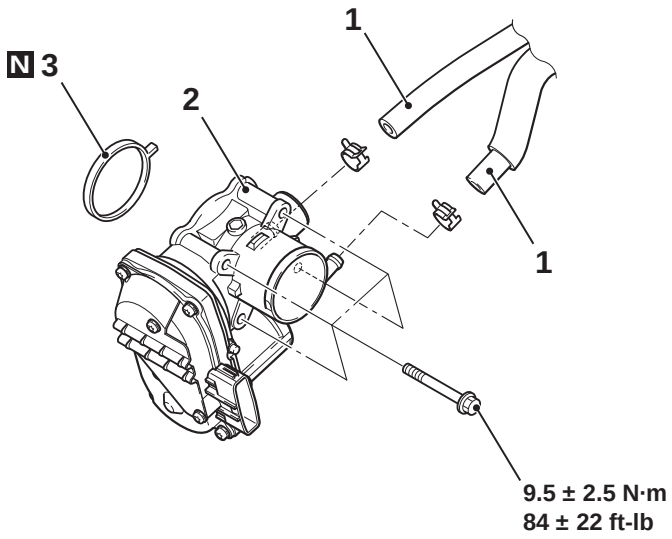
## REMOVAL AND INSTALLATION

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**⚠ CAUTION**

- **When the throttle body assembly is replaced, initialize the learned value using scan tool MB991958 (Refer to GROUP 00 – Precautions before Service, Initialization Procedure for Learning Value in MFI Engine P.00-41).**
- **Never loosen the screw fixing the throttle body assembly resin cover. If the screw is loosened, the sensor incorporated in the resin cover is misaligned and the throttle body assembly does not work normally.**

| Pre-removal operation | Post-installation operation |
|---|---|
| • Engine Coolant Draining (Refer to GROUP 14 – On-vehicle Service, Engine Coolant Replacement P.14-6).<br>• Air Cleaner Assembly Removal (Refer to GROUP 15 – Air Cleaner P.15-5).<br>• Battery and Battery Tray Removal (Refer to GROUP 54A – Battery P.54A-7). | • Battery and Battery Tray Installation (Refer to GROUP 54A – Battery P.54A-7).<br>• Air Cleaner Assembly Installation (Refer to GROUP 15 – Air Cleaner P.15-5).<br>• Engine Coolant Refilling (Refer to GROUP 14 – On-vehicle Service, Engine Coolant Replacement P.14-6). |




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**Removal steps**

>>B<< • Initialization operation (Installation only)
1. Water hose connection

**Removal steps (Continued)**

2. Throttle body assembly
>>A<< 3. Throttle body gasket

## INSTALLATION SERVICE POINTS

### >>A<< THROTTLE BODY GASKET INSTALLATION

Securely insert the gasket in the groove of the inlet manifold without causing any torsion or damage to the gasket.

### >>B<< INITIALIZATION OPERATION

Turn the ignition switch to the "ON" position and then to "LOCK" (OFF) position and hold it for at least 10 seconds.

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# ENGINE CONTROL MODULE (ECM)

## REMOVAL AND INSTALLATION

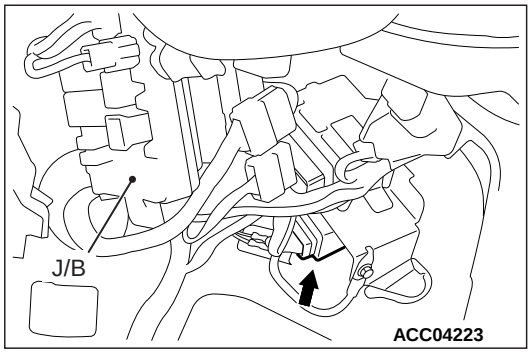
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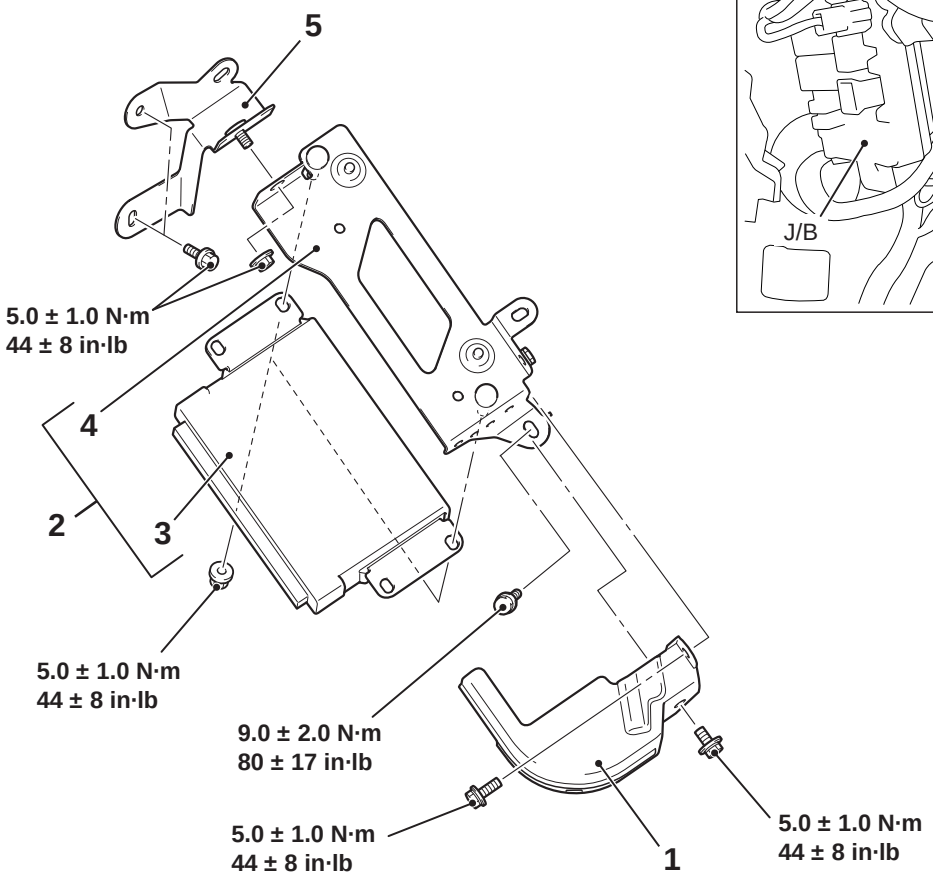
**⚠ CAUTION**

- **Do not replace the ECM and ETACS-ECU (immobilizer-ECU) simultaneously. Always replace the ECU by ones when the multiple ECU is replaced, and then replace the next ECU after registering the necessary IDs.**
- **If the ECM is replaced, perform the coding for it.**
- **If the ECM is replaced, use scan tool (M.U.T.-III) to write the VIN (Refer to GROUP 00 – How to Perform Vehicle Identification Number Writing P.00-26).**
- **After the ECM replacement, idling speed may be unstable because the MFI engine learning is not completed. To make it stable, let the system learn the idling (Refer to GROUP 00 – Precautions before Service, Learning Procedure for Idling in MFI Engine P.00-41).**

| Pre-removal operation | Post-installation operation |
|---|---|
| • Instrument Panel Lower Assembly Removal (Refer to GROUP 52A – Instrument Lower Panel P.52A-6). | • Instrument Panel Lower Assembly Installation (Refer to GROUP 52A – Instrument Lower Panel P.52A-6). |

### <Except vehicles for Canada>




ACC06820AB

**Removal steps**

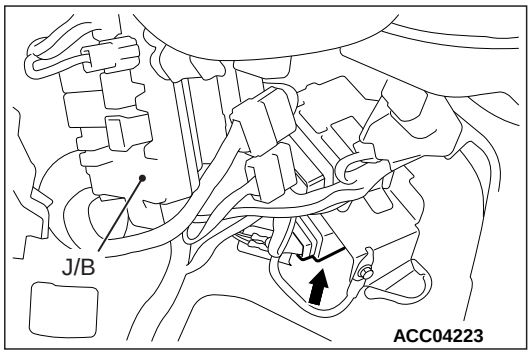
>>C<< • Initialization operation.<only at installation>
1. Connector cover
>>A<< 2. ECM and bracket assembly
3. ECM

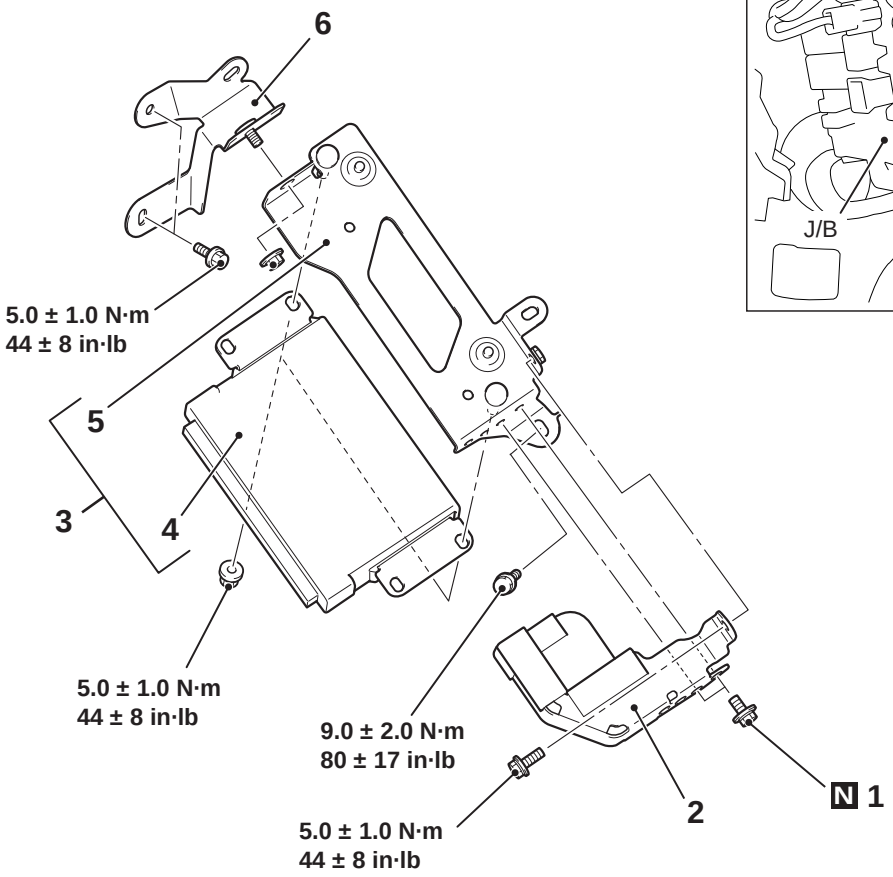
**Removal steps (Continued)**

• TCM [Refer to GROUP 23A – Transaxle Control Module (TCM)P.23A-142]
4. ECM bracket
5. ECM bracket

**TSB Revision**

## <Vehicles for Canada>




ACC06821AB

**Removal steps**

- >>**C**<< • Initialization operation (only at installation)
- <<**A**>> >>**B**<< 1. Break-off bolt
- 2. Connector cover
- >>**A**<< 3. ECM and bracket assembly
- 4. ECM

**Removal steps (Continued)**

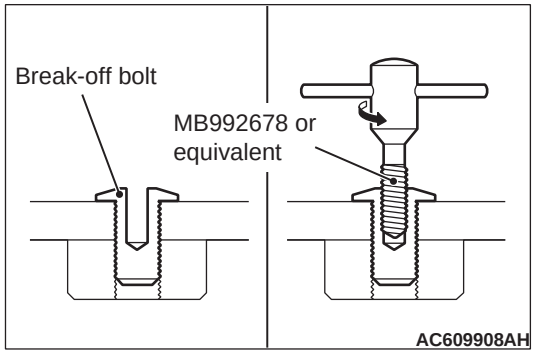
- • TCM [Refer to GROUP 23A – Transaxle Control Module (TCM)P.23A-142]
- 5. ECM bracket
- 6. ECM bracket

## REMOVAL SERVICE POINT

## <<A>> BREAK-OFF BOLT REMOVAL

1. <When using recommended tool screw extractor set (MB992678) or equivalent>

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(1) Drill in the break-off bolt a hole deep enough for the tap to stand.
(2) Use recommended tool screw extractor set (MB992678) or equivalent to remove the break-off bolt.

2. <When using the flat-tipped screwdriver>
   (1) Apply force towards the direction to loose the bolt by a flat-tipped screwdriver.
   (2) Remove the break-off bolt.

## INSTALLATION SERVICE POINTS

### >>A<< ECM AND BRACKET ASSEMBLY INSTALLATION

1. Tighten the ECM and bracket assembly mounting bolt temporarily.
2. Tighten the mounting nut to the specified torque.
   **Tightening torque: 5.0 ± 1.0 N·m (44 ± 8 in-lb)**
3. Tighten the mounting bolt to the specified torque.
   **Tightening torque: 9.0 ± 2.0 N·m (80 ± 17 in-lb)**

### >>B<< BREAK-OFF BOLT INSTALLATION

Tighten until the head of break-off bolt is broken off.

### >>C<< INITIALIZATION OPERATION

Turn the ignition switch to the "ON" position and then to "LOCK" (OFF) position and hold it for at least 10 seconds.