GASOLINE DIRECT INJECTION (GDI)

Click on the applicable bookmark to select the required model year.
GASOLINE DIRECT INJECTION (GDI)

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GENERAL INFORMATION

The Gasoline Direct Injection System consists of sensors which detect the engine conditions, the engine-ECU <M/T> or engine-A/T-ECU <A/T> which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.
A single injector for each cylinder is mounted at the cylinder head. The fuel is sent under pressure from the fuel tank to the fuel pressure regulator (low pressure) by the fuel pump (low pressure). The pressure is regulated by the fuel pressure regulator (low pressure) and the fuel regulated is then sent to the fuel pump (high pressure). The fuel under increased pressure generated by the fuel pump (high pressure) is then regulated by the fuel pressure regulator (high pressure) and is then distributed to each of the injectors via the delivery pipes.

THROTTLE VALVE OPENING ANGLE CONTROL

This system controls throttle valve opening angle electronically. The engine-ECU <M/T> or engine-A/T-ECU <A/T> determines how deeply the accelerator pedal is depressed by means of the accelerator position sensor (APS). Then the engine-ECU <M/T> or engine-A/T-ECU <A/T> sends a target value of the throttle valve opening angle to the throttle valve controller. The throttle valve control servo operates the throttle valve so that it reaches the target opening angle.

IDLE SPEED CONTROL

This system maintains engine idle speed at a predetermined condition by controlling the air flow that passes through the throttle valve according to engine idling condition and engine loads at idling.
The engine-ECU <M/T> or engine-A/T-ECU <A/T> operates the throttle valve control servo so that engine speed is maintained within a map value. The map value is predetermined according to engine coolant temperature and air-conditioning load.

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the engine operating conditions. The ignition timing is determined by the engine-ECU <M/T> or engine-A/T-ECU <A/T> from the engine speed, intake air volume, engine coolant temperature, atmospheric pressure and injection timing (intake stroke or compression stroke).
SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates or flashes as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis code corresponding to the abnormality is output.
- The engine-ECU records the engine operating condition when the diagnosis code is set. This data is called “freeze frame” data. This data can be read by using the MUT-II, and can then be used in simulation tests for troubleshooting. <Only vehicles with M/T>
- The RAM data inside the engine-ECU <M/T> or engine-A/T-ECU <A/T> that is related to the sensors and actuators can be read by means of the MUT-II. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

1. Fuel Pump Control
   Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
2. A/C Relay Control
   Turns the compressor clutch of the A/C ON and OFF.
3. Purge Control Solenoid Valve Control
   Refer to GROUP 17.
4. EGR Control Servo Control
   Refer to GROUP 17.

GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle body Throttle bore mm</td>
<td>65</td>
</tr>
<tr>
<td>Throttle position sensor</td>
<td>Variable resistor type</td>
</tr>
<tr>
<td>Throttle valve control servo</td>
<td>Brushless DC-motor type</td>
</tr>
<tr>
<td>Engine-ECU &lt;M/T&gt; Identification model No.</td>
<td>E2T79271 &lt;RHD&gt; E2T79272 &lt;LHD&gt;</td>
</tr>
<tr>
<td>Engine-A/T-ECU &lt;A/T&gt;      Identification model No.</td>
<td>E2T76277 &lt;RHD&gt; E2T76278 &lt;LHD&gt;</td>
</tr>
<tr>
<td>Items</td>
<td>Specifications</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td><strong>Sensors</strong></td>
<td></td>
</tr>
<tr>
<td>Air flow sensor</td>
<td>Karman vortex type</td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Semiconductor type</td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Thermistor type</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Thermistor type</td>
</tr>
<tr>
<td>Oxygen sensor</td>
<td>Zirconia type</td>
</tr>
<tr>
<td>Accelerator pedal position sensor (1st and 2nd channels)</td>
<td>Variable resistor type</td>
</tr>
<tr>
<td>Accelerator pedal position switch</td>
<td>Rotary contact type, within accelerator pedal position sensor (1st channel)</td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>Magnetic resistive element type</td>
</tr>
<tr>
<td>Inhibitor switch</td>
<td>Contact switch type</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>Hall element type</td>
</tr>
<tr>
<td>Crank angle sensor</td>
<td>Hall element type</td>
</tr>
<tr>
<td>Detonation sensor</td>
<td>Piezoelectric type</td>
</tr>
<tr>
<td>Fuel pressure sensor</td>
<td>Metallic membrane type</td>
</tr>
<tr>
<td>Power steering fluid pressure switch</td>
<td>Contact switch type</td>
</tr>
<tr>
<td><strong>Actuators</strong></td>
<td></td>
</tr>
<tr>
<td>Engine control relay type</td>
<td>Contact switch type</td>
</tr>
<tr>
<td>Fuel pump relay type</td>
<td>Contact switch type</td>
</tr>
<tr>
<td>Injector driver control relay</td>
<td>Contact switch type</td>
</tr>
<tr>
<td>Injector type and number</td>
<td>Electromagnetic type, 6</td>
</tr>
<tr>
<td>Injector identification mark</td>
<td>DIM 1070</td>
</tr>
<tr>
<td>Throttle valve control servo relay</td>
<td>Contact switch type</td>
</tr>
<tr>
<td>Throttle valve control servo</td>
<td>Brushless DC-motor type</td>
</tr>
<tr>
<td>EGR valve</td>
<td>Stepper motor type</td>
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<tr>
<td>Purge control solenoid valve</td>
<td>Duty cycle type solenoid valve</td>
</tr>
<tr>
<td>Fuel pressure regulator (low pressure)</td>
<td>Regulator pressure kPa 329</td>
</tr>
<tr>
<td>Fuel pressure regulator (high pressure)</td>
<td>Regulator pressure MPa 5.0</td>
</tr>
</tbody>
</table>
**GASOLINE DIRECT INJECTION SYSTEM DIAGRAM**

<table>
<thead>
<tr>
<th>Component</th>
<th>的功能</th>
<th>Component</th>
<th>的功能</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen sensor (front)</td>
<td>Power supply</td>
<td>Engine control relay</td>
<td></td>
</tr>
<tr>
<td>Oxygen sensor (rear)</td>
<td>Ignition switch-IG</td>
<td>Fuel pump relay</td>
<td></td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Ignition switch-ST</td>
<td>Injector driver relay</td>
<td></td>
</tr>
<tr>
<td>Throttle position sensor (2nd channel)</td>
<td>Accelerator pedal position sensor</td>
<td>Throttle control servo relay</td>
<td></td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>Detonation sensor</td>
<td>A/C relay</td>
<td></td>
</tr>
<tr>
<td>Crank angle sensor</td>
<td>Vehicle speed sensor</td>
<td>Condenser fan relay</td>
<td></td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>A/C switch 1</td>
<td>Ignition coil</td>
<td></td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>A/C switch 2</td>
<td>Engine warning lamp</td>
<td></td>
</tr>
<tr>
<td>Fuel pressure sensor</td>
<td>Inhibitor switch</td>
<td>GDI ECO indicator lamp</td>
<td></td>
</tr>
<tr>
<td>Throttle position sensor (1st channel)</td>
<td>Power steering fluid pressure switch</td>
<td>Diagnosis output</td>
<td></td>
</tr>
<tr>
<td>Engine ECU (M/T) or engine-A/T-ECU (A/T)</td>
<td>Alternator FR terminal</td>
<td>Alternator G terminal</td>
<td></td>
</tr>
<tr>
<td>Throttle valve controller</td>
<td>Stop lamp switch</td>
<td>Throttle valve controller</td>
<td></td>
</tr>
<tr>
<td>Engine ECU (M/T) or engine-A/T-ECU (A/T)</td>
<td>Clutch switch (M/T)</td>
<td>Oxygen sensor heater</td>
<td></td>
</tr>
<tr>
<td>Injector wire open circuit check signal</td>
<td>Small lamp switch</td>
<td></td>
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</tr>
<tr>
<td>Throttle valve controller</td>
<td>Injector driver (injector)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine ECU (M/T) or engine-A/T-ECU (A/T)</td>
<td>EGR valve (stepper motor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purge control solenoid valve</td>
<td>Throttle valve control servo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Diagram:**

- Fuel pressure regulator (low pressure) to fuel tank
- Fuel pressure sensor
- Engine coolant temperature sensor
- Oxygen sensor (front)
- Oxygen sensor (rear) (M/T)
- Intake air sensor
- Throttle position sensor (1st channel)
- Camshaft position sensor
- Crank angle sensor
- Canister
- Purge control solenoid valve
- EGR valve
- Engine ECU (M/T) or engine-A/T-ECU (A/T)

---

*Image X6163CA*
## SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment voltage of throttle position sensor (1st channel) V</td>
<td>0.4 - 0.6</td>
</tr>
<tr>
<td>Adjustment voltage of throttle position sensor (2nd channel) V</td>
<td>4.2 - 4.8</td>
</tr>
<tr>
<td>Throttle position sensor resistance kΩ</td>
<td>0.9 - 2.5</td>
</tr>
<tr>
<td>Adjustment voltage of accelerator pedal position sensors 1 and 2 V</td>
<td>0.985 - 1.085</td>
</tr>
<tr>
<td>Resistance of accelerator pedal position sensors 1 and 2 kΩ</td>
<td>3.5 - 6.5</td>
</tr>
<tr>
<td>Intake air temperature sensor resistance kΩ at 20°C</td>
<td>2.3 - 3.0</td>
</tr>
<tr>
<td>Intake air temperature sensor resistance kΩ at 80°C</td>
<td>0.30 - 0.42</td>
</tr>
<tr>
<td>Engine coolant temperature sensor resistance kΩ at 20°C</td>
<td>2.1 - 2.7</td>
</tr>
<tr>
<td>Engine coolant temperature sensor resistance kΩ at 80°C</td>
<td>0.26 - 0.36</td>
</tr>
<tr>
<td>Fuel pressure High-pressure side MPa</td>
<td>4 - 6.9</td>
</tr>
<tr>
<td>Fuel pressure Low-pressure side kPa</td>
<td>Approximately 329</td>
</tr>
<tr>
<td>Injector coil resistance (at 20°C) Ω</td>
<td>0.9 - 1.1</td>
</tr>
<tr>
<td>Oxygen sensor output voltage V (during revving)</td>
<td>0.6 - 1.0</td>
</tr>
<tr>
<td>Oxygen sensor heater resistance (at 20°C) Ω</td>
<td>4.5 - 8.0</td>
</tr>
<tr>
<td>Throttle control servo coil resistance (at 20°C) Ω</td>
<td>0.6 - 1.0</td>
</tr>
</tbody>
</table>

## SEALANT

<table>
<thead>
<tr>
<th>Item</th>
<th>Specified sealant</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine coolant temperature sensor</td>
<td>3M Nut Locking Part No.4171 or equivalent</td>
<td>Drying sealant</td>
</tr>
</tbody>
</table>

## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tools</th>
<th>Number</th>
<th>Name</th>
<th>Use</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="MB991502" /></td>
<td>MB991502</td>
<td>MUT-II sub assembly</td>
<td>• GDI system check</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Take a reading of the diagnosis codes</td>
</tr>
<tr>
<td>Tools</td>
<td>Number</td>
<td>Name</td>
<td>Use</td>
</tr>
<tr>
<td>-------</td>
<td>--------------</td>
<td>-------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td>MB991348,</td>
<td>Test harness set</td>
<td>• Troubleshooting - voltage measurement&lt;br&gt;• Inspection using an analyzer</td>
</tr>
<tr>
<td></td>
<td>MB991658</td>
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<td>MB991709</td>
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<td></td>
<td>MB991519</td>
<td>Alternator harness connector</td>
<td>Troubleshooting - voltage measurement</td>
</tr>
<tr>
<td></td>
<td>MB998478</td>
<td>Test harness (3-pin, square)</td>
<td>• Troubleshooting - voltage measurement&lt;br&gt;• Inspection using an analyzer</td>
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<tr>
<td></td>
<td>MB998464</td>
<td>Test harness (4-pin, square)</td>
<td>Oxygen sensor check</td>
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<tr>
<td></td>
<td>MB991529</td>
<td>Diagnosis code checking harness</td>
<td>Take a reading of the diagnosis codes &lt;A/T&gt;</td>
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<tr>
<td></td>
<td>MD998709</td>
<td>Adaptor hose</td>
<td>Fuel pressure measurement</td>
</tr>
<tr>
<td></td>
<td>MD998742</td>
<td>Hose adaptor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MB991637</td>
<td>Fuel pressure gauge set</td>
<td></td>
</tr>
</tbody>
</table>
TROUBLESHOOTING <M/T>

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

NOTE
When replacing the engine-ECU, replace immobilizer-ECU and ignition key as well at the same time.

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)
If an abnormality occurs in any of the following items related to the GDI system, the engine warning lamp will illuminate or flash. If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

Engine warning lamp inspection items

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Diagnosis item</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Engine-ECU</td>
</tr>
<tr>
<td>P0100</td>
<td>Air flow sensor system</td>
</tr>
<tr>
<td>P0105</td>
<td>Barometric pressure sensor system</td>
</tr>
<tr>
<td>P0110</td>
<td>Intake air temperature sensor system</td>
</tr>
<tr>
<td>P0115</td>
<td>Engine coolant temperature sensor system</td>
</tr>
<tr>
<td>P0120</td>
<td>Throttle position sensor (1st channel) system</td>
</tr>
<tr>
<td>P0125</td>
<td>Feedback system</td>
</tr>
<tr>
<td>P0130</td>
<td>Oxygen sensor (front) system &lt;sensor 1&gt;</td>
</tr>
<tr>
<td>P0135</td>
<td>Oxygen sensor heater (front) system &lt;sensor 1&gt;</td>
</tr>
<tr>
<td>P0136</td>
<td>Oxygen sensor (rear) system &lt;sensor 2&gt;</td>
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<tr>
<td>P0141</td>
<td>Oxygen sensor heater (rear) system &lt;sensor 2&gt;</td>
</tr>
<tr>
<td>P0170</td>
<td>Abnormal fuel system</td>
</tr>
<tr>
<td>P0190</td>
<td>Abnormal fuel pressure</td>
</tr>
<tr>
<td>P0201</td>
<td>No.1 injector system</td>
</tr>
<tr>
<td>P0202</td>
<td>No.2 injector system</td>
</tr>
<tr>
<td>P0203</td>
<td>No.3 injector system</td>
</tr>
<tr>
<td>P0204</td>
<td>No.4 injector system</td>
</tr>
<tr>
<td>P0205</td>
<td>No.5 injector system</td>
</tr>
<tr>
<td>Code No.</td>
<td>Diagnosis item</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>P0206</td>
<td>No.6 injector system</td>
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<tr>
<td>P0220</td>
<td>Accelerator pedal position sensor (1st channel) system</td>
</tr>
<tr>
<td>P0225</td>
<td>Throttle position sensor (2nd channel) system</td>
</tr>
<tr>
<td>P0300</td>
<td>Ignition coil (power transistor) system</td>
</tr>
<tr>
<td>P0301</td>
<td>No.1 cylinder misfire detected.</td>
</tr>
<tr>
<td>P0302</td>
<td>No.2 cylinder misfire detected.</td>
</tr>
<tr>
<td>P0303</td>
<td>No.3 cylinder misfire detected.</td>
</tr>
<tr>
<td>P0304</td>
<td>No.4 cylinder misfire detected.</td>
</tr>
<tr>
<td>P0305</td>
<td>No.5 cylinder misfire detected.</td>
</tr>
<tr>
<td>P0306</td>
<td>No.6 cylinder misfire detected.</td>
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<tr>
<td>P0335</td>
<td>Crank angle sensor system</td>
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<tr>
<td>P0340</td>
<td>Camshaft position sensor system</td>
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<tr>
<td>P0403</td>
<td>EGR valve system</td>
</tr>
<tr>
<td>P0420</td>
<td>Catalyst malfunction</td>
</tr>
<tr>
<td>P0443</td>
<td>Purge control solenoid valve system</td>
</tr>
<tr>
<td>P1200</td>
<td>Injector driver system</td>
</tr>
<tr>
<td>P1220</td>
<td>Electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>P1221</td>
<td>Throttle valve position feedback system</td>
</tr>
<tr>
<td>P1222</td>
<td>Throttle control servo system</td>
</tr>
<tr>
<td>P1223</td>
<td>Communication line system with throttle valve controller</td>
</tr>
<tr>
<td>P1225</td>
<td>Accelerator pedal position sensor (2nd channel) system</td>
</tr>
<tr>
<td>P1226</td>
<td>Throttle valve controller system</td>
</tr>
</tbody>
</table>

**NOTE**

1. If the engine warning lamp illuminates because of a malfunction of the engine-ECU, communication between MUT-II and the engine-ECU is impossible. In this case, the diagnosis code cannot be read.

2. After the engine-ECU has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.

   If diagnosis code P0120, P0220, P0225 or P1225 is set, the engine warning lamp will flash. If the 1st and 2nd channels of the throttle position sensor or the accelerator pedal position sensor fail at the same time, the engine warning lamp will also flash.

3. After the engine warning lamp illuminates, it will be switched off under the following conditions.
   (1) When the engine-ECU monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.

   *: In this case, “one time” indicates from engine start to stop.

   (2) For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES
Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE
1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE
By turning the ignition switch to OFF, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.
5. Erase the diagnosis codes.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING
1. Carry out inspection by means of the data list and the actuator test function. If there is an abnormality, check and repair the chassis harnesses and components.
2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the MUT-II, and then start the engine again and carry out a road test to confirm that the problem has disappeared.
FREEZE FRAME DATA
When the engine-ECU detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called “Freeze frame data.” By analyzing this “freeze frame” data with the MUT-II, an effective troubleshooting can be performed.

<table>
<thead>
<tr>
<th>Data item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine coolant temperature sensor</td>
<td>°C</td>
</tr>
<tr>
<td>Engine speed</td>
<td>r/min</td>
</tr>
<tr>
<td>Vehicle speed</td>
<td>km/h</td>
</tr>
<tr>
<td>Long-term fuel compensation (long-term fuel trim)</td>
<td>%</td>
</tr>
<tr>
<td>Short-term fuel compensation (short-term fuel trim)</td>
<td>%</td>
</tr>
<tr>
<td>Fuel control condition</td>
<td>Unit</td>
</tr>
<tr>
<td>Open loop</td>
<td>OL</td>
</tr>
<tr>
<td>Closed loop</td>
<td>CL</td>
</tr>
<tr>
<td>Open loop owing to drive condition</td>
<td>OL-DRV.</td>
</tr>
<tr>
<td>Open loop owing to system malfunction</td>
<td>OL-SYS.</td>
</tr>
<tr>
<td>Closed loop based on one oxygen sensor</td>
<td>CL-H02S</td>
</tr>
<tr>
<td>Calculation load value</td>
<td>%</td>
</tr>
<tr>
<td>Diagnosis code during data recording</td>
<td>-</td>
</tr>
</tbody>
</table>

NOTE
If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS
The engine-ECU monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. This history can be read out by using MUT-II. (If the ECU has judged a item before, the MUT-II displays “Complete.”)
In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).
- Catalyst: P0420
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141
FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

<table>
<thead>
<tr>
<th>Malfunctioning item</th>
<th>Control contents during malfunction</th>
</tr>
</thead>
</table>
| Air flow sensor                       | 1. Suspends lean burn operation.  
                                          | 2. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. |
| Intake air temperature sensor         | Controls as if the intake air temperature is 25°C.                                                                     |
| Throttle position sensor (2nd channel)| 1. Suspends lean burn operation.  
                                          | 2. Controls the throttle opening angle feedback (half as much as the opening rate in the normal condition) by using signals from the throttle position sensor (1st channel). However, this controlling system is not applied if the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.  
                                          | 3. Refrains from controlling the throttle opening angle feedback if the throttle position sensor (1st channel) is also defective. |
| Engine coolant temperature sensor     | Controls as if the engine coolant temperature is 80°C. (Moreover, the control system is working until the ignition switch is turned OFF if the sensor signal returns to normal.) |
| Camshaft position sensor              | Cuts the fuel supply once a malfunction is detected. (Only when there has been no occasion of detecting No.1 cylinder top dead centre after the ignition switch is turned ON.) |
| Vehicle speed sensor                  | 1. Suspends lean burn operation. However, the control is cancelled as a certain time passes by with the engine speed of 1,500 r/min or more.  
                                          | 2. Suspends lean burn operation during the engine idling. |
| Barometric pressure sensor            | Controls as if the barometric pressure is 101 kPa.                                                                     |
| Detonation sensor                     | Fixes the ignition timing as that for standard petrol.                                                                 |
| Injector                              | 1. Suspends lean burn operation.  
                                          | 2. Suspends the exhaust gas recirculation.                                                                            |
| Ignition coil (incorporating powder transistor) | 1. Suspends lean burn operation.  
                                          | 2. Cuts off the fuel supply to cylinders with an abnormal ignition signal.                                             |
| Fuel pressure sensor                  | 1. Controls as if the fuel pressure is 5MPa.  
                                          | 2. Suspends fuel injection. (when the low pressure is detected and the engine speed is more than 3,000 r/min)          |
| Alternator FR terminal                | Refrains from controlling to suppress the alternator output to electrical load. (Operated as a normal alternator)        |
| Accelerator pedal position sensor (2nd channel) | 1. Suspends lean burn operation.  
                                          | 2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (1st channel). However, the control system is not applicable if the difference from the accelerator pedal position sensor (1st channel) output voltage is 1.0 V or higher.  
                                          | 3. Suspends the electronic controlled throttle valve system if accelerator pedal position sensor (1st channel) is also defective. |
## Malfunctioning item | Control contents during malfunction
--- | ---
**Accelerator pedal position sensor (1st channel)** | 1. Suspends lean burn operation.  
2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (2nd channel). (However, this control is not applicable if the voltage difference between the accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) is 1.0 V or higher.)  
3. Also suspends the electronic-controlled throttle valve system when the accelerator pedal position sensor (2nd channel) is defective.

**Throttle position sensor (1st channel)** | 1. Suspends lean burn operation.  
2. Controls throttle opening angle feedback by using signals from throttle position sensor (2nd channel). (However, the controlling system is not applied when the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.)  
3. Refrains from controlling the throttle opening angle feedback when throttle position sensor (2nd channel) is also defective.

**Electronic-controlled throttle valve system** | 1. Suspends the electronic controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the idle speed feedback control.

**Throttle valve position feedback** | 1. Suspends the electronic controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control.  
However, if the throttle valve opening angle is significantly wide, this system carries out the following controls.  
1. Always cuts the fuel supply to three cylinders.  
2. Cuts the fuel supply when the engine speed reaches 3,000 r/min or more.

**Throttle control servo** | 1. Suspends the electronic-controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control.

**Communication line between the throttle valve controller and the ECU** | 1. Communication error between the throttle valve controller and the engine-ECU:  
   • Suspends lean burn operation.  
   • Cuts the fuel supply when the engine speed reaches 3,000 r/min or more.  
   • Suspends the cruise-control.  
2. Communication error between the throttle valve controller and the engine-ECU:  
   • Suspends lean burn operation.  
   • Cuts the fuel supply when the engine speed reaches 3,000 r/min or more.  
   • Suspends the cruise-control.  
   • The throttle valve controller controls the throttle valve opening angle by using signals from accelerator pedal position sensor (2nd channel).

**Throttle valve controller** | 1. Suspends the electronic-controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control.

**NOTE**
If the electronic-controlled throttle valve system is suspended, the engine warning lamp will illuminate.
<table>
<thead>
<tr>
<th>Code No.</th>
<th>Diagnosis item</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0100</td>
<td>Air flow sensor system</td>
<td>13A-17</td>
</tr>
<tr>
<td>P0105</td>
<td>Barometric pressure sensor system</td>
<td>13A-19</td>
</tr>
<tr>
<td>P0110</td>
<td>Intake air temperature sensor system</td>
<td>13A-21</td>
</tr>
<tr>
<td>P0115</td>
<td>Engine coolant temperature sensor system</td>
<td>13A-22</td>
</tr>
<tr>
<td>P0120★</td>
<td>Throttle position sensor (1st channel) system</td>
<td>13A-25</td>
</tr>
<tr>
<td>P0125</td>
<td>Feedback system</td>
<td>13A-27</td>
</tr>
<tr>
<td>P0130</td>
<td>Oxygen sensor (front) system &lt;sensor 1&gt;</td>
<td>13A-28</td>
</tr>
<tr>
<td>P0135</td>
<td>Oxygen sensor heater (front) system &lt;sensor 1&gt;</td>
<td>13A-30</td>
</tr>
<tr>
<td>P0136</td>
<td>Oxygen sensor (rear) system &lt;sensor 2&gt;</td>
<td>13A-31</td>
</tr>
<tr>
<td>P0141</td>
<td>Oxygen sensor heater (rear) system &lt;sensor 2&gt;</td>
<td>13A-33</td>
</tr>
<tr>
<td>P0170</td>
<td>Abnormal fuel system</td>
<td>13A-34</td>
</tr>
<tr>
<td>P0190★</td>
<td>Abnormal fuel pressure</td>
<td>13A-36</td>
</tr>
<tr>
<td>P0201</td>
<td>No.1 injector system</td>
<td>13A-38</td>
</tr>
<tr>
<td>P0202</td>
<td>No.2 injector system</td>
<td>13A-40</td>
</tr>
<tr>
<td>P0203</td>
<td>No.3 injector system</td>
<td>13A-42</td>
</tr>
<tr>
<td>P0204</td>
<td>No.4 injector system</td>
<td>13A-44</td>
</tr>
<tr>
<td>P0205</td>
<td>No.5 injector system</td>
<td>13A-46</td>
</tr>
<tr>
<td>P0206</td>
<td>No.6 injector system</td>
<td>13A-48</td>
</tr>
<tr>
<td>P0220★</td>
<td>Accelerator pedal position sensor (1st channel) system</td>
<td>13A-50</td>
</tr>
<tr>
<td>P0225★</td>
<td>Throttle position sensor (2nd channel) system</td>
<td>13A-52</td>
</tr>
<tr>
<td>P0300★</td>
<td>Ignition coil (power transistor) system</td>
<td>13A-53</td>
</tr>
<tr>
<td>P0301</td>
<td>No.1 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0302</td>
<td>No.2 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0303</td>
<td>No.3 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0304</td>
<td>No.4 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0305</td>
<td>No.5 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0306</td>
<td>No.6 cylinder misfire detected</td>
<td>13A-55</td>
</tr>
<tr>
<td>P0325</td>
<td>Detonation sensor system</td>
<td>13A-56</td>
</tr>
<tr>
<td>P0335</td>
<td>Crank angle sensor system</td>
<td>13A-56</td>
</tr>
<tr>
<td>P0340</td>
<td>Camshaft position sensor system</td>
<td>13A-58</td>
</tr>
<tr>
<td>P0403</td>
<td>EGR valve system</td>
<td>13A-60</td>
</tr>
<tr>
<td>P0420</td>
<td>Catalyst malfunction</td>
<td>13A-61</td>
</tr>
<tr>
<td>Code No.</td>
<td>Diagnosis item</td>
<td>Reference page</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>P0443</td>
<td>Purge control solenoid valve system</td>
<td>13A-62</td>
</tr>
<tr>
<td>P0500</td>
<td>Vehicle speed sensor system</td>
<td>13A-63</td>
</tr>
<tr>
<td>P1200</td>
<td>Injector driver system</td>
<td>13A-63</td>
</tr>
<tr>
<td>P1220★</td>
<td>Electronic-controlled throttle valve system</td>
<td>13A-64</td>
</tr>
<tr>
<td>P1221★</td>
<td>Throttle valve position feedback system</td>
<td>13A-65</td>
</tr>
<tr>
<td>P1222★</td>
<td>Throttle control servo system</td>
<td>13A-66</td>
</tr>
<tr>
<td>P1223★</td>
<td>Communication line with throttle valve controller</td>
<td>13A-67</td>
</tr>
<tr>
<td>P1225★</td>
<td>Accelerator pedal position sensor (2nd channel) system</td>
<td>13A-68</td>
</tr>
<tr>
<td>P1226★</td>
<td>Throttle valve controller system</td>
<td>13A-69</td>
</tr>
<tr>
<td>P1500</td>
<td>Alternator FR terminal system</td>
<td>13A-70</td>
</tr>
<tr>
<td>P1610</td>
<td>Immobilizer system</td>
<td>13A-71</td>
</tr>
</tbody>
</table>

**NOTE**

1. Do not replace the engine-ECU until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a “★”, the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.
### INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

<table>
<thead>
<tr>
<th>Code No.</th>
<th>P0100 Air flow sensor system</th>
</tr>
</thead>
</table>
| **Probable cause** | - Malfunction of air flow sensor  
- Open or short circuit in air flow sensor circuit or  
loose connector contact  
- Malfunction of engine-ECU |

#### Code No. P0100 Air flow sensor system

**Range of Check**
- Engine speed: 500 r/min or more

**Set Conditions**
- The sensor output frequency is 3.3 Hz or less for four seconds.

**Check the following connector:** B-120

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
</table>

**Measure at air flow sensor connector B-120**
- Disconnect the connector and measure at the harness side.

(1) Voltage between terminal 3 and earth (Ignition switch: ON)
- **OK:** 4.8 - 5.2 V

(2) Voltage between terminal 4 and earth (Ignition switch: ON)
- **OK:** System voltage

(3) Resistance between terminal 5 and earth
- **OK:** 2 Ω or less

**MUT-II Data list**
- 12 Air flow sensor (Refer to P.13A-105, DATA LIST REFERENCE TABLE.)

**OK**

**Transient malfunction**
- (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

**Check the following connector:** D-117

<table>
<thead>
<tr>
<th>OK</th>
<th>Check the following connector: D-118</th>
</tr>
</thead>
</table>

**Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.**

**NG**

**Measure at engine-ECU connector D-117**
- Measure the voltage at the engine-ECU terminal.
- Ignition switch: ON

(1) Voltage between terminal 61 and earth
- **OK:** 4.8 - 5.2 V

**OK**

**Check the following connector:** D-117

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
</table>

**Check the harness between the air flow sensor and the engine-ECU.**

**NG**

**Check the trouble symptoms.**

**NG**

**Replace the engine-ECU.**

**OK**

**Measure at air flow sensor connector B-120**
- Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON

(1) Voltage between terminal 7 and earth
- **OK:** 7 - 8 V

**OK**

To the next page
Check the following connector:
D-118

Check the harness between the air flow sensor and the engine-ECU.

Check the trouble symptoms.

Replace the engine-ECU.

Measure at air flow sensor connector B-120.
- Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
- Selector lever position: P
- Voltage between terminal 7 and earth
  OK: Engine: Idling
    0 - 1 V
    Engine speed: 3000 r/min
    6 - 9 V

From the previous page

OK

Measure at air flow sensor connector B-120.

OK

Check the trouble symptoms.

NG

Replace the engine-ECU.

NG

Repair

Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.

Selector lever position: P

Voltage between terminal 7 and earth

OK: Engine: Idling
    0 - 1 V
    Engine speed: 3000 r/min
    6 - 9 V

OK

OK

Measure the output waveform at air flow sensor connector B-120 (by using an analyzer).
- Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
- Engine: Idling
- Voltage between terminal 3 and earth
  OK: Waveforms should be displayed on P.13A-118 (Inspection Procedure Using an Analyzer) and noise should not be displayed in the waveform.

OK

OK

Check the trouble symptoms.

NG

Replace the air flow sensor.

NG

Repair

Check the following connectors:
B-25X, D-117, D-118

NG

Repair

Check the harnesses between the air flow sensor and the engine-ECU and between the air flow sensor and the engine control relay, and repair if necessary.
**Code No.P0105 Barometric pressure sensor system**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of barometric pressure sensor</td>
</tr>
<tr>
<td>- Open or short circuit in barometric pressure sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

**Range of Check**
- Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed.
- Battery voltage: 8 V or more

**Set Conditions**
- The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure)
- Or
- The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure)

**Check the following connector:**

**NG**
- Measure at air flow sensor connector B-120.
  - Disconnect the connector and measure at the harness side.
  - (1) Voltage between terminal 1 and earth (Ignition switch: ON)
    - OK: 4.8 - 5.2 V
  - (2) Resistance between terminal 5 and earth
    - OK: 2 Ω or less

**OK**
- Measure at engine-ECU connector D-117.
  - Measure the voltage at the engine-ECU terminal.
  - Voltage between terminal 41 and earth
    - OK: 4.8 - 5.2 V

**NG**
- Check the following connector:
  - D-117

**Repair**
- Measure the voltage at the engine-ECU terminal.
  - Ignition switch: ON
  - Voltage between terminal 41 and earth
    - OK: 4.8 - 5.2 V

**OK**
- Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.

**NG**
- Replace the air flow sensor.

**OK**
- Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.
Measure at engine-ECU connector D-117.
- Measure the voltage at the engine-ECU terminal.
- Ignition switch: ON
- Voltage between terminal 51 and earth
  OK: Altitude 0 m: 3.7 - 4.3 V
  Altitude 1200 m: 3.2 - 3.8 V

Check the following connector: D-117

Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.

Check the following connector: D-117

Check the trouble symptoms.

Replace the engine-ECU.
### Code No.P0110 Intake air temperature sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed.</td>
<td>- Malfunction of intake air temperature sensor</td>
</tr>
<tr>
<td>The sensor output voltage is 4.6 V or more for four seconds (equivalent to (-45^\circ\text{C}) of intake air temperature)</td>
<td>- Open or short circuit in intake air temperature sensor or loose connector contact</td>
</tr>
<tr>
<td>or</td>
<td>- Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

#### Set Conditions

**OK**

- Measure at air flow sensor connector B-120.
  - Disconnect the connector and measure at the harness side.
  - Resistance between terminal 5 and earth
    - OK: 2 \(\Omega\) or less
  - Voltage between terminal 6 and earth
    - Ignition switch: ON
    - OK: 4.8 - 5.2 V

**NG**

- Check the intake air temperature sensor itself.
  (Refer to P.13A-1227.)

**OK**

- Check the following connector: B-120

**NG**

- Repair

**OK**

- Measure at engine-ECU connector D-118.
  - OK: 4.8 - 5.2 V

**NG**

- Check the following connector: D-117
  - OK: 4.8 - 5.2 V

**NG**

- Replacement of the engine-ECU

---

### MUT-II Data list

| 13 Intake air temperature sensor | OK: Roughly the same as ambient temperature. |

**NG**

- Transient malfunction
  (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

**OK**

- Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.

**NG**

- Check the trouble symptoms.
- Replace the engine-ECU.

---

**OK**

- Measure at engine-ECU connector D-117.
  - OK: 4.8 - 5.2 V

**NG**

- Check the following connector: D-117
  - OK: 4.8 - 5.2 V

**NG**

- Replacement of the engine-ECU

---

**OK**

- Check the harness between the air flow sensor and the engine-ECU.

**NG**

- Check the trouble symptoms.
- Replace the engine-ECU.
Measure at air flow sensor connector B-120.
- Use the test harness (MB991709) to connect only terminals 5 and 6, and then measure at the pickup harness.
- Ignition switch: ON
- Voltage between terminal 6 and earth
  OK: Ambient temperature 0°C: 3.2 - 3.8 V
      Ambient temperature 20°C: 2.3 - 2.9 V
      Ambient temperature 40°C: 1.5 - 2.1 V
      Ambient temperature 80°C: 0.4 - 1.0 V

Check the trouble symptoms.
OK -> NG
Replace the engine-ECU.

Check the following connectors: D-117, D-118
OK -> NG
Repair

Check the harness between the air flow sensor and the engine-ECU, and repair if necessary.

---

**Code No.P0115 Engine coolant temperature sensor system**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of engine coolant temperature sensor</td>
</tr>
<tr>
<td>- Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

**Range of Check**
- Engine: Two seconds after the engine has been started
- Engine: After starting

**Probable cause**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of engine coolant temperature sensor</td>
</tr>
<tr>
<td>- Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

**Set Conditions**
- The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of engine coolant temperature)
  or
- The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C of engine coolant temperature)
- The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more.
MUT-II Data list
21 Engine coolant temperature sensor
OK: When the engine is cold, the temperature is roughly the same as ambient temperature. If warm, it is 80 - 120°C.

NG

Measure at engine coolant temperature sensor connector B-56.
- Disconnect the connector and measure at the harness side.
- Resistance between terminals 1 and 2
  OK: At 20 °C of engine coolant temperature: 2.1 - 2.7 kΩ
  At 80 °C of engine coolant temperature: 0.26 - 0.36 kΩ

OK

Check the following connector:
B-56

NG

Repair

OK

To the next page

OK

OK

OK

OK

OK
Measure at engine coolant temperature sensor connector B-56.
- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
- Voltage between terminal 1 and earth

OK: At 0°C of engine coolant temperature: 3.2 - 3.8 V
At 20°C of engine coolant temperature: 2.3 - 2.9 V
At 40°C of engine coolant temperature: 1.3 - 1.9 V
At 80°C of engine coolant temperature: 0.3 - 0.9 V

NG
Check the engine coolant temperature sensor.
(Refer to P.13A-227.)

OK
NG
Check the following connectors:
D-117, D-118

OK
NG
Check the harness wire between the engine coolant temperature sensor and the engine-ECU, and repair if necessary.

OK
NG
Check the trouble symptoms.

NG
Replace the engine-ECU.
### Code No.P0120 Throttle position sensor (1st channel) system

The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU.

**Range of Check**
- Ignition switch: ON

**Set Conditions**
- The sensor output voltage is 0.2 V or less.
- The sensor output voltage is 4.85 V or more and the throttle position sensor (2nd channel) output voltage is 2.5V or more.
- The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.
- The opening angle of throttle position sensor (1st channel) is different from its target by 1 V or more.
- The throttle position sensor (1st channel) output changes within 25 mV when the throttle control servo moves one step.

### Probable cause
- Malfunction of throttle position sensor
- Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact
- Malfunction of throttle valve controller
- Malfunction of engine-ECU

### MUT-II Data list
- Throttle position sensor (1st channel) (Refer to P.13A-105, DATA LIST REFERENCE TABLE.)

| OK | Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.) |
| NG | Replace |
| NG | Repair |

**Check the throttle position sensor.**
(Refer to P.13A-228.)

**Check the following connector:**
B-102

**Measure at throttle position sensor connector B-102.**
- Disconnect the connector and measure at the harness side.
  1. Voltage between terminal 1 and earth (Ignition switch: ON)
     - OK: 4.8 - 5.2 V
  2. Resistance between terminal 3 and earth
     - OK: 2 Ω or less

**OK**
**NG**

**Measure at throttle position sensor (1st channel) (Refer to P.13A-105, DATA LIST REFERENCE TABLE.)**

**OK**
**NG**

**Check the following connector:**
D-11

**OK**
**NG**

**Check the trouble symptoms.**
**NG**

**Replace the throttle valve controller.**

**To the next page**
From the previous page

OK

Measure at throttle position sensor connector B-102.
- Use test harness (MB991536) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
  1. Voltage between terminal 1 and earth
     OK: 4.8 - 5.2 V
  2. Voltage between terminal 2 and earth
     OK: Accelerator pedal fully released: 0.4 - 0.8 V
       Accelerator pedal fully depressed: 4.2 - 4.8 V
  3. Voltage between terminal 3 and earth
     OK: 0.5 V or less

OK

Measure at throttle valve controller connector D-11.
- Measure voltage at the throttle valve controller connector terminals
- Ignition switch: ON
- Voltage between terminal 7 and earth
  OK: Accelerator pedal fully released: 0.4 - 0.8 V
    Accelerator pedal fully depressed: 4.2 - 4.8 V

NG

Check the following connector: D-11

Check the harness wire between the throttle position sensor and the throttle valve controller, and repair if necessary.

OK

Check the following connector: D-11

Check the harness wire between the throttle position sensor and the throttle valve controller, and repair if necessary.

NG

Repair

Check the harness wire between the throttle position sensor and the throttle valve controller, and repair if necessary.

OK

Check the following connector: D-11

Check the harness wire between the throttle position sensor and the throttle valve controller, and repair if necessary.

NG

Repair

Check the trouble symptoms.

NG

Replace the throttle valve controller.
### Probable cause

- Malfunction of oxygen sensor (front)
- Open or short circuit in the oxygen sensor (front) circuit or loose connector contact
- Malfunction of engine-ECU

### Code No. P0125 Feedback system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>The engine coolant temperature is approx. 80°C or more.</td>
<td>- Malfunction of oxygen sensor (front)</td>
</tr>
<tr>
<td>During stoichiometric feedback control</td>
<td>- Open or short circuit in the oxygen sensor (front) circuit or loose connector contact</td>
</tr>
<tr>
<td>The vehicle is not being decelerated.</td>
<td>- Malfunction of engine-ECU</td>
</tr>
<tr>
<td>Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds.</td>
<td>- Malfunction of oxygen sensor (front)</td>
</tr>
</tbody>
</table>

**Check the following connector:**

- **C-19**
  - NG → Repair
  - OK → Measure at oxygen sensor (front) connector C-19.

  **OK**

  **NG** → Repair

  **Measure at oxygen sensor (front) connector C-19.**
  - Disconnect the connector and measure at the harness side.
  - Resistance between terminal 2 and earth
    - **OK:** 2 Ω or less
    - **NG** → Repair

  **OK**

  **NG** → Repair

  **Check the following connectors:**

  - **D-118, E-116**
    - **OK** → OK
    - **NG** → NG

  **OK**

  **NG** → NG

  **Measure at engine-ECU connector D-118.**
  - Measure the voltage at the engine-ECU terminal.
  - Engine: 2,500r/min (after warming up)
  - Voltage between terminal 71 and earth
    - **OK:** 0V and 0.8 V alternate.
    - **NG** → NG

  **OK**

  **NG** → NG

  **Check the following connectors:**

  - **D-118, E-116**
    - **OK** → OK
    - **NG** → NG

  **OK**

  **NG** → NG

  **Check the trouble symptoms.**

  **NG** → NG

  **Replace the engine-ECU.**
### Code No. P0130 Oxygen sensor (front) system

**<sensor 1>**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Three minutes have been passed since the engine has been started.</td>
<td>- Malfunction of oxygen sensor (front)</td>
</tr>
<tr>
<td>- The engine coolant temperature is approx. 80°C or more.</td>
<td>- Open or short circuit in the oxygen sensor (front) circuit or loose connector contact</td>
</tr>
<tr>
<td>- Intake air temperature is 20 - 50°C</td>
<td>- Malfunction of engine-ECU</td>
</tr>
<tr>
<td>- Engine speed is 1,200 r/min or more</td>
<td></td>
</tr>
<tr>
<td>- Driving on a level surface at constant speed.</td>
<td></td>
</tr>
</tbody>
</table>

**Set Conditions**

- The oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (front) inside the engine-ECU.

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Engine speed is 3,000 r/min or less</td>
<td></td>
</tr>
<tr>
<td>- During driving</td>
<td></td>
</tr>
<tr>
<td>- During air/fuel ratio feedback control</td>
<td></td>
</tr>
</tbody>
</table>

**Set Conditions**

- The oxygen sensor (front) output frequency is five or less per 12 seconds on average.
Check the following connector: C-19
OK ➔ Repair
NG ➔ Check the following connector: D-118, E-116
NG ➔ Repair
OK ➔ OK
NG ➔ Check the trouble symptoms.
NG ➔ Replace the engine-ECU.

Measure at oxygen sensor (front) connector C-19.
- Disconnect the connector and measure at the harness side.
- Resistance between terminal 2 and earth
  OK: 2 Ω or less

Measure at oxygen sensor (front) connector C-19.
- Use the test harness (MD998464) to connect the connector, and measure at the pick-up harness side.
- Engine: 2,500r/min (after warming up)
  (1) Voltage between terminal 2 and earth
    OK: 0.5 V or less
  (2) Voltage between terminal 4 and earth
    OK: 0 V and 0.8 V alternate.

Measure at engine-ECU connector D-118.
- Measure the voltage at the engine-ECU terminal.
- Engine: 2,500r/min (after warming up)
- Voltage between terminal 71 and earth
  OK: 0V and 0.8 V alternate.
# Code No.P0135 Oxygen sensor heater (front) system

## Probable cause
- Malfunction of oxygen sensor heater (front)
- Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact
- Malfunction of engine-ECU

## Range of Check
- The engine coolant temperature is approx. 20°C or more.
- The oxygen sensor heater (front) remains on.
- The engine speed is 50 r/min or more.
- Battery voltage is 11 - 16 V.

## Set Conditions
- The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds.

---

### Measure at oxygen sensor (front) connector C-19.
- Disconnect the connector and measure at the harness side.
- Resistance between terminals 1 and 3
  - **OK:** 4.5 - 8.0 Ω
  - **NG** Replace

### Check the following connector: C-19
- **OK**
- **NG** Repair

### Measure at oxygen sensor (front) connector C-19.
- Disconnect the connector and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal 1 and earth
  - **OK:** System voltage
  - **NG** Check the following connectors: B-25X, D-128, E-113
  - **OK** Check the harness wires between the oxygen sensor (front) and the engine control relay, and repair if necessary.
  - **NG** Repair

### Measure at engine-ECU connector D-118.
- Measure the voltage at the engine-ECU terminal.
- Ignition switch: ON
- Voltage between terminal 89 and earth
  - **OK:** System voltage
  - **NG** Check the following connectors: D-118, E-113
  - **OK** Check the harness wire between the oxygen sensor (front) and the engine-ECU, and repair if necessary.
  - **NG** Repair

### Check the following connector: D-118
- **OK**
- **NG** Repair

### Check the harness wires between the oxygen sensor (front) and the engine-ECU and between the oxygen sensor (front) and the engine control relay.
- **OK**
- **NG** Repair

### Check the trouble symptoms.
- **OK**
- **NG** Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

### Replace the engine-ECU.

---
## Code No.P0136 Oxygen sensor (rear) system
### <sensor 2>

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Three minutes have been passed since the engine has been started.</td>
<td>● Malfunction of oxygen sensor (rear)</td>
</tr>
<tr>
<td>● The engine coolant temperature is approx. 80°C or more.</td>
<td>● Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact</td>
</tr>
<tr>
<td>● Intake air temperature is 20 - 50°C</td>
<td>● Malfunction of engine-ECU</td>
</tr>
<tr>
<td>● Engine speed is 1,200 r/min or more</td>
<td></td>
</tr>
<tr>
<td>● Driving on a level surface at constant speed.</td>
<td></td>
</tr>
<tr>
<td><strong>Set Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>● The oxygen sensor (rear) output voltage is 4.5 V or more when the sensor</td>
<td></td>
</tr>
<tr>
<td>output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen</td>
<td></td>
</tr>
<tr>
<td>sensor (rear) inside the engine-ECU.</td>
<td></td>
</tr>
<tr>
<td>● Malfunction of oxygen sensor (rear)</td>
<td></td>
</tr>
<tr>
<td>● Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>● Malfunction of engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Two seconds have passed after the ECU detected an open circuit.</td>
</tr>
<tr>
<td>● When the oxygen sensor (front) is in good condition.</td>
</tr>
<tr>
<td><strong>Set Conditions</strong></td>
</tr>
<tr>
<td>● When the air/fuel ratio is rich, the oxygen sensor (front) output voltage is 0.5 V or more, the oxygen sensor (rear) output voltage is less than 0.1 V, and the oxygen sensor (rear) output voltage fluctuates within 0.078 V.</td>
</tr>
</tbody>
</table>
Check the following connector: C-10

OK

NG

Repair

Measure at oxygen sensor (rear) connector C-10.
- Disconnect the connector and measure at the harness side.
- Resistance between terminal 2 and earth
  OK: 2 Ω or less

OK

NG

Repair

Check the following connectors: D-118, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor (rear) and the engine-ECU.

OK

NG

Check the trouble symptoms.

Replace the engine-ECU.

NG

Check the following connectors: D-118, E-116

OK

NG

Repair

Check the oxygen sensor (rear). (Refer to P.13A-230.)

NG

Replace

OK

NG

Repair

Check the harness wire between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.

OK

NG

Repair

Check the following connectors: D-117, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.

OK

NG

Repair

Check the following connector: D-117

OK

NG

Repair

Check the trouble symptoms.

OK

NG

Replace the engine-ECU.

NG

Transient malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
## Code No.P0141 Oxygen sensor heater (rear) system
### <sensor 2>

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of oxygen sensor heater (rear)</td>
<td></td>
</tr>
<tr>
<td>Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

### Range of Check
- The engine coolant temperature is approx. 20°C or more.
- The oxygen sensor heater (rear) remains on.
- The engine speed is 50 r/min or more.
- Battery voltage is 11 - 16 V.

### Set Conditions
- The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds.

### Check the harness wires between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.

### Repair

<table>
<thead>
<tr>
<th>Measure at oxygen sensor (rear) connector C-10.</th>
<th>NG</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnect the connector and measure at the harness side.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance between terminals 1 and 3 OK: 4.5 - 8.0 Ω</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Check the following connector: C-10</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Measure at oxygen sensor (rear) connector C-10.</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnect the connector and measure at the harness side.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition switch: ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage between terminal 1 and earth OK: System voltage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure at engine-ECU connector D-118</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure the voltage at the engine-ECU terminal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition switch: ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage between terminal 90 and earth OK: System voltage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Check the following connector: D-118</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Check the harness wires between the oxygen sensor (rear) and the engine control relay, and repair if necessary.</th>
<th>OK</th>
<th></th>
</tr>
</thead>
</table>

Check the trouble symptoms.

Replace the engine-ECU.

### Diagram

- **Measure at oxygen sensor (rear) connector C-10.**
  - Disconnect the connector and measure at the harness side.
  - Resistance between terminals 1 and 3 OK: 4.5 - 8.0 Ω

- **Check the following connector: C-10** NG Repair

- **Measure at oxygen sensor (rear) connector C-10.**
  - Disconnect the connector and measure at the harness side.
  - Ignition switch: ON
  - Voltage between terminal 1 and earth OK: System voltage

- **Check the following connector: D-118** NG Repair

- **Check the harness wires between the oxygen sensor (rear) and the engine control relay.**
  - OK

- **Check the trouble symptoms.** NG

- **Replace the engine-ECU.**
**Code No.P0170 Abnormal fuel system**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine: Being learning the air-fuel ratio</td>
<td>● Malfunction of fuel supply system</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>● Malfunction of oxygen sensor (front)</td>
</tr>
<tr>
<td>● Ten seconds or more have been passed while the fuel injection amount compensation value is too low.</td>
<td>● Malfunction of intake air temperature sensor</td>
</tr>
<tr>
<td>or</td>
<td>● Malfunction of barometric pressure sensor</td>
</tr>
<tr>
<td>● Ten seconds or more have been passed while the fuel injection amount compensation value is too high.</td>
<td>● Malfunction of air flow sensor</td>
</tr>
<tr>
<td></td>
<td>● Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

**MUT-II Self-Diag Code**

Is any diagnosis code other than No.P0170 output?

YES → Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.

NO → Check the air intake from the intake hose and intake manifold.

NG → Repair

OK → Check the exhaust gas leaks from the exhaust manifold.

NG → Repair

OK → Check the throttle body (around the throttle valve), and clean if necessary. (Refer to P.13A-220).

NG → Cleaning

OK → Check fuel leakage around the fuel pump (high-pressure) line.

NG → Repair

OK → Replace the fuel pump (high-pressure).

**MUT-II Data list**

<table>
<thead>
<tr>
<th>74 Fuel pressure sensor (Refer to 13A-105, DATA LIST REFERENCE TABLE.)</th>
<th>Refer to P.13A-105, DATA LIST REFERENCE TABLE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Oxygen sensor (front)</td>
<td>Reference</td>
</tr>
<tr>
<td>12 Air flow sensor</td>
<td>If all the service data is normal, go to “OK.”</td>
</tr>
<tr>
<td>13 Intake air temperature sensor</td>
<td>If any abnormal service is found, go to “NG.”</td>
</tr>
<tr>
<td>21 Engine coolant temperature sensor</td>
<td></td>
</tr>
<tr>
<td>25 Barometric pressure sensor</td>
<td></td>
</tr>
</tbody>
</table>

NG → Refer to the Inspection procedure for the sensor, which is indicated by the abnormal service data. (Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)

OK

Check the oxygen sensor (front) (Refer to P.13A-230.)

NG → Replace

OK

Check the purge control solenoid valve (Refer to GROUP 17 - Emission Control).

NG → Replace

OK

To the next page
OK

Check the injectors for clogging or leaks.

NG

Repair

Check the fuel lines for fuel leaks.

NG

Repair

Check the fuel pressure between the fuel pump (low-pressure) and the fuel pump (high-pressure) (Refer to P.13A-222).

OK

NG

Repair

NG

Repair

OK

NG

Repair

OK

Check the trouble symptoms.

NG

Replace the engine-ECU.

Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
**Code No.P0190 Abnormal fuel pressure**

**Probable cause**

- Malfunction of fuel pressure sensor
- Open or short circuit in the fuel pressure sensor circuit or loose connector contact
- Malfunction of engine-ECU
- Malfunction of high-pressure fuel pump
- Clogging of high-pressure fuel lines
- Air trapped due to poor fuel level

**Range of Check**

- Ignition switch: ON
- The sensor output voltage is 4.8V or more, or 0.2 V or less for four seconds.

**Set Conditions**

- The fuel pressure is 6.9 MPa or more, or 2 MPa or less for four seconds.

**This diagnosis code will also be output when air is trapped into the high-pressure fuel lines (such as poor fuel level). In that case, the air can be evacuated by operating the engine for at least 15 seconds at 2,000 r/min. After the repair, use the MUT-II to erase the diagnosis code.**

---

**MUT-II Data list**

74 Fuel pressure sensor (Refer to 13A-105, DATA LIST REFERENCE TABLE.)

<table>
<thead>
<tr>
<th>OK</th>
<th>Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Check the following connector: B-110</td>
</tr>
<tr>
<td>NG</td>
<td>Measure at intermediate connector B-110</td>
</tr>
<tr>
<td>OK</td>
<td>Disconnect the connector, and measure at the engine-ECU harness side.</td>
</tr>
<tr>
<td>(1) NG</td>
<td>Measure at engine-ECU connector D-117.</td>
</tr>
<tr>
<td>OK</td>
<td>Measure the voltage at the engine-ECU terminal.</td>
</tr>
<tr>
<td>NG</td>
<td>Voltage between terminal 41 and earth</td>
</tr>
<tr>
<td>4.8 - 5.2 V</td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td>Measure the voltage at the engine-ECU terminal.</td>
</tr>
<tr>
<td>OK</td>
<td>Voltage between terminal 41 and earth</td>
</tr>
<tr>
<td>4.8 - 5.2 V</td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the engine-ECU.</td>
</tr>
<tr>
<td>OK</td>
<td>Check the harness wire between the intermediate connector and the engine-ECU.</td>
</tr>
<tr>
<td>NG</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td>NG</td>
<td>Replace the engine-ECU.</td>
</tr>
</tbody>
</table>

To the next page
From the previous page

OK

Measure at intermediate connector B-110.
- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Engine: Idling
 1. Voltage between terminal 4 and earth
    OK: 4.8 - 5.2 V
 2. Voltage between terminal 5 and earth
    OK: 0.3 - 4.7 V
 3. Voltage between terminal 6 and earth
    OK: 0.5 V or less

(1), (3) NG

Check the following connector:
B-111

OK

Check the harness wire between the fuel pressure sensor and the intermediate connector.

NG

Repair

OK

Check the following connectors:
D-117, D-118

OK

Check the harness wire between the intermediate connector and the engine-ECU, and repair if necessary.

NG

Repair

OK

Measure at engine-ECU connector D-118.
- Measure the voltage at the engine-ECU terminal.
- Engine: Idling
- Voltage between terminal 92 and earth
  OK: 0.3 - 4.7 V

NG

Check the following connector:
D-118

OK

Check the harness wire between the intermediate connector and the engine-ECU, and repair if necessary.

NG

Repair

OK

Check the following connector:
D-118

OK

Check the harness wire between the intermediate connector and the engine-ECU, and repair if necessary.

NG

Repair

OK

Check the following connector:
D-118

OK

Check the trouble symptoms.

OK

Replace the fuel pressure sensor.

NG

Repair

OK

Check the following connector:
D-118

OK

Check the trouble symptoms.

OK

Replace the engine-ECU.
### Code No.P0201 No.1 injector system

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of No.1 injector</td>
<td></td>
</tr>
<tr>
<td>Open or short circuit in the No.1 injector circuit or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Check</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The engine speed is 4,000 r/min or less.</td>
<td></td>
</tr>
<tr>
<td>The battery voltage is 10 V or more.</td>
<td></td>
</tr>
<tr>
<td>The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The injector driver is not transmitting a injector open circuit check signal for four seconds.</td>
<td></td>
</tr>
</tbody>
</table>

### Probable cause

- Malfunction of No.1 injector
- Open or short circuit in the No.1 injector circuit or loose connector contact
- Malfunction of engine-ECU

### Diagram

```
MUT-II Actuator Test
01 No.1 injector
OK: The idling condition should change.

NG

Check the following connector:
B-105

OK

Measure at intermediate connector B-105.
- Disconnect the connector and measure at the harness side.
- Resistance between terminals 11 and 12
  OK: 0.9 - 1.1 Ω

NG

Check the following connector:
B-121

OK

Check the harness wire between the injector driver and the intermediate connector.

NG

Check the following connector:
D-116

OK

Check the harness wire between the injector driver and the engine-ECU.

NG

Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.
- Engine: Idling
- Voltage between terminal 1 and earth
  OK: A normal waveform should be displayed as described on P.13A-121 (INSPEcTION PROCEDURE USING AN ANALYZER).

NG

Check the following connector:
B-117

OK

Check the harness wire between the No.1 injector and the intermediate connector.

NG

Check the following connector:
B-117

OK

Check the harness wire between the No.1 injector and the intermediate connector.

NG

Check the following connector:
B-117

OK

Replace the engine-ECU.

To the next page
```
OK
Check the harness wire between No.1 injector and the intermediate connector.

NG
Repair

OK
Replace the No.1 injector.

NG
Replace the injector driver.

NG
Check the trouble symptoms.
**Code No.P0202 No.2 injector system**

**Probable cause**
- Malfunction of No.2 injector
- Open or short circuit in the No.2 injector circuit or loose connector contact
- Malfunction of engine-ECU

**Range of Check**
- The engine speed is 4,000 r/min or less.
- The battery voltage is 10 V or more.
- The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.

**Set Conditions**
- The injector driver is not transmitting a injector open circuit check signal for four seconds.

**Probable cause**

<table>
<thead>
<tr>
<th>Description</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUT-II Actuator Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02 No.2 injector</td>
<td>OK: The idling condition should change.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td>Replace the injector driver.</td>
</tr>
<tr>
<td>Check the following connector: B-105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure at intermediate connector B-105.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Disconnect the connector and measure at the harness side.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Resistance between terminals 5 and 6 OK: 0.9 - 1.1 Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td>Replace the engine-ECU.</td>
</tr>
<tr>
<td>Check the following connector: B-121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the harness wire between the injector driver and the intermediate connector.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Replace the No.2 injector.</td>
</tr>
<tr>
<td>Check the following connector: D-116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the harness wire between the injector driver and the engine-ECU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.</td>
</tr>
<tr>
<td></td>
<td>OK: A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Check the following connector: B-114</td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Check the following connector: B-114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the harness wire between the No.2 injector and the intermediate connector.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td>Replace the engine-ECU.</td>
</tr>
<tr>
<td>Check the following connector: B-114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the harness wire between No.2 injector and the intermediate connector.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
</tbody>
</table>

To the next page
OK

Check the harness wire between No.2 injector and the intermediate connector.

NG  Repair

OK

Replace the No.2 injector.

NG

Check the trouble symptoms.

NG  Replace the injector driver.
### Code No.P0203 No.3 injector system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The engine speed is 4,000 r/min or less.</td>
<td>• Malfunction of No.3 injector</td>
</tr>
<tr>
<td>• The battery voltage is 10 V or more.</td>
<td>• Open or short circuit in the No.3 injector circuit or loose connector contact</td>
</tr>
<tr>
<td>• The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.</td>
<td>• Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The injector driver is not transmitting a injector open circuit check signal for four seconds.</td>
<td></td>
</tr>
</tbody>
</table>

#### Probable cause

- Malfunction of No.3 injector
- Open or short circuit in the No.3 injector circuit or loose connector contact
- Malfunction of engine-ECU

### MUT-II Actuator Test

**03 No.3 injector**

**OK:** The idling condition should change.

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-105**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Measure at intermediate connector B-105.**

- Disconnect the connector and measure at the harness side.
- **OK:** 0.9 - 1.1 Ω

**Check the following connector:**

**B-121**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between the injector driver and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between No.3 injector and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between No.3 injector and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between No.3 injector and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.**

- **OK:** A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between No.3 injector and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Replace the No.3 injector.**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Replace the engine-ECU.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Replace the engine-ECU.**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**To the next page**

---

**Engine: Idling**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Voltage between terminal 24 and earth**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the following connector:**

**B-118**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the harness wire between the No.3 injector and the intermediate connector.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Replace the engine-ECU.**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**To the next page**
From the previous page

OK

Check the harness wire between No.3 injector and the intermediate connector.

NG  Repair

OK

Replace the No.3 injector.

NG

Check the trouble symptoms.

NG  Replace the injector driver.
**Code No.P0204 No.4 injector system**

**Range of Check**
- The engine speed is 4,000 r/min or less.
- The battery voltage is 10 V or more.
- The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.

**Set Conditions**
- The injector driver is not transmitting a injector open circuit check signal for four seconds.

**Probable cause**
- Malfunction of No.4 injector
- Open or short circuit in the No.4 injector circuit or loose connector contact
- Malfunction of engine-ECU

---

**MUT-II Actuator Test**

**04 No.4 injector**

**OK:** The idling condition should change.

**NG:**
- Replace the injector driver.
- Replace the engine-ECU.

---

**Check the following connector:**

**B-105**

**OK:** Check the trouble symptoms.

**NG:**
- Replace the No.4 injector.
- Replace the engine-ECU.

---

**Measure at intermediate connector B-105.**

- Disconnect the connector and measure at the harness side.
- Resistance between terminals 3 and 4
  **OK:** 0.9 - 1.1 Ω

**NG:**
- Replace the No.4 injector.
- Replace the engine-ECU.

---

**Check the following connector:**

**B-121**

**OK:** Check the harness wire between the injector driver and the intermediate connector.

**NG:**
- Replace the No.4 injector.
- Replace the engine-ECU.

---

**Check the following connector:**

**D-116**

**OK:** Check the harness wire between the injector driver and the engine-ECU.

**NG:**
- Replace the No.4 injector.
- Replace the engine-ECU.

---

**Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.**

- Engine: Idling
- Voltage between terminal 2 and earth
  **OK:** A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).

**NG:**
- Replace the No.4 injector.
- Replace the engine-ECU.

---

**Check the following connector:**

**B-115**

**OK:**
- Check the harness wire between the No.4 injector and the intermediate connector.
- Replace the engine-ECU.

**NG:**
- Replace the engine-ECU.

---

**Check the following connector:**

**B-115**

**OK:**
- Check the harness wire between No.4 injector and the intermediate connector.
- Replace the No.4 injector.

**NG:**
- Replace the engine-ECU.

---

**Check the following connector:**

**B-115**

**OK:**
- Check the harness wire between the No.4 injector and the intermediate connector.
- Replace the No.4 injector.

**NG:**
- Replace the engine-ECU.

---

**Check the harness wire between No.4 injector and the intermediate connector.**

**OK:**
- Check the harness wire between the No.4 injector and the intermediate connector.
- Replace the engine-ECU.

**NG:**
- Replace the engine-ECU.

---

**To the next page**
OK

Check the harness wire between No.4 injector and the intermediate connector.

NG

Repair

OK

Replace the No.4 injector.

NG

Replace the injector driver.

Check the trouble symptoms.
**Code No.P0205 No.5 injector system**

**Range of Check**
- The engine speed is 4,000 r/min or less.
- The battery voltage is 10 V or more.
- The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.

**Set Conditions**
- The injector driver is not transmitting a injector open circuit check signal for four seconds.

**Probable cause**
- Malfunction of No.5 injector
- Open or short circuit in the No.5 injector circuit or loose connector contact
- Malfunction of engine-ECU

---

**MUT-II Actuator Test**

- **05 No.5 injector**
  - **OK:** The idling condition should change.
  - **NG:** Check the trouble symptoms.

**Check the following connector:**
- **B-105**
  - **OK:** Replace the injector driver.
  - **NG:** Check the trouble symptoms.

**Measure at intermediate connector B-105.**
- Disconnect the connector and measure at the harness side.
- Resistance between terminals 7 and 8
  - **OK:** 0.9 - 1.1 Ω
  - **NG:** Replace the No.5 injector.

**Check the following connector:**
- **B-121**
  - **OK:** Check the harness wire between the injector driver and the intermediate connector.
  - **NG:** Repair

**Check the following connector:**
- **D-116**
  - **OK:** Check the harness wire between the injector driver and the engine-ECU.
  - **NG:** Repair

**Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.**
- Engine: Idling
- Voltage between terminal 10 and earth
  - **OK:** A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).
  - **NG:** Replace the engine-ECU.

**Check the following connector:**
- **B-103**
  - **OK:** Check the harness wire between the No.5 injector and the intermediate connector.
  - **NG:** Repair

**Check the following connector:**
- **B-103**
  - **OK:** Replace the engine-ECU.
  - **NG:** Repair

---

**To the next page**
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Check the harness wire between No.5 injector and the intermediate connector. NG → Repair

OK

Replace the No.5 injector.

Check the trouble symptoms. NG → Replace the injector driver.

Replace the No.5 injector.
Code No.P0206 No.6 injector system

Probable cause
- Malfunction of No.6 injector
- Open or short circuit in the No.6 injector circuit or loose connector contact
- Malfunction of engine-ECU

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● The engine speed is 4,000 r/min or less.</td>
<td></td>
</tr>
<tr>
<td>● The battery voltage is 10 V or more.</td>
<td></td>
</tr>
<tr>
<td>● The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.</td>
<td></td>
</tr>
</tbody>
</table>

Set Conditions
- The injector driver is not transmitting a injector open circuit check signal for four seconds.

**MUT-II Actuator Test**
06 No.6 injector
OK: The idling condition should change.

**Check the following connector:**
B-105

Measure at intermediate connector B-105.
- Disconnect the connector and measure at the harness side.
- Resistance between terminals 1 and 2
  OK: 0.9 - 1.1 Ω

**Check the following connector:**
B-121

OK

**Check the following connector:**
D-116

OK

Check the harness wire between the injector driver and the engine-ECU.

Use an analyzer to measure the signal waveform at engine-ECU connectors D-116 and D-118.
- Engine: Idling
- Voltage between terminal 25 and earth
  OK: A normal waveform should be displayed as described on P.13A-121 (INPECTION PROCEDURE USING AN ANALYZER).

**Check the following connector:**
B-104

NG

Check the harness wire between No.6 injector and the intermediate connector.

OK

Replace the No.6 injector.

NG

Repair

**Check the following connector:**
B-104

OK

Check the trouble symptoms.

NG

Replace the injector driver.

**Check the following connector:**
B-104

Repair

OK

Check the harness wire between No.6 injector and the intermediate connector.

OK

Replace the engine-ECU.

**Check the following connector:**
B-104

NG

Repair

OK

Replace the No.6 injector.

**Check the following connector:**
B-105

NG

Repair

**Check the following connector:**
B-104

Repair

OK

Replace the engine-ECU.

NG

Repair

OK

To the next page...
**Check the harness wire between No.6 injector and the intermediate connector.**

- **OK**
- **NG** → **Repair**

**Replace the No.6 injector.**

**Check the trouble symptoms.**

- **OK**
- **NG** → **Replace the injector driver.**
<table>
<thead>
<tr>
<th>Code No.P0220 Accelerator pedal position sensor (1st channel) system</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| **Range of Check**  
- Accelerator pedal position sensor (2nd channel) is normal.  
- Communication between the engine-ECU and the throttle valve controller is normal.  
- The output voltage of accelerator pedal position sensor (1st channel) is 0.2 V or less for one second.  
- The output voltage of accelerator pedal position sensor (2nd channel) is 2.5 V or less, and that of accelerator pedal position sensor (1st channel) is 4.5 V or more for one second.  
- The difference between accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) output voltages is 1.0 V or more (i.e. the throttle opening angle changes slightly).  
- The output voltage of accelerator pedal position sensor (1st channel) is 1.1 V or more for one second when the accelerator pedal position switch is turned on. | - Malfunction of accelerator pedal position sensor (1st channel)  
- Open or short circuit in the accelerator pedal position sensor (1st channel) circuit or loose connector contact  
- Accelerator pedal position switch seized ON  
- Malfunction of throttle valve controller  
- Malfunction of engine-ECU |

**Set Conditions**
- The output voltage of accelerator pedal position sensor (2nd channel) is normal.  
- Communication between the engine-ECU and the throttle valve controller is normal.  
- The output voltage of accelerator pedal position sensor (1st channel) is 0.2 V or less for one second.  
- The output voltage of accelerator pedal position sensor (2nd channel) is 2.5 V or less, and that of accelerator pedal position sensor (1st channel) is 4.5 V or more for one second.  
- The difference between accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) output voltages is 1.0 V or more (i.e. the throttle opening angle changes slightly).  
- The output voltage of accelerator pedal position sensor (1st channel) is 1.1 V or more for one second when the accelerator pedal position switch is turned on.

---

**MUT-III Data list**

26 Accelerator pedal position switch (Refer to 13A-105, DATA LIST REFERENCE TABLE.)

- OK
- NG

**MUT-III Data list**

78 Accelerator pedal position sensor (1st channel) (Refer to 13A-105, DATA LIST REFERENCE TABLE.)

- OK
- NG

Check the following connector:  
D-135

- OK
- NG

**OK**  
Check the following connector:  
D-117

- OK
- NG

Measure at accelerator pedal position sensor connector D-135.  
- Disconnect the connector and measure at the harness side.  
- Resistance between terminal 1 and earth  
  OK: 2 Ω or less  
- Voltage between terminal 2 and earth  
  (Ignition switch: ON)  
  OK: 4.8 - 5.2 V

- NG

To the next page
OK

Measure at accelerator pedal position sensor connector D-135.
- Connect connector terminals No.1, No.2 and No.3 only by using test harness (MB991658), and measure at the pick-up harness.
- Ignition switch: ON
  1) Voltage between terminal 1 and earth
     OK: 0.5 V or less
  2) Voltage between terminal 2 and earth
     OK: 4.8 - 5.2 V
  3) Voltage between terminal 3 and earth
     OK: Accelerator pedal fully released: 0.985 - 1.085 V
         Accelerator pedal fully depressed: 4.0 V or higher

(1), (2) NG
Check the following connector: D-117
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-ECU, and repair if necessary.

(3) NG
Adjust the accelerator pedal position sensor. (Refer to P.13A-221).

Check the following connector: D-118
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-ECU, and repair if necessary.

Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-ECU, and repair if necessary.

Check the following connector: D-118
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-ECU, and repair if necessary.

Check the following connector: D-118
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-ECU, and repair if necessary.

OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
**Code No.0225 Throttle position sensor (2nd channel) system**

The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU.

**Range of Check**
- Ignition switch: ON
- The throttle position sensor (1st channel) is normal.

**Set Conditions**
- The sensor output voltage is 0.2 V or less for four seconds.
- The sensor output voltage is 4.85 V or more for four seconds, and the output voltage of the throttle position sensor (1st channel) is 1.2 V or more.
- The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.

**Probable cause**
- Malfunction of throttle position sensor (2nd channel)
- Open or short circuit in the throttle position sensor (2nd channel) circuit or loose connector contact
- Malfunction of the throttle valve controller
- Malfunction of the engine-ECU

**MUT-II Data list**

<table>
<thead>
<tr>
<th>OK</th>
<th>Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Replace</td>
</tr>
<tr>
<td>OK</td>
<td>Check throttle position sensor (2nd channel). (Refer to P.13A-228).</td>
</tr>
<tr>
<td>NG</td>
<td>Repair</td>
</tr>
<tr>
<td>OK</td>
<td>Check the following connector: B-102</td>
</tr>
</tbody>
</table>

| NG | Measure at throttle position sensor connector B-102.                                        |
|    | Disconnect the connector and measure at the harness side.                                    |
|    | (1) The voltage between terminal 1 and earth (Ignition switch: ON)                           |
|    | OK: 4.8 - 5.2 V                                                                               |
|    | (2) Resistance between terminal 3 and earth                                                   |
|    | OK: 2 Ω or less                                                                               |

| NG | Measure at throttle valve controller connector D-11.                                        |
|    | Measure the voltage at the throttle valve controller connector terminals.                     |
|    | Ignition switch: ON                                                                          |
|    | The voltage between terminal 6 and earth                                                     |
|    | OK: 4.8 - 5.2 V                                                                               |

| OK | Check the following connector: D-11                                                          |
| NG | Repair                                                                                       |

| OK | Check the harness wire between the throttle position sensor and the throttle valve controller. |
| NG | Replace the throttle valve controller.                                                      |
From the previous page

OK

Measure at throttle position sensor connector B-102.
- Use test harness (MB991536) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
  (1) The voltage between terminal 1 and earth
      OK: 4.8 - 5.2 V
  (2) The voltage between terminal 3 and earth
      OK: 0.5 V or less
  (3) The voltage between terminal 4 and earth
      OK: Accelerator pedal fully released: 4.0 V or more
           Accelerator pedal fully depressed: 0.4 - 0.6 V

(1), (2) NG

Repair

Check the following connector:
D-11
OK

Measure at engine-ECU connector D-118.
- Measure the voltage at the engine-ECU terminal.
- Ignition switch: ON
- The voltage between terminal 78 and earth
  OK: Accelerator pedal fully released: 4.0 V or more
       Accelerator pedal fully depressed: 0.4 - 0.6 V

NG

Check the trouble symptoms.

NG

Replace the engine-ECU.

(3) NG

Adjust the throttle position sensor.
(Refer to P.13A-220.)

NG

Repair

Check the harness wire between throttle position sensor (2nd channel) and the throttle valve controller.

OK

Check the following connector:
D-118
OK

Check the harness wire between throttle position sensor (2nd channel) and the engine-ECU, and repair if necessary.

NG

Repair

Check the following connector:
D-118
OK

Check the harness wire between throttle position sensor (2nd channel) and the engine-ECU, and repair if necessary.

NG

Repair

Check the following connector:
D-118
OK

Check the harness wire between throttle position sensor (2nd channel) and the engine-ECU, and repair if necessary.

NG

Repair

Check the following connector:
D-118
OK

Check the trouble symptoms.

NG

Replace the engine-ECU.

---

**Code No.P0300 Ignition coil (power transistor) system**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine speed is approx. 50 - 4,000 r/min.</td>
<td>● Malfunction of the ignition coil</td>
</tr>
<tr>
<td>● Engine is not cranking.</td>
<td>● Malfunction of the ignition coil and sensor</td>
</tr>
<tr>
<td>● The ignition failure sensor does not send a signal about a certain cylinder for four seconds.</td>
<td>● Malfunction of the spark plug</td>
</tr>
<tr>
<td></td>
<td>● Open or short circuit in the primary ignition circuit or loose connector contact</td>
</tr>
<tr>
<td></td>
<td>● Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>
GDI - Troubleshooting <M/T>

MUT-II Actuator Test
01 No.1 injector
02 No.2 injector
03 No.3 injector
04 No.4 injector
05 No.5 injector
06 No.6 injector

OK: The idling condition should change.

Reference
When the cylinder (defective cylinder) where idling condition does not change is detected after suspending the injector, go to (1) and inspect the spark plug, the ignition coil, the connector, and the harness of the defective cylinder. (When more than one cylinder are detected, inspect all of them.) When all the cylinders are OK, go to (2).

Check the harness wire between the ignition coil connector for a defective cylinder and the intermediate connector.

Check the spark plug and the ignition coil for a defective cylinder. (Refer to GROUP 16 - Ignition System.)

Check the following connectors:
B-107 and the ignition coil connectors, which correspond to defective cylinders (B-101, B-108, B-112, B-113, B-116, B-119).

Check the harness wire between the ignition coil connector for a defective cylinder and the intermediate connector.

Check the following connector:
D-116

Check the harness wire between the engine-ECU and the intermediate connector.

Use an analyzer to measure the signal waveform at engine-ECU connector D-116.
- Engine: Idling
- The voltage between the ignition coil primary signal terminal for a defective cylinder and earth

OK: A normal waveform should be displayed as described on P.13A-122 (Inspection Procedure Using an Analyzer).

OK

NG

Repair

Repair the ignition coil assembly for a defective cylinder and the spark plug.

Check the following connectors:
B-04, D-117

Check the harness wires between the ignition failure sensor and the engine-ECU, and between the ignition failure sensor and earth.

Repair the ignition failure sensor

Check the trouble symptoms.

OK

NG

Replace

Replace the engine-ECU.

Check the trouble symptoms.

OK

NG

Replace

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

Check the spark plug and the ignition coil for a defective cylinder. (Refer to GROUP 16 - Ignition System.)
Code No.P0301 No.1 cylinder misfire detected.
Code No.P0302 No.2 cylinder misfire detected.
Code No.P0303 No.3 cylinder misfire detected.
Code No.P0304 No.4 cylinder misfire detected.
Code No.P0305 No.5 cylinder misfire detected.

Probable cause

- Malfunction of the ignition system
- Abnormal compression
- Malfunction of injector
- Malfunction of engine-ECU

Range of Check
- The engine speed is 500 - 4,500 r/min.
- While the engine is running except deceleration and sudden acceleration.

Set Conditions
- The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder).
- The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in only one cylinder).

Check the harness wire between the ignition coil and the engine-ECU.

Check the compression pressure. (Refer to GROUP 11A - On-vehicle Service.)

Check the trouble symptoms.

Replace the engine-ECU.
## Code No.P0325 Detonation sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine: Two seconds after the engine has been started</td>
<td>● Malfunction of the detonation sensor</td>
</tr>
<tr>
<td>● Changes in sensor output voltage (detonation sensor peak voltage per 1/3 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less.</td>
<td>● Open or short circuit in the detonation sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>● Malfunction of engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

### Probable cause

- Malfunction of the detonation sensor
- Open or short circuit in the detonation sensor circuit or loose connector contact
- Malfunction of engine-ECU

### Check the following connector: B-05

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Repair</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
</tbody>
</table>

Check the harness wire between the detonation sensor and earth, and repair if necessary.

### Measure at the detonation sensor connector B-05.

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
</tbody>
</table>

- The resistance between terminal 2 and earth
  - OK: 2 Ω or less

### Check the following connector: D-118

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Repair</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
</tbody>
</table>

Check the harness wire between the detonation sensor and the engine-ECU.

### Check the trouble symptoms.

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>OK</td>
</tr>
</tbody>
</table>

Check the trouble symptoms.

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>OK</td>
</tr>
</tbody>
</table>

Replace the detonation sensor.

Replace the engine-ECU.

## Code No.P0335 Crank angle sensor system

### Range of Check

- Engine is cranking

### Set Conditions

- Sensor output voltage does not change for 4 seconds (no pulse signal input).

### Probable cause

- Malfunction of the crank angle sensor.
- Open or short circuit in the crank angle sensor circuit or loose connector contact.
- Malfunction of engine-ECU

### Check the trouble symptoms.

<table>
<thead>
<tr>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>OK</td>
</tr>
</tbody>
</table>

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

Replace the detonation sensor.

Replace the engine-ECU.
Check the harness wire between the crank angle sensor and the engine-ECU, and repair if necessary.

Check the following connector: B-52

OK

Check the trouble symptoms.

NG

Replace the engine-ECU.

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

Check the harness wire between the crank angle sensor and earth, and repair if necessary.

Check the harness between the crank angle sensor and earth, and repair if necessary.

Measure at the crank angle sensor connector B-52.
- Disconnect the connector and measure at the harness side.
  - (1) The resistance between terminal 1 and earth
    OK: 2 Ω or less
  - (2) The voltage between terminal 2 and earth
    (Ignition switch: ON)
    OK: 4.8 - 5.2 V
  - (3) The voltage between terminal 3 and earth
    (Ignition switch: ON)
    OK: System voltage

Check the following connector: D-117

OK

Check the following connector: D-117

NG

Repair

Check the following connector: D-117

NG

Repair

Check the trouble symptoms.

NG

Replace the engine-ECU.

Check the trouble symptoms.

OK

Check the following connector: B-52

NG

Repair

OK

Check the following connector: B-52

NG

Repair

OK

Check the following connector: D-117

NG

Repair

OK

Check the following connector: D-117

NG

Repair

NG

Check the crank angle sensor vane

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

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Replace the crank angle sensor

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Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor

OK

Replace the crank angle sensor

NG

Replace the crank angle sensor
<table>
<thead>
<tr>
<th>Code No. P0340 Camshaft position sensor system</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Check</td>
<td>• Malfunction of the camshaft position sensor</td>
</tr>
<tr>
<td>• After the engine was started</td>
<td>• Open or short circuit in the camshaft position sensor circuit or loose connector contact.</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>• Malfunction of engine-ECU</td>
</tr>
<tr>
<td>• The sensor output voltage does not change for 4 seconds (no pulse signal input).</td>
<td></td>
</tr>
</tbody>
</table>
Check the following connector: B-110

Measure at intermediate connector B-110
- Disconnect the connector and measure at the harness side.
1. The voltage between terminal 1 and earth
   (Ignition switch: ON)
   OK: System voltage
2. The voltage between terminal 2 and earth
   (Ignition switch: ON)
   OK: 4.8 - 5.2 V
3. The resistance between terminal 3 and earth
   OK: 2 Ω or less

NG Repair

OK

Check the following connector: B-25X

Check the harness wire between the intermediate connector and the engine control relay, and repair if necessary.

OK

NG Repair

Check the following connector: D-117

Measure at engine-ECU connector D-117:
- Measure the voltage at the engine-ECU terminal.
- Disconnect connector B-110.
- Ignition switch: ON
- The voltage between terminal 50 and earth
  OK: 4.8 - 5.2 V

OK

NG Repair

Check the following connector: D-117

Check the harness wire between the intermediate connector and the engine-ECU.

OK

NG Repair

Check the trouble symptoms.

NG Replace the engine-ECU.

OK

Check the following connector: B-109

Check the harness wire between the intermediate connector and earth, and repair if necessary.

OK

NG Repair

Check the following connector: B-109

Check the harness wire between the intermediate connector and earth, and repair if necessary.

OK

NG Repair

Check the camshaft position sensor

OK Replace

NG Replace

Check the trouble symptoms.

Replace the camshaft position sensing cylinder

OK

Check the following connectors: B-25X, D-117

Check the harness wires between the intermediate connector and the engine-ECU, the intermediate connector and the engine control relay, and the intermediate connector and earth. Then, repair if necessary.

OK

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

Replace the engine-ECU.
**Code No.P0403 EGR valve system**

**Probable cause**
- Malfunction of the EGR valve
- Open or short circuit in the EGR valve circuit or loose connector contact
- Malfunction of engine-ECU

**Range of Check**
- Ignition switch: OFF to ON
- EGR valve is in operation after the engine starting process is complete.
- Off-surge voltage is not generated from the motor coil while the EGR valve control motor is running.

**Set Conditions**
- Measure at EGR valve connector B-60
  - Disconnect the connector, and measure at the EGR valve side.
  - The resistance between terminals 1 and 2
  - The resistance between terminals 2 and 3
  - The resistance between terminals 4 and 5
  - The resistance between terminals 5 and 6
  **OK:** 15 - 20 Ω

**Check the following connector: B-60**

**OK**

**NG**
- Replace

**Check the following connector: B-60**

**OK**

**NG**
- Repair

**Measure at EGR valve connector B-60**
- Disconnect the connector and measure at the harness side.
- Ignition switch: ON
- The voltage between terminal 2 and earth
- The voltage between terminal 5 and earth
  **OK:** System voltage

**Check the following connector: B-25X**

**OK**

**NG**
- Repair

**Measure at engine-ECU connector D-116**
- Measure the voltage at the engine-ECU terminal.
- The voltage between terminal 5 and earth.
- The voltage between terminal 6 and earth.
- The voltage between terminal 32 and earth.
- The voltage between terminal 34 and earth.
  **OK:** The voltage changes as follows for three seconds when the ignition switch is turned ON.
  (When using a circuit tester)
  5 V and 8 V alternates
  (When using an analyzer)
  1 V or less and system voltage alternates

**Check the following connector: D-116**

**OK**

**NG**
- Repair

**Check the following connector: D-116**

**OK**

**NG**
- Repair

**Check the harness wires between the EGR valve and the engine control relay, and between the EGR valve and the engine-ECU.**

**Check the trouble symptoms.**

**OK**

**NG**
- Replace the engine-ECU.

**Intermittent malfunction**
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
## Code No.P0420 Catalyst malfunction

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Range of Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of catalyst</td>
<td>• The engine speed is 3,000 r/min or less.</td>
</tr>
<tr>
<td>• Malfunction of the oxygen sensor (front)</td>
<td>• During driving</td>
</tr>
<tr>
<td>• Malfunction of the oxygen sensor (rear)</td>
<td>• During air/fuel ratio feedback control</td>
</tr>
<tr>
<td>• Malfunction of engine-ECU</td>
<td>• The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average.</td>
</tr>
</tbody>
</table>

### Probable cause

- Malfunction of catalyst
- Malfunction of the oxygen sensor (front)
- Malfunction of the oxygen sensor (rear)
- Malfunction of engine-ECU

### Check the trouble symptoms.

**Check the exhaust manifold. (Are there any cracks?)**

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Data list

**NG**

<table>
<thead>
<tr>
<th>59 Oxygen sensor (rear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission: 2nd</td>
</tr>
<tr>
<td>Drive with wide open throttle</td>
</tr>
<tr>
<td><strong>OK</strong>: 600 - 1,000 mV</td>
</tr>
</tbody>
</table>

### Check the oxygen sensor (rear) system <sensor 2>

(Refer to P.13A-31, INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODE P0136.)

**OK**

### NG

<table>
<thead>
<tr>
<th>Replace the catalytic converter.</th>
</tr>
</thead>
</table>

### Check the trouble symptoms.

**NG**

<table>
<thead>
<tr>
<th>Replace the engine-ECU.</th>
</tr>
</thead>
</table>

### NG

<table>
<thead>
<tr>
<th>Replace the oxygen sensor (rear).</th>
</tr>
</thead>
</table>

### NG

<table>
<thead>
<tr>
<th>Replace the oxygen sensor (front).</th>
</tr>
</thead>
</table>

### NG

<table>
<thead>
<tr>
<th>Check the oxygen sensor (front) system &lt;sensor 1&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Refer to P.13A-28, INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODE P0130.)</td>
</tr>
</tbody>
</table>

**OK**

<table>
<thead>
<tr>
<th>Replace the oxygen sensor (rear).</th>
</tr>
</thead>
</table>

### NG

<table>
<thead>
<tr>
<th>Check the trouble symptoms.</th>
</tr>
</thead>
</table>

**NG**

<table>
<thead>
<tr>
<th>Replace the engine-ECU.</th>
</tr>
</thead>
</table>
## Code No. P0443 Purge control solenoid valve system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the purge control solenoid valve</td>
</tr>
<tr>
<td>- Open or short circuit in the purge control solenoid valve circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of engine-ECU</td>
</tr>
</tbody>
</table>

### Range of Check
- Ignition switch: ON
- Battery voltage is 10 V or more.

### Set Conditions
- The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.

### MUT-II Actuator Test

**08 Purge control solenoid valve**

**OK:** Operating sound can be heard and the valve vibrates.

**NG**

- Intermittent malfunction
  (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

### Measure at the purge control solenoid valve connector B-106.

- Disconnect the connector, and measure at the solenoid valve side.
- The resistance between terminals 1 and 2
  **OK:** 28 - 36 Ω (at 20°C)

### Check the following connector:

**B-106**

**OK**

- OK: System voltage

**NG**

- Check the harness wire between the purge control solenoid valve and the engine control relay, and repair if necessary.

### Measure at engine-ECU connector D-116.

- Measure the voltage at the engine-ECU terminal.
- The voltage between terminal 16 and earth
  **OK:** System voltage

**NG**

- Check the harness wire between the purge control solenoid valve and the engine-ECU.

### Check the following connector:

**D-116**

**OK**

- Check the trouble symptoms.

**NG**

- Replace the engine-ECU.

---

**OK**

- Replace the engine-ECU.
### Code No.P0500 Vehicle speed sensor system

**Probable cause**
- Malfunction of the vehicle speed sensor
- Open or short circuit in the vehicle speed sensor circuit or loose connector contact
- Malfunction of engine-ECU

#### Range of Check
- Engine: Two seconds after the engine was started
- Idle switch: OFF
- Engine speed: 2,500 r/min or more
- During high engine load

#### Set Conditions
- The sensor output voltage does not change for 4 seconds (no pulse signal input).

#### Does the speedometer operate normally?
- **NO**
  - Check the vehicle speed sensor
  - (Refer to GROUP 54 - Combination Meter.)
- **YES**

#### Use an analyzer to measure the output waveform of the vehicle speed sensor at engine-ECU connector D-118.
- **NG**
  - Check the following connectors: D-118, E-13
    - **OK**
      - Check the harness wire between intermediate connector E-13 and the engine-ECU, and repair if necessary.
    - **NG**
      - Repair
- **NG**
  - Check the trouble symptoms.

#### Check the following connector: C-09
- **OK**
  - Check the harness wire between intermediate connector E-13 and the engine-ECU, and repair if necessary.
- **NG**
  - Check the trouble symptoms.

#### Replace the engine-ECU.

### Code No.P1200 Injector driver system

**Probable cause**
- Malfunction of the injector driver
- Open or short circuit, or loose connector contact
- Malfunction of engine-ECU

#### Range of Check
- Engine speed: 4,000 r/min or less
- Battery voltage: 10 V or more
- The fuel cut operation and the injector operation (by carrying out the Actuator test) are not in progress.
- During high engine load

#### Set Conditions
- Injector open circuit check signal is not output from the injector driver.

#### Check the following connectors: B-121, D-118
- **NG**
  - Repair
- **OK**
  - Use an analyzer to measure the signal waveform at engine-ECU connectors D-116, D-118.
    - **OK**
      - Engine: Idling
      - The voltage between terminal 96 and earth, terminal 1 and earth
      - OK: A normal waveform should be displayed as described on P.13A-121 (INSPECTION PROCEDURE USING AN ANALYZER).
    - **NG**
      - Replace the injector driver.
- **NG**
  - Check the trouble symptoms.

#### Replace the engine-ECU.

#### Intermittent malfunction
- (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
**Code No.P1220 Electronic-controlled throttle valve system**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Short in communication line</td>
</tr>
<tr>
<td>• Malfunction of the engine-ECU</td>
</tr>
<tr>
<td>• Malfunction of the throttle valve controller</td>
</tr>
</tbody>
</table>

**Range of Check**
- Ignition switch: ON
- Error in communication between the engine-ECU and the throttle valve controller

**Set Conditions**
- Output voltage of throttle position sensor (2nd channel) fluctuates significantly (approx. 1 V or more) from an expected value, based on that of the accelerator pedal position sensor (2nd channel).

**Range of Check**
- Ignition switch: ON
- Error in communication between the throttle valve controller and the engine-ECU

**Set Conditions**
- The output voltage of the throttle position sensor (2nd channel) is significantly different (approx. 1 V) from the throttle valve opening angle (voltage), which the engine-ECU request the throttle valve controller.

---

**Check the following connectors: D-11, D-118**

<table>
<thead>
<tr>
<th>Check</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Repair</td>
</tr>
</tbody>
</table>

**Check the harness wire between the throttle valve controller and the engine-ECU.**

<table>
<thead>
<tr>
<th>Check</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Repair</td>
</tr>
</tbody>
</table>

**Check the trouble symptoms.**

<table>
<thead>
<tr>
<th>Check</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td></td>
</tr>
</tbody>
</table>

**Replace the throttle valve controller.**

**Check the trouble symptoms.**

<table>
<thead>
<tr>
<th>Check</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td></td>
</tr>
</tbody>
</table>

**Replace the engine-ECU.**
## Code No.P1221 Throttle valve position feedback system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of throttle position sensor (1st channel)</td>
</tr>
<tr>
<td>- Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of the throttle valve controller</td>
</tr>
</tbody>
</table>

### Range of Check
- Ignition switch: ON
- Battery voltage: 10 V or more

### Set Conditions
- Failure in the position feedback (The engine-ECU detects that the current in the motor is excessive and the opening angle difference between the target value of throttle position sensor (1st channel) and the actual value of throttle position sensor (1st channel) is 2.0 V or more)
- Malfunction of throttle position sensor (1st channel)
- Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact
- Malfunction of the throttle valve controller

### OK
1. Check the trouble symptoms.
2. Replace the throttle valve controller.

### NG
1. MUT-II Self-Diag Code
   - Is code No.P0120 set? YES → Refer to Code No.P0120, Throttle position sensor (1st channel) system (Refer to P.13A-25).
   - NO → Adjust the throttle position sensor. (Refer to P.13A-220.)
   - OK → Replace the throttle body assembly.
   - NG → Check the throttle valve control servo. (Refer to 13A-132.)
     - OK → Replace the throttle body assembly.
     - NG → Check the following connectors: B-102, B-122, D-11
       - OK → Replace the throttle body assembly.
       - NG → Check the harness wires between the throttle position sensor and the throttle valve controller, and between the throttle valve control servo and the throttle valve controller.
       - OK → Replace the throttle valve controller.
       - NG → Replace the throttle valve controller.
### Code No.P1222 throttle valve control servo system

<table>
<thead>
<tr>
<th>The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range of Check</strong></td>
</tr>
<tr>
<td>• throttle valve control servo relay: ON</td>
</tr>
<tr>
<td><strong>Set Conditions</strong></td>
</tr>
<tr>
<td>• Short circuit of the throttle valve control servo drive circuit to earth</td>
</tr>
<tr>
<td>• Power is supplied to the throttle valve control servo circuit from other sources.</td>
</tr>
<tr>
<td>• Open circuit in the throttle valve control servo power supply circuit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the throttle valve control servo</td>
</tr>
<tr>
<td>• Open circuit in the throttle valve control servo power supply circuit</td>
</tr>
<tr>
<td>• Open or short circuit in the throttle valve control servo circuit or loose connector contact</td>
</tr>
<tr>
<td>• Malfunction of throttle valve controller</td>
</tr>
</tbody>
</table>

#### Check the operation of the throttle valve control servo.

**OK**: The throttle valve opens or closes when the accelerator pedal is depressed or released.

**NG**: Transient malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

#### Check the throttle valve control servo (Refer to P.13A-232.)

**OK**: Replace the throttle body assembly

**NG**: Repair

#### Check the following connector: B-122

**OK**: Measure at the throttle valve control servo connector B-122
- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
- The voltage between terminal 1 and earth
- The voltage between terminal 2 and earth
- The Voltage between terminal 3 and earth

**OK**: Voltage changes between 5 - 7 V when the accelerator pedal is operated.

**NOTE**: Erase the diagnosis code before the measurement since a diagnosis code is recorded when the harness is disconnected.

**NG**: Check the following connector: D-11

**OK**: Check the harness wire between the throttle valve control servo and the throttle valve controller.

**NG**: Check the trouble symptoms.

**Replace the throttle valve controller.**

**NG**: Replace the throttle valve controller.

**NG**: Replace the trouble symptoms.

**NG**: Replace the engine-ECU.
### Code No.P1223 Communication line system with the throttle valve controller

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Short in communication line</td>
</tr>
<tr>
<td>• Malfunction of engine-ECU</td>
</tr>
<tr>
<td>• Malfunction of throttle valve controller</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ignition switch: ON</td>
</tr>
<tr>
<td>• Battery voltage: 8 V or more.</td>
</tr>
<tr>
<td>• Engine: not cranking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• System detects an error in communication line between the engine-ECU and the throttle valve controller, and between the throttle valve controller and the engine-ECU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Self-Diag Code Is Code No.P1220 output?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
<tr>
<td>Refer to Code No.P1220, Electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>(Refer to P13A-64.)</td>
</tr>
<tr>
<td>NO</td>
</tr>
<tr>
<td>Repair</td>
</tr>
</tbody>
</table>

**Check the following connector:** D-11

Measure at throttle valve controller connector D-11.
- Measure voltage at the throttle valve controller connector terminals.
- Ignition switch: ON
  1. The voltage between terminal 5 and earth
     - OK: System voltage
  2. The voltage between terminal 22 and earth
     - OK: System voltage
  3. The voltage between terminal 3 and earth
     - The voltage between terminal 4 and earth
     - The voltage between terminal 16 and earth
     - OK: 0.5 V or less

**Check the following connector:** D-118

Check the harness wire between the throttle valve controller and the engine-ECU.

**Check the trouble symptoms.**

NG Replace the throttle valve controller.

NG Replace the engine-ECU.
**Code No.P1225 Accelerator pedal position sensor (2nd channel) system**

**Probable cause**

- Malfunction of accelerator pedal position sensor (2nd channel)
- Open or short circuit in accelerator pedal position sensor (2nd channel) circuit or loose connector contact
- Malfunction of the throttle valve controller
- Malfunction of engine-ECU

**Range of Check**

- Accelerator pedal position sensor (2nd channel) is normal.
- Communication between the engine-ECU and the throttle valve controller is normal.

**Set Conditions**

- Output voltage of the accelerator pedal position sensor (2nd channel) is 0.2 V or less for one second
- Output voltage of the accelerator pedal position sensor (1st channel) is 2.5 V or less, and output voltage of the accelerator pedal position sensor (2nd channel) is 4.5 V or more for one second.
- Difference between the accelerator pedal position sensor (1st and 2nd channels) output voltages exceeds 1.0 V (i.e. when the throttle valve opening angle changes slightly).

---

**MUT-II Data list**

77 Accelerator pedal position sensor (2nd channel) (Refer to P.13A-105, DATA LIST REFERENCE TABLE.)

**OK**

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

**NG**

Check the accelerator pedal position sensor (Refer to P.13A-229.)

**OK**

Measure at accelerator pedal position sensor connector D-135

- Disconnect the connector and measure at the harness side.
  (1) The resistance between terminal 7 and earth
  OK: 2 Ω or less
  (2) The voltage between terminal 8 and earth
  (Ignition switch: ON)
  OK: 4.8 - 5.2 V

**NG**

Check the following connector: D-11

**NG**

Check the following connector: D-11

**OK**

Check the trouble symptoms.

**NG**

Replace the throttle valve controller.

**OK**

To the next page

**NG**

Check the following connector: D-11

**OK**

Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller.

**NG**

Check the trouble symptoms.

(repeat the process for different conditions and issues)
Measure at throttle valve controller connector D-11.
• Use test harness (MB991658) to connect terminals No.6, No.7, No.8 only, and measure at the pick-up harness side.
• Ignition switch: ON
(1) The voltage between terminal 6 and earth
   OK: Accelerator pedal fully released: 0.985 - 1.085 V
   Accelerator pedal fully depressed: 4.0 V or higher
(2) The voltage between terminal 7 and earth
   OK: 0.5 V or more
(3) The voltage between terminal 8 and earth
   OK: 4.8 - 5.2 V

Measure at accelerator pedal position sensor connector D-135.
• Use test harness (MB991658) to connect terminals No.6, No.7, No.8 only, and measure at the pick-up harness side.
• Ignition switch: ON
(1) The voltage between terminal 6 and earth
   OK: Accelerator pedal fully released: 0.985 - 1.085 V
   Accelerator pedal fully depressed: 4.0 V or higher
(2) The voltage between terminal 7 and earth
   OK: 0.5 V or more
(3) The voltage between terminal 8 and earth
   OK: 4.8 - 5.2 V

Code No.P1226 Throttle valve controller system
Probable cause
Set Conditions
• Errors in reading or writing to the throttle valve controller ROM.

Replace the throttle valve controller.
## Code No.P1500 Alternator FR terminal system

**Range of Check**
- Engine speed: 50 r/min or more
- Input voltage from the alternator FR terminal is system voltage for 20 seconds.

**Probable cause**
- Open circuit in alternator FR terminal circuit
- Malfunction of engine-ECU

### Check the following connector:
- **B-41**
  - **NG** → Repair
  - **OK**

### Measure at intermediate connector B-41.
- **NG** → Repair
- **OK**

### Measure at engine-ECU connector D-117.
- **NG** → Repair
- **OK**: 9 - 10 V

### Check the following connector:
- **D-117**
  - **OK** → Repair
  - **NG** → Replace the engine-ECU.

### Check the harness wire between the intermediate connector and the engine-ECU.
- **OK** → Repair
- **NG** → Replace the alternator.

### Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
- Replace the harness wire between the alternator and the intermediate connector.

---

**Check the trouble symptoms.**
<table>
<thead>
<tr>
<th>Cord No. P1610 Immobilizer system</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Check</td>
<td>● Open or short circuit, or loose connector contact</td>
</tr>
<tr>
<td>Ignition switch: ON</td>
<td>● Malfunction of the immobilizer-ECU</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>● Malfunction of the engine-ECU</td>
</tr>
<tr>
<td>Improper communication between</td>
<td></td>
</tr>
<tr>
<td>the engine-ECU and the</td>
<td></td>
</tr>
<tr>
<td>immobilizer-ECU</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
(1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
(2) This code may be displayed when registering the key encrypted code.

Check the following connectors:
D-118, D-202, E-13  
NG → Repair

Check the harness wire between the immobilizer-ECU and the engine-ECU.  
OK

Check the trouble symptoms.  
NG

Replace the immobilizer-ECU  

Check the trouble symptoms.  
NG

Replace the engine-ECU.
## INSPECTION CHART FOR TROUBLE SYMPTOMS

<table>
<thead>
<tr>
<th>Trouble symptom</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication with MUT-II is impossible.</td>
<td>1</td>
<td>13A-74</td>
</tr>
<tr>
<td>Communication with engine-ECU only is not possible.</td>
<td>2</td>
<td>13A-75</td>
</tr>
<tr>
<td>Engine warning lamp and related parts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.</td>
<td>3</td>
<td>13A-76</td>
</tr>
<tr>
<td>The engine warning lamp remains illuminating and never goes out.</td>
<td>4</td>
<td>13A-76</td>
</tr>
<tr>
<td>Starting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No initial combustion (starting impossible)</td>
<td>5</td>
<td>13A-77</td>
</tr>
<tr>
<td>Initial combustion but no complete combustion (starting impossible)</td>
<td>6</td>
<td>13A-79</td>
</tr>
<tr>
<td>Long time to start (improper starting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idling stability (Improper idling)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable idling (Rough idling, hunting)</td>
<td>7</td>
<td>13A-81</td>
</tr>
<tr>
<td>Idling speed is high. (Improper idling speed)</td>
<td>8</td>
<td>13A-83</td>
</tr>
<tr>
<td>Idling speed is low. (Improper idling speed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idling stability (Engine stalls)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the engine is cold, it stalls at idling. (Die out)</td>
<td>9</td>
<td>13A-84</td>
</tr>
<tr>
<td>When the engine is hot, it stalls at idling. (Die out)</td>
<td>10</td>
<td>13A-85</td>
</tr>
<tr>
<td>The engine stalls when starting the car. (Pass out)</td>
<td>11</td>
<td>13A-87</td>
</tr>
<tr>
<td>The engine stalls when decelerating.</td>
<td>12</td>
<td>13A-88</td>
</tr>
<tr>
<td>Driving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hesitation, sag or stumble</td>
<td>13</td>
<td>13A-89</td>
</tr>
<tr>
<td>Poor acceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The feeling of impact or vibration when accelerating</td>
<td>14</td>
<td>13A-90</td>
</tr>
<tr>
<td>The feeling of impact or vibration when decelerating</td>
<td>15</td>
<td>13A-91</td>
</tr>
<tr>
<td>Knocking</td>
<td>16</td>
<td>13A-91</td>
</tr>
<tr>
<td>Dieseling</td>
<td>17</td>
<td>13A-91</td>
</tr>
<tr>
<td>Too high CO and HC concentration when idling</td>
<td>18</td>
<td>13A-92</td>
</tr>
<tr>
<td>Low alternator output voltage (approx. 12.3 V)</td>
<td>19</td>
<td>13A-94</td>
</tr>
<tr>
<td>Engine idle speed is incorrect while the A/C is on.</td>
<td>20</td>
<td>13A-94</td>
</tr>
<tr>
<td>A/C condenser fan is inoperative</td>
<td>21</td>
<td>13A-95</td>
</tr>
<tr>
<td>Clutch switch system malfunction</td>
<td>22</td>
<td>13A-96</td>
</tr>
<tr>
<td>GDI ECO indicator lamp system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDI ECO indicator lamp does not illuminate.</td>
<td>23</td>
<td>13A-96</td>
</tr>
<tr>
<td>GDI ECO indicator lamp remains illuminated and does not go off.</td>
<td>24</td>
<td>13A-97</td>
</tr>
</tbody>
</table>
### PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

<table>
<thead>
<tr>
<th>Items</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting</td>
<td></td>
</tr>
<tr>
<td>Won't start</td>
<td>The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.</td>
</tr>
<tr>
<td>Fires up and dies</td>
<td>There is combustion within the cylinders, but then the engine soon stalls.</td>
</tr>
<tr>
<td>Hard starting</td>
<td>Engine starts after cranking a while.</td>
</tr>
<tr>
<td>Idling stability</td>
<td></td>
</tr>
<tr>
<td>Hunting</td>
<td>Engine speed doesn't remain constant; changes at idle.</td>
</tr>
<tr>
<td>Rough idle</td>
<td>Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.</td>
</tr>
<tr>
<td>Incorrect idle speed</td>
<td>The engine doesn't idle at the usual correct speed.</td>
</tr>
<tr>
<td>Engine stall (Die out)</td>
<td>The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not.</td>
</tr>
<tr>
<td>Engine stall (Pass out)</td>
<td>The engine stalls when the accelerator pedal is depressed or while it is being used.</td>
</tr>
<tr>
<td>Driving</td>
<td></td>
</tr>
<tr>
<td>Hesitation, Sag</td>
<td>“Hesitation” is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine speed) during such acceleration. Serious hesitation is called “sag”.</td>
</tr>
<tr>
<td>Poor acceleration</td>
<td>Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.</td>
</tr>
<tr>
<td>Stumble</td>
<td>Engine speed increase is delayed when the accelerator pedal is initially depressed for acceleration.</td>
</tr>
</tbody>
</table>
## Items

<table>
<thead>
<tr>
<th>Items</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving</td>
<td>Shock: The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.</td>
</tr>
<tr>
<td></td>
<td>Surge: This is repeated surging ahead during constant speed travel or during variable speed travel.</td>
</tr>
<tr>
<td></td>
<td>Knocking: A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.</td>
</tr>
<tr>
<td>Stopping</td>
<td>Run on (&quot;Dieseling&quot;): The condition in which the engine continues to run after the ignition switch is turned to OFF. Also called &quot;Dieseling&quot;.</td>
</tr>
</tbody>
</table>

## INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

### INSPECTION PROCEDURE 1

**Communication with MUT-II is not possible.**  
*(Communication with all systems is not possible.)*

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the connector</td>
</tr>
<tr>
<td>• Malfunction of the harness wire</td>
</tr>
<tr>
<td>• Malfunction of MUT-II</td>
</tr>
</tbody>
</table>

The cause is probably a defect in the power supply system (including earth) for the diagnosis line.

**Measure at the diagnostic connector (16-pin) D-23.**
- Voltage between 16 and earth  
  **OK:** System voltage  
  **NG:** Check the following connectors: D-27, D-210, D-211

**Check trouble symptom.**

- Check the harness wire between the power supply and diagnostic connector (16 pin), and repair if necessary.

**Replace the MUT-II.**
Inspection procedure 2

<table>
<thead>
<tr>
<th>MUT-II communication with engine-ECU is impossible.</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the following causes may be suspected.</td>
<td>• Malfunction of engine-ECU power supply circuit</td>
</tr>
<tr>
<td>• No power supply to engine-ECU.</td>
<td>• Malfunction of engine-ECU</td>
</tr>
<tr>
<td>• Defective earth circuit of engine-ECU.</td>
<td>• Open circuit between the engine-ECU and diagnosis</td>
</tr>
<tr>
<td>• Defective engine-ECU.</td>
<td></td>
</tr>
<tr>
<td>• Improper communication line between engine-ECU and MUT-II</td>
<td>connector</td>
</tr>
</tbody>
</table>

Check the following connectors:
D-06, D-23, D-33, D-118, D-128, D-222, E-13

NG → Repair

Check trouble symptom.

NG → Repair

Check the harness wire between engine-ECU and diagnosis connector.

NG → Repair

OK

Check the engine-ECU power supply and earth circuit system.
(Refer to P.13A-98, Inspection procedure 25.)

OK

NOTE
On vehicles with center display, if a malfunction cannot be resolved after the procedure above, check the center display and replace if necessary. (Refer to GROUP 54 - Center display.)
Inspection procedure 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Burnt-out bulb</td>
</tr>
<tr>
<td>• Defective warning lamp circuit</td>
</tr>
<tr>
<td>• Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

Because there is a burnt-out bulb, the engine-ECU causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON. If the engine warning lamp does not illuminate immediately after the ignition switch is turned to ON, one of the malfunctions listed at right has probably occurred.

**MUT-II Data list**

16 engine-ECU power supply voltage (Refer to P.13A-105.)

<table>
<thead>
<tr>
<th>NG</th>
<th>Check the engine-ECU power supply and earth circuit system. (Refer to P.13A-98, Inspection procedure 25.)</th>
</tr>
</thead>
</table>

Measure at the engine-ECU connector D-116.
- Disconnect the connector, and measure at the harness side.
- Earth the terminal No. 31.

OK: The engine warning lamp illuminates.

NG

Check a burnt-out bulb.

OK

Replace

NG

Measure at the combination meter connector D-01.
- Disconnect the connector, and measure at the harness side.
- Voltage between 62 and earth (Ignition switch: ON)

OK: System voltage

NG

Check the following connectors:
D-02, D-116, E-13

OK

Repair

NG

Check trouble symptom.

NG

Check the harness wire between combination meter and engine-ECU connector, and repair if necessary.

OK

Replace the engine-ECU.

Inspection procedure 4

The engine warning lamp remains illuminating and never goes out.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Short-circuit between the engine warning lamp and engine-ECU</td>
</tr>
<tr>
<td>• Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

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

**MUT-II Self-Diag code**

Are diagnosis codes displayed?

Yes

Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES

NG

Measure at the combination meter connector D-02.
- Disconnect the connector, and measure at the harness side.
- Disconnect the engine-ECU connector
- Continuity between 38 and earth

OK: No continuity

NG

Check the harness wire between combination meter and engine-ECU connector, and repair if necessary.

OK

Replace the engine-ECU.
## Inspection procedure 5

### No initial combustion (starting impossible)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the fuel supply system</td>
</tr>
<tr>
<td>- Malfunction of the ignition system</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

**This is caused by incorrect fuel supply into the combustion chamber, and improper ignition circuit. Besides that, foreign material may be contaminated in fuel.**

1. **Check system voltage while the engine is cranking.**
   - **OK:** 8 V or more
   - **NG:** Check the battery. (Refer to GROUP 55 - Battery.)

2. **MUT-II Self-Diag code**
   - Is a diagnosis code displayed?
     - **Yes:** Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.
     - **No:** Check the engine control relay and ignition switch-IG system. (Refer to P.13A-99, Inspection procedure 26.)

3. **MUT-II Data list**
   - 16 System voltage (Refer to P.13A-105.)
     - **OK:** Check the engine coolant temperature sensor system. (Refer to P.13A-22, code No. P0115.)
     - **NG:** Check the camshaft rotate when the engine is cranking?
       - **Yes:** Check the camshaft rotate when the engine is cranking?
         - **Yes:** Check if the timing belt is broken or damaged.
         - **No:** Check the crank angle sensor system. (Refer to P.13A-56, code No. P0335.)

4. **MUT-II Actuator test**
   - 07 Fuel pump (low pressure) (Refer to P.13A-110.)
     - **OK:** Check the fuel pump (low pressure) system. (Refer to P.13A-101, Inspection procedure 29.)
     - **NG:** Check if the fuel leakage. (Refer to P.13A-225.)

5. **MUT-II Data list**
   - 22 Crank angle sensor (Refer to P.13A-105.)
     - **OK:** Clean around the throttle valve. (Refer to P.13A-220.)
     - **NG:** Check the throttle position sensor (1st channel) system. (Refer to P.13A-25, code No. P0120.)

6. **MUT-II Data list**
   - 21 Engine coolant temperature sensor (Refer to P.13A-105.)
     - **OK:** Check the engine coolant temperature sensor system. (Refer to P.13A-22, code No. P0115.)
     - **NG:** Inspect engine start ability by cranking the engine while the accelerator pedal is slightly depressed.

7. **MUT-II Data list**
   - 79 Throttle position sensor (1st channel) (Refer to P.13A-105.)
     - **OK:** Check the throttle position sensor (1st channel) system. (Refer to P.13A-25, code No. P0120.)
     - **NG:** Measure at injector driver connector B-121.
       - Disconnect the connector, and measure at the connector side.
       - Voltage between each of terminals 4, 12, 21 and earth (Ignition switch: ON)
       - **OK:** System voltage
     - **OK:** Check the injector driver system. (Refer to P.13A-104, Inspection procedure 34.)

8. **MUT-II Data list**
     - Connect the connector.
     - Connect a timing light to the No.1 terminal of each connector in turn. (Engine cranking)
     - **OK:** The timing light flashes.
     - **OK:** Check that the crank angle sensor and timing belt cover are properly installed.

To the next page
Check ignition coil spark for each cylinder.
(1) Remove the ignition coil.
(2) Install a new spark plug to the removed ignition coil.
(3) Disconnect the injector intermediate connector.
   **Caution**
   Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
(4) Earth the spark plug electrode securely.
(5) Check that the spark plug ignites when the engine is cranked.

OK
NG
Replace the ignition coil.

Check all the following items:
- Spark plug
- Compression pressure
- Foreign material (such as water or kerosine) entered the fuel lines

OK

Check trouble symptom.

OK
NG
Replace the injector.
## Inspection procedure 6

<table>
<thead>
<tr>
<th>Initial combustion takes place, but does not complete (start impossible), too long time to start (poor start)</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| This may be caused by improper spark plug ignition (poor spark), improper mixture during engine cranking, improper fuel pressure. | - Malfunction of the fuel supply system  
- Malfunction of the fuel pressure sensor  
- Malfunction of the ignition system  
- Malfunction of the electronic-controlled throttle valve system  
- Malfunction of the engine-ECU |

### Check system voltage while the engine is cranking.

<table>
<thead>
<tr>
<th>OK: 8 V or more</th>
<th>NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check the battery. (Refer to GROUP 55 - Battery.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Self-Diag code

**Is a diagnosis code displayed?**

<table>
<thead>
<tr>
<th>Yes</th>
<th>NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Actuator test

07 Fuel pump (low pressure) (Refer to P.13A-110.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check the fuel pump (low pressure) system. (Refer to P.13A-101, Inspection procedure 29.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Data list

21 Engine coolant temperature sensor (Refer to P.13A-105.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check the engine coolant temperature system. (Refer to P.13A-22, code No. P0115.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Data list

18 Cranking signal (Refer to P.13A-105.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check the ignition switch-ST system. (Refer to P.13A-99, Inspection procedure 27.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Data list

74 Fuel pressure sensor (Refer to P.13A-105.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check an abnormal fuel pressure system. (Refer to P.13A-36, code No. P0190.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Check fuel leakage. (Refer to P.13A-225.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean around the throttle valve. (Refer to P.13A-220.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Is the engine started normally when it is cranked with the accelerator pedal depressed slightly?

<table>
<thead>
<tr>
<th>Yes</th>
<th>NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Check ignition timing when the engine is cranked.

<table>
<thead>
<tr>
<th>OK: approx. 5° BTDC</th>
<th>NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check that the crank angle sensor and timing belt cover are properly installed.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the next page
Check ignition coil spark for each cylinder.

(1) Remove the ignition coil.
(2) Install a new spark plug to the removed ignition coil.
(3) Disconnect the injector intermediate connector.

**Caution**
Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.

(4) Earth the spark plug electrode securely.
(5) Check that the spark plug ignites when the engine is cranked.

NG
Replace the ignition coil.

Check all the following items:
- Spark plug
- Compression pressure
- Foreign material (such as water or kerosine) entered the fuel lines

OK

Check trouble symptom.

NG
Replace the injector.

OK
# Inspection procedure 7

## Unstable idling (rough idle, hunting)

This malfunction is probably caused by a faulty ignition system, improper air/fuel ratio, a faulty electronic-controlled throttle valve system, improper compression pressure, etc. As many causes can be suspected, diagnose from easier items.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the ignition system</td>
</tr>
<tr>
<td>- Malfunction of the air/fuel ratio control system</td>
</tr>
<tr>
<td>- Malfunction of the electronic-control throttle valve system</td>
</tr>
<tr>
<td>- Improper compression pressure</td>
</tr>
<tr>
<td>- Air sucking into the air intake system</td>
</tr>
</tbody>
</table>

### Has the battery been disconnected recently?
- Yes: Warm up the engine, and then let it run at idle for approx. ten minutes.
- No

### MUT-II Self-Diag code

- **Is a diagnosis code displayed?**
  - Yes: Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.
  - No

### Does the engine idle speed fluctuates excessively (excessive hunting)?
- Yes: Clean around the throttle valve. (Refer to P.13A-220.)
- No

### MUT-II Data list

<table>
<thead>
<tr>
<th>Data list</th>
</tr>
</thead>
<tbody>
<tr>
<td>79 Throttle position sensor (1st channel) (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>26 Accelerator pedal position switch (Refer to P.13A-110.)</td>
</tr>
<tr>
<td>13 Intake air temperature sensor (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>25 Barometric pressure sensor (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>21 Engine coolant temperature sensor (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>08 Purge control solenoid valve (Refer to P.13A-110.)</td>
</tr>
<tr>
<td>59 Oxygen sensor (rear)</td>
</tr>
<tr>
<td>11 Oxygen sensor (front)</td>
</tr>
</tbody>
</table>

### OK: 600 - 1,000 mV

- **Transmission: 2nd gear**
- **Driving with throttle widely open**
- Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)
- Check the accelerator pedal position switch system. (Refer to P.13A-100, Inspection procedure 28.)
- Check the intake air temperature sensor system. (Refer to P.13A-21, code No. P0110.)
- Check the barometric pressure sensor system. (Refer to P.13A-19, code No. P0105.)
- Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)
- Check the purge control solenoid valve system. (Refer to P.13A-62, code No. P0443.)
- Check the oxygen sensor (rear) system. (Refer to P.13A-31, code No. P0136.)
- Check the oxygen sensor (front) system. (Refer to P.13A-28, code No. P0130.)

### To the next page
OK

Check that air is sucked in the air intake system.

- Broken intake manifold gasket
- Damaged vacuum hose
- Damaged air intake hose

NG

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-224.)

OK

Check that air is sucked in the air intake system.

- Broken intake manifold gasket
- Damaged vacuum hose
- Damaged air intake hose

NG

Check the power steering fluid pressure switch system. (Refer to P.13A-102, Inspection procedure 30.)

OK

Check the A/C switch and A/C relay system. (Refer to P.13A-102, Inspection procedure 31.)

NG

Check the stop lamp switch. (Refer to P.13A-103, Inspection procedure 32.)

OK

Check the small lamp switch system. (Refer to P.13A-104, Inspection procedure 33.)

NG

Check the EGR valve. (Refer to P.13A-60, code No. P0403.)

Check ignition coil spark for each cylinder.

1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.
   Caution
   Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

OK

Clean around the throttle valve. (Refer to P.13A-220.)

NG

Replace the ignition coil.

Check all the following items in that order.

1. Spark plugs
2. Exhaust gas emission control system
3. EGR system
4. Compression pressure
5. Foreign material (such as water or kerosine) entered the fuel line.
6. Air is sucked in the air intake system, or EGR gas leaks.
   - Damaged intake manifold gasket
   - Damaged air intake hose
   - Damaged vacuum hose
   - Faulty EGR valve seat
### Inspection procedure 8

<table>
<thead>
<tr>
<th>Idle speed is high or low (Improper idling)</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| The cause is probably that the intake air amount during idling is too great or too small. | - Malfunction of the electronic-controlled throttle valve system  
- Malfunction of the throttle body |

#### MUT-II Self-Diag code

<table>
<thead>
<tr>
<th>Is a diagnosis code displayed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NG</th>
</tr>
</thead>
</table>

(Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)

#### MUT-II Data list

<table>
<thead>
<tr>
<th>79 Throttle position sensor (1st channel) (Refer to P.13A-105.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)

<table>
<thead>
<tr>
<th>08 Purge control solenoid valve (Refer to P.13A-110.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
</tr>
</tbody>
</table>

Check the purge control solenoid valve. (Refer to P.13A-62, code No. P0443.)

<table>
<thead>
<tr>
<th>26 Accelerator pedal position switch (Refer to P.13A-105.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the accelerator pedal position switch system. (Refer to P.13A-100, Inspection procedure 28.)

<table>
<thead>
<tr>
<th>21 Engine coolant temperature sensor (Refer to P.13A-105.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)

<table>
<thead>
<tr>
<th>28 A/C switch (Refer to P.13A-105.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the A/C switch and A/C relay system. (Refer to P.13A-102, Inspection procedure 31.)

<table>
<thead>
<tr>
<th>67 Stop lamp switch (Refer to P.13A-105.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the stop lamp switch system. (Refer to P.13A-103, Inspection procedure 32.)

- Clean around the throttle valve. (Refer to P.13A-220.)
- Adjust the throttle position sensor. (Refer to P.13A-220.)
### When the engine is cold, it stalls at idling. (Die out)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the electronic-control throttle valve system</td>
</tr>
<tr>
<td>- Malfunction of the throttle body</td>
</tr>
</tbody>
</table>

### Inspection procedure 9

<table>
<thead>
<tr>
<th>Have the battery terminals been disconnected recently?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Self-Diag code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is a diagnosis code displayed?</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is the engine idling correct after the engine has been warmed up?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 Crank angle sensor (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>Check idling speed when the engine is cold.</td>
</tr>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 Accelerator pedal position switch (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>Check the accelerator position switch. (Refer to P.13A-100, Inspection procedure 28.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 Engine coolant temperature sensor (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 EGR valve (Refer to P.13A-105.)</td>
</tr>
<tr>
<td>Check the EGR valve system. (Refer to P.13A-60, code No. P0403.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does the engine stall immediately after the accelerator pedal is released?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

| Measure fuel high pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-224.) | NG |
|-----------------------------------------------------------------------------------------------|
| OK | Repair  |

| Check ignition timing. (Refer to GROUP 11A - Engine Adjustment.) | NG |
|-----------------------------------------------------------------------------------------------|
| OK | Check that the crank angle sensor and timing belt cover are properly installed. |

**Caution**

Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.

(4) Earth the spark plug electrode securely.

(5) Check that the spark plug ignites when the engine is cranked.

**Check all the following items:**

- Spark plugs
- Compression pressure
- Engine oil viscosity

<table>
<thead>
<tr>
<th>OK</th>
<th>Check trouble symptom.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Replace the injector.</td>
</tr>
</tbody>
</table>
**Inspection procedure 10**

### When the engine is hot, it stalls at idling. (Die out)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition system</td>
</tr>
<tr>
<td>• Malfunction of air/fuel ratio control system</td>
</tr>
<tr>
<td>• Malfunction of electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>• Malfunction of the throttle body</td>
</tr>
<tr>
<td>• Poor connector contact</td>
</tr>
<tr>
<td>• Improper compression pressure</td>
</tr>
<tr>
<td>• Air stuck in the air intake system</td>
</tr>
</tbody>
</table>

The cause is probably an improper air/fuel ratio, faulty electronic-controlled throttle valve system, compression pressure. In addition, if the engine stalls suddenly, another possible cause might be a poor connector contact.

- **Have the battery terminals been disconnected recently?**
  - **Yes**
    - Warm up the engine, and then let it run at idle for approx. ten minutes.
  - **No**

- **MUT-II Self-Diag code**
  - Is a diagnosis code displayed?
    - **Yes**
      - Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.
    - **No**

- **MUT-II Data list**
  - 79 Throttle position sensor (1st channel) (Refer to P.13A-105.)
    - **OK**
    - **NG**
      - Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)

- **Is it easy to reproduce the engine stall?**
  - **Yes**
  - **No**
    - While carrying out an intermittent malfunction simulation test. (Refer to GROUP 00 - Points to Note for Intermittent Malfunction.), check for sudden changes in the following signals.
      - Crank angle sensor signal
      - Injector drive signal
      - Fuel pump (low pressure) drive signal
      - Air flow sensor
      - Primary ignition signal
      - Power supply to the engine-ECU

- **MUT-II Data list**
  - 26 Accelerator pedal position switch (Refer to P.13A-105.)
    - **OK**
    - **NG**
      - Check the accelerator pedal position switch. (Refer to P.13A-100, Inspection procedure 28.)

- **MUT-II Data list**
  - 13 Intake air temperature sensor (Refer to P.13A-105.)
    - **OK**
    - **NG**
      - Check the intake air temperature sensor. (Refer to P.13A-21, code No. P0110.)

- **MUT-II Data list**
  - 25 Barometric pressure sensor (Refer to P.13A-105.)
    - **OK**
    - **NG**
      - Check the barometric pressure sensor. (Refer to P.13A-19, code No. P0105.)

- **MUT-II Data list**
  - 21 Engine coolant temperature sensor (Refer to P.13A-105.)
    - **OK**
    - **NG**
      - Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)

- **MUT-II Data list**
  - 59 Oxygen sensor (rear)
    - Transmission: 2nd gear
    - Driving with throttle widely open
    - **OK**: 600 - 1,000 mV
    - **NG**
      - Check the oxygen sensor (rear) system. (Refer to P.13A-31, code No. P0136.)

- **MUT-II Data list**
  - 11 Oxygen sensor (front)
    - **OK**: 600 - 1,000 mV when the engine is suddenly raced
    - **NG**
      - Check the oxygen sensor (front) system. (Refer to P.13A-28, code No. P0130.)

- **MUT-II Data list**
  - 11 Oxygen sensor (front)
    - **OK**: 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for four minutes after the engine started).
    - **NG**
      - Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-224.)
      - **OK**
      - **NG**
        - Check that air is sucked in the air intake system.
          - Broken intake manifold gasket
          - Damaged vacuum hose
          - Damaged air intake hose
From the previous page

**MUT-II Data list**

27 Power steering fluid pressure switch (Refer to P.13A-105.)

OK

NG

Check the power steering fluid pressure switch system. (Refer to P.13A-102, Inspection procedure 30.)

**MUT-II Data list**

28 A/C switch (Refer to P.13A-105.)

OK

NG

Check the A/C switch and A/C relay system. (Refer to P.13A-102, Inspection procedure 31.)

**MUT-II Data list**

31 Small lamp switch (Refer to P.13A-105.)

OK

NG

Check the small lamp switch system. (Refer to P.13A-104, Inspection procedure 33.)

**MUT-II Data list**

34 Air flow sensor reset signal (Refer to P.13A-105.)

OK

NG

Check the air flow sensor system. (Refer to P.13A-17, code No. P0100.)

**MUT-II Data list**

68 EGR valve (Refer to P.13A-105.)

OK

NG

Check the EGR valve. (Refer to P.13A-60, code No. P0403.)

Does the engine stall immediately after the accelerator pedal is released?

Yes

Check ignition timing. (Refer to GROUP 11A - Engine Adjustment.)

NG

Clean around the throttle valve. (Refer to P.13A-220.)

No

Check ignition coil spark for each cylinder.

1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector. **Caution**
   Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

OK

NG

Replace the ignition coil.

Check all the following items:
- Spark plugs
- Compression pressure
- Foreign material (such as water or kerosine) entered the fuel lines
Inspection procedure 11

The engine stalls when starting the car. (Pass out)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition system</td>
</tr>
<tr>
<td>• Malfunction of the EGR valve</td>
</tr>
<tr>
<td>• Air stuck in the air intake system</td>
</tr>
</tbody>
</table>

---

MUT-II Self-Diag code
Is a diagnosis code displayed?

- Yes
  - (Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)

- No

MUT-II Data list
68 EGR valve (Refer to P.13A-105.)

- NG
  - Check the EGR valve. (Refer to P.13A-60, code No. P0403.)

- OK

MUT-II Actuator test
08 Purge control solenoid valve (Refer to P.13A-110.)

- NG
  - Check the purge control solenoid valve system. (Refer to P.13A-62, code No. P0443.)

- OK
  - Replace the ignition coil.

---

Check ignition coil spark for each cylinder.
(1) Remove the ignition coil.
(2) Install a new spark plug to the removed ignition coil.
(3) Disconnect the injector intermediate connector.
   - Caution
   Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
(4) Earth the spark plug electrode securely.
(5) Check that the spark plug ignites when the engine is cranked.

- NG
  - Replace the ignition coil.

- OK

Check all the following items:
(1) Spark plug
(2) Check if air is stuck in the air intake system.
   • Damage intake manifold gasket
   • Damaged or disconnected vacuum hose
   • Damaged air intake hose
## Inspection procedure 12

### The engine stalls when decelerating.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>• Malfunction of the EGR valve system</td>
</tr>
</tbody>
</table>

### The cause is probably an improper air/fuel ratio due to a faulty EGR system, or poor intake air volume due to a faulty electronic-controlled throttle valve system.

#### Have the battery terminals been disconnected recently?

<table>
<thead>
<tr>
<th>Yes</th>
<th>Warm up the engine, and then let it run at idle for approx. ten minutes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

#### MUT-II Self-Diag code

<table>
<thead>
<tr>
<th>Is a diagnosis code displayed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes (Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)</td>
</tr>
</tbody>
</table>

#### MUT-II Data list

1. **26 Accelerator pedal position switch** (Refer to P.13A-105.)
   - NG: Check the accelerator pedal position switch. (Refer to P.13A-100, Inspection procedure 28.)
   - OK: MUT-II Data list
2. **79 Throttle position sensor (1st channel)** (Refer to P.13A-105.)
   - NG: Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)
   - OK: MUT-II Data list
3. **68 EGR valve** (Refer to P.13A-105.)
   - NG: Check the EGR valve system. (Refer to P.13A-69, code No. P0403.)
   - OK: Replace the ignition coil.

Check ignition coil spark for each cylinder.
1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

Check all the following items:
- Spark plug
- Clean around the throttle valve (Refer to P.13A-220.)
## Inspection procedure 13

### Hesitation, sag, stumble, poor acceleration or surge

The cause is probably a malfunction of the ignition system, electronic-controlled throttle valve system, compression pressure, etc.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition system</td>
</tr>
<tr>
<td>• Malfunction of the air/fuel ratio control system</td>
</tr>
<tr>
<td>• Malfunction of the electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>• Improper compression pressure</td>
</tr>
<tr>
<td>• Air stuck in the air intake system</td>
</tr>
</tbody>
</table>

### MUT-II Self-Diag code

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is a diagnosis code displayed?</td>
<td>Yes</td>
</tr>
<tr>
<td>(Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check ignition timing

(Refer to GROUP 11A - Engine Adjustment.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 Accelerator pedal position switch</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the accelerator pedal position switch

(Refer to P.13A-100, Inspection procedure 28.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Intake air temperature sensor</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the intake air temperature sensor

(Refer to P.13A-21, code No. P0110.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Barometric pressure sensor</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the barometric pressure sensor

(Refer to P.13A-19, code No. P0105.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 Engine coolant temperature sensor</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the engine coolant temperature sensor

(Refer to P.13A-22, code No. P0115.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>79 Throttle position sensor (1st channel)</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the throttle valve position feedback system

(Refer to P.13A-65, code No. P1221.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>59 Oxygen sensor (rear)</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-78.)</td>
<td></td>
</tr>
</tbody>
</table>

#### Transmission: 2nd gear

#### Driving with throttle widely open

**OK:** 600 - 1,000 mV

### Check the oxygen sensor (rear) system

(Refer to P.13A-31, code No. P0136.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Oxygen sensor (front)</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

**OK:** 600 - 1,000 mV when the engine is suddenly raced

### Check the oxygen sensor (front) system

(Refer to P.13A-28, code No. P0130.)

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Oxygen sensor (front)</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

**OK:** 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for four minutes after the engine started).

### Measure fuel high-pressure between the fuel pump (high pressure) and injector

(Refer to P.13A-224.)

### Check that air is sucked in the air intake system

**OK**

- Broken intake manifold gasket
- Damaged vacuum hose
- Damaged air intake hose

### MUT-II Data list

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 EGR valve</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-105.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the EGR valve

(Refer to P.13A-60, code No. P0403.)

### MUT-II Actuator test

<table>
<thead>
<tr>
<th>Actuator Type</th>
<th>OK Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>08 Purge control solenoid valve</td>
<td>OK</td>
</tr>
<tr>
<td>(Refer to P.13A-110.)</td>
<td></td>
</tr>
</tbody>
</table>

### Check the purge control solenoid valve

(Refer to P.13A-62, code No. P0443.)

---

To the next page
Check all the following items:
- Spark plug
- EGR system
- Compression pressure
- Clogged fuel filter, fuel line

NG
Replace the ignition coil.

OK
Check trouble symptom.

NG
Replace the injector.

**Inspection procedure 14**

**The feeling of impact when accelerating**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the ignition system</td>
</tr>
</tbody>
</table>

The cause is probably an ignition leak being generated in line with an increase in the spark plug request voltage during acceleration.

**MUT-II Self-Diag code**

<table>
<thead>
<tr>
<th>Is a diagnosis code displayed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

(Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)

<table>
<thead>
<tr>
<th>No</th>
</tr>
</thead>
</table>

**MUT-II Data list**

79 Throttle position sensor (1st channel) (Refer to P.13A-105.)

NG
Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)

OK
Check all the following items:
- Spark plug
- Ignition current leak

NG
Replace the ignition coil.

**Check ignition coil spark for each cylinder.**

(1) Remove the ignition coil.
(2) Install a new spark plug to the removed ignition coil.
(3) Disconnect the injector intermediate connector.

**Caution**
Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.

(4) Earth the spark plug electrode securely.
(5) Check that the spark plug ignites when the engine is cranked.

OK
Check ignition coil spark for each cylinder.

NG
Replace the ignition coil.

OK
Check all the following items:
- Spark plug
- EGR system
- Compression pressure
- Clogged fuel filter, fuel line

OK
Check trouble symptom.

NG
Replace the injector.

**Measure high fuel pressure between the fuel pump (high pressure) and injector.** (Refer to P.13A-224.)

NG
Repair

OK
### Inspection procedure 15

<table>
<thead>
<tr>
<th>The feeling of impact when decelerating</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably insufficient intake air due to a faulty electronic-controlled throttle valve system.</td>
<td>- Malfunction of the electronic-controlled throttle valve system</td>
</tr>
</tbody>
</table>

#### MUT-II Self-Diag code

<table>
<thead>
<tr>
<th>Is a diagnosis code displayed?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)</td>
<td>(Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)</td>
<td></td>
</tr>
</tbody>
</table>

#### MUT-II Data list

<table>
<thead>
<tr>
<th>79 Throttle position sensor (1st channel) (Refer to P.13A-105.)</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the throttle valve position feedback system. (Refer to P.13A-65, code No. P1221.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>26 Accelerator pedal position switch (Refer to P.13A-105.)</th>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the accelerator pedal position switch system. (Refer to P.13A-100, Inspection procedure 28.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clean around the throttle valve. (Refer to P.13A-220.)

---

### Inspection procedure 16

<table>
<thead>
<tr>
<th>Knocking</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| The cause is probably incorrect detonation control or improper heat range of the spark plugs. | - Malfunction of the detonation sensor  
- Improper heat range of the spark plugs |

#### MUT-II Self-Diag code

<table>
<thead>
<tr>
<th>Is a diagnosis code displayed?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the detonation sensor system. (Refer to P.13A-56, code No. P0325.)</td>
<td>(Refer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)</td>
<td></td>
</tr>
</tbody>
</table>

Does knocking occur when the vehicle is driven with the detonation sensor disconnected?  
(At this time, use the MUT-II to check whether the ignition timing is retarded from when the detonation sensor connector is connected.)

Check all the following items:
- Spark plug
- Foreign material (such as water or kerosine) entered the fuel lines

---

### Inspection procedure 17

<table>
<thead>
<tr>
<th>Run-on (dieseling)</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably fuel leak from injector(s)</td>
<td>- Malfunction of the injector</td>
</tr>
</tbody>
</table>

Replace the injector.
Inspection procedure 18

**Too high CO and HC concentration when idling**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>The cause is probably an incorrect air/fuel ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of air/fuel ratio control system</td>
<td></td>
</tr>
<tr>
<td>- Deterioration of the catalyst</td>
<td></td>
</tr>
</tbody>
</table>

**MUT-II Self-Diag code**

Is a diagnosis code displayed?

Yes

(Rrefer to P.13A-15, INSPECTION CHART FOR DIAGNOSIS CODES.)

No

Check ignition timing. (Refer to GROUP 11A - Engine Adjustment.)

NG

Check that the crank angle sensor and timing belt cover are properly installed.

OK

Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)

**MUT-II Data list**

21 Engine coolant temperature sensor (Refer to P.13A-105.)

NG

Check the engine coolant temperature sensor. (Refer to P.13A-22, code No. P0115.)

OK

Check the intake air temperature sensor. (Refer to P.13A-21, code No. P0110.)

NG

Check the barometric pressure sensor. (Refer to P.13A-19, code No. P0105.)

OK

Check the oxygen sensor (rear) system. (Refer to P.13A-31, code No. P0136.)

**MUT-II Data list**

59 Oxygen sensor (rear) (Refer to P.13A-78.)

- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV

NG

Check the oxygen sensor (rear) system. (Refer to P.13A-31, code No. P0136.)

OK

NG

Check the oxygen sensor (front) system. (Refer to P.13A-31, code No. P0130.)

NG

Check the oxygen sensor (front) system. (Refer to P.13A-31, code No. P0130.)

OK

Replace the oxygen sensor (front).

NG

Check trouble symptom.

**MUT-II Data list**

11 Oxygen sensor (front)

OK: 600 - 1,000 mV when the engine is suddenly raced

OK

NG

Check the oxygen sensor (front) system. (Refer to P.13A-31, code No. P0130.)

NG

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-224.)

NG

Repair

OK

Replace the oxygen sensor (front).

NG

Check trouble symptom.

11 Oxygen sensor (front)

OK: 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for four minutes after the engine started).

NG

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-224.)

OK

Check ignition coil spark for each cylinder.

(1) Remove the ignition coil.
(2) Install a new spark plug to the removed ignition coil.
(3) Disconnect the injector intermediate connector.

Caution

Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.

(4) Earth the spark plug electrode securely.
(5) Check that the spark plug ignites when the engine is cranked.

OK

NG

Replace the ignition coil.

NG

Replace the ignition coil.

OK

Check all the following items:

- Spark plug
- EGR system
- Compression pressure
- Clogged fuel filter or line

OK

To the next page
From the previous page

### MUT-II Data list
68 EGR valve (Refer to P.13A-105.)
- OK
- NG
  - Check the EGR valve system. (Refer to P.13A-60, code No. P0403.)

### MUT-II Actuator test
08 Purge control solenoid valve (Refer to P.13A-110.)
- OK
- NG
  - Check purge control solenoid valve system. (Refer to P.13A-62, code No. P0443.)
  - Replace the injector.
  - Check trouble symptom.
  - NG
    - Replace the three-way catalytic converter.
### Inspection procedure 19

**Low alternator output voltage (approx. 12.3 V)**

<table>
<thead>
<tr>
<th>The cause is probably a malfunction of the alternator or one of the problems listed at right.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probable cause</strong></td>
</tr>
<tr>
<td>- Malfunction of the charging system</td>
</tr>
<tr>
<td>- Open circuit between the alternator G terminal and the engine-ECU</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

- **Measure at the alternator connector B-59.**
  - Connect the connector. (Use the test harness MB991519)
  - Voltage between 1 (black clip) and earth
    - (Engine: Idling)
    - (Radiator fan: Not operating)
    - (Headlamp: OFF → ON)
    - (Stop lamp: OFF → ON)
    - (Rear defogger switch: OFF → ON)
  - **OK:** Voltage increased by 0.2 - 3.5 V.
- **NG**
  - Check the alternator. (Refer to GROUP 16 - Charging System.)

- **NG**
  - Measure at the alternator connector B-59.
  - Disconnect the connector, and measure at the harness side.
  - Continuity between 1 and earth
    - **OK:** No continuity
- **OK**
  - Check the following connectors: B-41, B-59, D-119

- **NG**
  - Measure at the alternator connector B-59.
  - Disconnect the engine-ECU connector.
  - Continuity between 1 and earth
    - **OK:** No continuity

### Inspection procedure 20

**Idling speed is improper when A/C is operating**

<table>
<thead>
<tr>
<th>If the engine-ECU detects that the air conditioner is on, it activates the throttle control servo to control idle-up operation. The A/C-ECU judges if the load caused by air conditioner operation is high or low, and converts it to voltage signal (high or low voltage) and inputs the signal to the engine-ECU. Based on this voltage signal, the engine-ECU controls the idle-up speed (for high or low load).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probable cause</strong></td>
</tr>
<tr>
<td>- Malfunction of the A/C control system</td>
</tr>
<tr>
<td>- Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

- **Measure at the engine-ECU connector D-117.**
  - Connect the connector.
  - Voltage between 65 and earth (Engine: at idle, outside air temperature: 25°C or more)
    - **OK:** 0 - 3 V (When A/C is MAX. COOL condition (when the load by A/C is high))
    - System voltage (When A/C is MAX. HOT condition (when the load by A/C is low))
- **NG**
  - Check the A/C system. (Refer to GROUP 55 - On-vehicle Service.)

- **OK**
  - Check the following connector: D-117
- **NG**
  - Check trouble symptom.

- **NG**
  - Replace the engine-ECU.
# Inspection procedure 21

<table>
<thead>
<tr>
<th>A/C condenser fan is inoperative</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| The fan motor relay is controlled by turning on and off the power transistor in the engine-ECU. | • Malfunction of the A/C condenser fan relay.  
• Malfunction of the condenser fan motor.  
• Improper connector contact, open circuit or short-circuited harness wire  
• Malfunction of the engine-ECU |

Measure at the engine-ECU connector D-116.  
- Disconnect the connector, and measure at the harness side.  
- Check condition of the condenser fan.  
  (Ignition switch: ON)  
  OK: Fan stops.  
- The voltage between 18 and earth  
  (Ignition switch: ON)  
  OK: System voltage  
- Connect a jumper cable between 18 and earth.  
  (Ignition switch: ON)  
  OK: A/C condenser fan rotates.  

OK

NG

Check the condenser fan circuit. (Refer to ELECTRICAL WIRING)

OK

NG

Check the following connector: D-116

OK

NG

Repair

Check the trouble symptoms.

OK

NG

Replace the engine-ECU.
Inspection procedure 22

Clutch switch system malfunction

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the clutch switch</td>
</tr>
<tr>
<td>- Open circuit or short-circuited harness wire in the clutch switch circuit</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

The clutch pedal switch sends a signal indicating clutch pedal depression to the engine-ECU. The engine-ECU controls the fuel injection properly according to this signal, thus prevents the fluctuation of the engine speed during shift change.

Check the clutch switch. (Refer to P.13A-233.)

Measure at the clutch switch connector D-137.
- Disconnect the connector, and measure at the harness side.
  (1) Voltage between 2 and earth (Ignition switch: ON)
  OK: System voltage
  (2) Continuity between 1 and earth
  OK: Continuity

Check the following connector:
D-137

Check the trouble symptoms.

Replace the engine-ECU.

Check the following connector:
D-26 <LHD>, D-124 <RHD>, D-117, E-10

Check the harness wire between the engine-ECU and the clutch switch connector.

Replace the engine-ECU.

GDI ECO indicator lamp does not illuminate.

If the GDI ECO indicator lamp does not illuminate after turning switch, the causes listed in the right column are suspected.

Measure at the engine-ECU connector D-116.
- Disconnect the connector, and measure at the harness side.
- Earth terminal 14 (Ignition switch: ON)
  OK: The GDI ECO indicator lamp illuminates.

Check the following connectors: E-13, E-112

Check the relative circuit of GDI ECO indicator lamp. (Refer to GROUP 54A - Troubleshooting.)
### Inspection procedure 24

<table>
<thead>
<tr>
<th>GDI ECO indicator lamp remains illuminated and does not go off.</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the GDI ECO indicator lamp does not go off during high load operation, the causes listed in the right column are suspected.</td>
<td>Short circuit between the GDI ECO indicator lamp and engine-ECU</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the engine-ECU</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the GDI ECO indicator lamp-ECU</td>
</tr>
</tbody>
</table>

#### Probable cause:
- Short circuit between the GDI ECO indicator lamp and engine-ECU
- Malfunction of the engine-ECU
- Malfunction of the GDI ECO indicator lamp-ECU

#### Measure at GDI ECO indicator lamp-ECU connector E-112.
- Disconnect the connector, and measure at the harness side.
- Disconnect the engine-ECU connector.
- Continuity between terminal 3 and earth
  - **OK**: No continuity
  - **NG**: Check the harness wire between the GDI ECO indicator lamp-ECU and engine-ECU, and repair if necessary.

#### Check the relative circuit of GDI ECO indicator lamp. (Refer to GROUP 54A - Troubleshooting.)
- **OK**

#### Replace the engine-ECU.
Inspection procedure 25

**Engine-ECU power supply and earth circuit system**

The cause is probably a malfunction of the engine-ECU or one of the problems listed at right.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Open circuit or short-circuited harness wire in the engine-ECU power supply circuit</td>
</tr>
<tr>
<td>• Open circuit or short-circuited harness wire in the engine-ECU earth circuit</td>
</tr>
<tr>
<td>• Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

Measure at the engine-ECU connectors D-117, D-118.
- Disconnect the connector, and measure at the harness side.
  1. Voltage between 99 and earth (Ignition switch: ON)
     OK: System voltage
  2. Voltage between 57 and earth
     OK: System voltage
  3. Voltage between 47, 59 and earth (Ignition switch: ON)
     OK: System voltage (When terminal 57 is shorted to earth)
  4. Continuity between 46, 58 and earth
     OK: Continuity
  5. Voltage between 60 and earth
     OK: System voltage

Check the following connectors:
D-117, D-118

(1) NG
Check the following connector:
D-208, D-223, E-13
OK
NG
Repair

(2), (3) NG
Check the harness wire between the engine-ECU and engine control relay, and repair if necessary.

OK
NG
Repair

(4) NG
Check the following connector:
D-14
OK
NG
Repair

(5) NG
Check the following connectors:
D-27, D-31 <LHD>, E-13
OK
NG
Repair

OK
NG
Repair

Replace the engine-ECU.
**Inspection procedure 26**

### Engine control relay and ignition switch-IG system

**Probable cause**

- Malfunction of the ignition switch
- Malfunction of the engine control relay
- Open circuit or short-circuited harness wire of the engine control relay circuit
- Malfunction of the engine-ECU

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Check the engine control relay. (Refer to P.13A-227.)</td>
</tr>
<tr>
<td>NG</td>
<td>Replace</td>
</tr>
<tr>
<td>OK</td>
<td>Measure at the engine control relay connector B-25X.</td>
</tr>
<tr>
<td>NG</td>
<td>Check the following connector: D-143</td>
</tr>
<tr>
<td>OK</td>
<td>OK: System voltage</td>
</tr>
<tr>
<td>NG</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td>OK</td>
<td>Check the engine-ECU power supply and earth circuit system. (Refer to P.13A-98, Inspection procedure 25.)</td>
</tr>
</tbody>
</table>

**Inspection procedure 27**

### Ignition switch-ST system

**Probable cause**

- Malfunction of the ignition switch
- Open circuit or short-circuited harness wire of the ignition switch circuit
- Malfunction of the engine-ECU

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Check the ignition switch. (Refer to GROUP 54.)</td>
</tr>
<tr>
<td>NG</td>
<td>Replace</td>
</tr>
<tr>
<td>OK</td>
<td>Measure at the engine-ECU connector D-117.</td>
</tr>
<tr>
<td>NG</td>
<td>Check the following connectors: C-01, E-113, E-114</td>
</tr>
<tr>
<td>OK</td>
<td>OK: 8 V or more</td>
</tr>
<tr>
<td>NG</td>
<td>Check the harness wire between the engine-ECU and the ignition switch.</td>
</tr>
<tr>
<td>NG</td>
<td>Check the ignition switch. (Refer to GROUP 54.)</td>
</tr>
</tbody>
</table>
## Inspection procedure 28

### Accelerator pedal position switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Maladjustment of the accelerator cable</td>
</tr>
<tr>
<td>- Maladjustment of the accelerator pedal position switch</td>
</tr>
<tr>
<td>- Open circuit or short-circuited harness wire in the accelerator pedal position switch system, or poor connector contact</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

### Check the accelerator pedal position switch. (Refer to P.13A-230.)

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
</table>

### Measure at accelerator pedal position sensor connector D-135.

- Disconnect the connector, and measure at the harness side.
- Voltage between terminal 4 and earth (Ignition switch: ON)
  
  **OK:** 4 V or more

- Continuity between terminal 5 and earth
  
  **OK:** Continuity

### Check the following connector: D-118

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
</table>

### Check trouble symptom.

### Check the harness wire between the engine-ECU and accelerator pedal position sensor.

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
</table>

### Check trouble symptom.

### Replace the engine-ECU.
### Inspection procedure 29

#### Fuel pump (low pressure) system

- The engine-ECU turns on the fuel pump relay while the engine is cranking or running, and supplies power source to the fuel pump (low pressure).

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the fuel pump relay</td>
</tr>
<tr>
<td>- Malfunction of the fuel pump (low pressure)</td>
</tr>
<tr>
<td>- Open circuit or short-circuited harness wire in the fuel pump (low pressure) circuit, or poor connector contact</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

#### MUT-II Actuator test

- **07 Fuel pump** (Refer to P.13A-110.)

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Replace</td>
</tr>
</tbody>
</table>

- Check the fuel pump relay. (Refer to P.13A-227.)

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace</td>
<td>Replace</td>
</tr>
</tbody>
</table>

- **Measure at fuel pump relay connector** B-27X.
  - Disconnect the connector, and measure at the harness side.
  - Voltage between terminals 3, 4 and earth (Ignition switch: ON)
  - **OK:** System voltage

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair</td>
<td>NG</td>
</tr>
</tbody>
</table>

- **Measure at engine-ECU connector** D-116.
  - Disconnect the connector, and measure at the harness side.
  - Voltage between terminal 21 and earth (Ignition switch: ON)
  - **OK:** System voltage

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair</td>
<td>NG</td>
</tr>
</tbody>
</table>

- **Measure at engine-ECU connector** D-116.
  - Disconnect the connector, and measure at the harness side.
  - Short circuit between terminal 21 and earth (Ignition switch: ON)
  - **OK:** The fuel pump operates (its operation sound can be heard).

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace</td>
<td>NG</td>
</tr>
</tbody>
</table>

- **Measure at fuel pump (low pressure) connector** G-12.
  - Disconnect the connector, and measure at the harness side.
  - (1) Voltage between terminal 5 and earth (Ignition switch: ON)
  - **OK:** System voltage
  - (2) Continuity between 4 and earth
  - **OK:** Continuity

<table>
<thead>
<tr>
<th>NG</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repair</td>
<td>NG</td>
</tr>
</tbody>
</table>

- **Check the following connector** G-12
- Check trouble symptom.
- **NG**
- Replace the fuel pump (low pressure).
### Inspection procedure 30

#### Power steering fluid pressure switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the power steering fluid pressure switch</td>
<td></td>
</tr>
<tr>
<td>Open circuit or short-circuited harness wire in the power steering fluid pressure switch circuit, or poor connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

**Check the power steering fluid pressure switch.**  
(Refer to GROUP 37A - On-vehicle Service.)

<table>
<thead>
<tr>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Replace</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
<tr>
<td>NG</td>
<td>NG</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
<tr>
<td>NG</td>
<td>NG</td>
</tr>
</tbody>
</table>

### Inspection procedure 31

#### A/C switch and A/C relay system

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the A/C control system</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the A/C switch</td>
<td></td>
</tr>
<tr>
<td>Open circuit or short-circuited harness wire in the A/C switch circuit, or poor connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

**Service the A/C compressor relay.**  
(Refer to GROUP 55 - On-vehicle Service.)

<table>
<thead>
<tr>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>Replace</td>
</tr>
<tr>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>OK</td>
<td>NG</td>
</tr>
<tr>
<td>NG</td>
<td>NG</td>
</tr>
</tbody>
</table>

**Check the A/C system.**  
(Refer to GROUP 55 - On-vehicle Service.)
### Stop lamp switch system

The engine-ECU determines whether the brake pedal is depressed or not, by means of the stop lamp switch input signal.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the stop lamp switch</td>
</tr>
<tr>
<td>- Open circuit or short-circuited harness wire in the stop lamp circuit, or poor connector contact</td>
</tr>
<tr>
<td>- Malfunction of the engine-ECU</td>
</tr>
</tbody>
</table>

#### Inspection procedure 32

#### Probable cause

**Check the stop lamp switch.** (Refer to GROUP 35 - Brake Pedal.)

**Measure at stop lamp switch connector D-136.**
- Disconnect the connector, and measure at the harness side.
- Voltage between terminal 2 and earth
  - **OK:** System voltage

**NG**

**Replace**

**OK**

**Measure at engine-ECU connector D-117.**
- Disconnect the connector, and measure at the harness side.
- Voltage between terminal 63 and earth
  - **Ignition switch: ON**
  - **OK:** 0 - 3 V (when the brake pedal is not depressed)
  - System voltage (when the brake pedal is depressed)

**NG**

**Check trouble symptom.**

**OK**

**Measure at engine-ECU connector D-117.**
- Disconnect the connector, and measure at the harness side.
- Voltage between terminal 63 and earth
  - **Ignition switch: ON**
  - **OK:** 0 - 3 V (when the brake pedal is not depressed)
  - System voltage (when the brake pedal is depressed)

**NG**

**Check trouble symptom.**

**OK**

**Check the following connectors:**
- **D-26 <LHD>, D-27, D-124**
- **<RHD>**

**OK**

**NG**

**Repair**

**Check trouble symptom.**

**NG**

**Check the harness wire between the battery and stop lamp switch.**

**Check trouble symptom.**

**OK**

**Check the following connectors:**
- **D-26 <LHD>, D-124 <RHD>, D-128, E-13**

**OK**

**NG**

**Repair**

**Check trouble symptom.**

**NG**

**Check the harness wire between the engine-ECU and stop lamp, and repair if necessary.**

**OK**

**NG**

**Replace the engine-ECU.**
### Inspection procedure 33

**Small lamp switch system**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper connector contact, open circuit or short-circuited harness wire in the taillamp circuit</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

**The engine-ECU determines whether the small lamp switch is on or off.**

According to that information, the engine-ECU controls alternator output current when the vehicle is started.

- Improper connector contact, open circuit or short-circuited harness wire in the taillamp circuit
- Malfunction of the engine-ECU

#### Measurement Procedure

- **Measure at the engine-ECU connector D-118.**
  - Disconnect the connector, and measure at the harness side.
  - **Voltage between 88 and earth**
    - **Lighting switch: ON**
    - **OK:** System voltage
  - **Voltage between 88 and earth**
    - **Lighting switch: OFF**
    - **OK:** System voltage

- **Check the following connector D-118**

- **Check the trouble symptoms.**

- **Replace the engine-ECU.**

### Inspection procedure 34

**Injector driver system**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the injector driver</td>
<td></td>
</tr>
<tr>
<td>Improper connector contact, open circuit or short-circuited harness wire</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-ECU</td>
<td></td>
</tr>
</tbody>
</table>

**The engine-ECU drives the injector by the drive signal.**

#### Measurement Procedure

- **Check the following connectors: B-121, D-116**

- **Check the harness wire between the injector driver and engine-ECU.**

- **Use a analyzer to measure the signal waveform at the engine-ECU connectors D-116 and D-118.**
  - **Voltage between 96 and earth, and between 1 and earth**
    - **OK:** A normal waveform should be displayed as described on P.13A-118 (INSPECTION PROCEDURE USING AN ANALYZER).

- **Check the trouble symptoms.**

- **Replace the engine-ECU.**
DATA LIST REFERENCE TABLE

Caution
When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE
*1: Within four minutes after starting the engine
*2: In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
*3: The accelerator pedal position switch normally turns off when the voltage of the accelerator pedal position sensor (1st channel) is 200 - 600 mV higher than the voltage at the idle position. If the accelerator pedal position switch turns back on after the accelerator pedal position sensor voltage has risen by 100 mV and the throttle valve has opened, the accelerator pedal position switch and the accelerator pedal position sensor (1st channel) need to be adjusted.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check items</th>
<th>Requirements</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Oxygen sensor (front)</td>
<td>Engine: After warm-up</td>
<td>Idling: 200 mV or less*1</td>
<td>Code No. 13A-28</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sudden racing: 600 - 1,000 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,500 r/min: 400 mV or less and 600 - 1,000 mV alternates.</td>
<td></td>
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</tr>
<tr>
<td>12</td>
<td>Air flow sensor</td>
<td>● Engine coolant temperature: 80 - 95°C ● Lamps, electric cooling fan and all accessories: OFF ● Transmission: Neutral</td>
<td>Idling: 22 - 48 Hz</td>
<td>Code No. 13A-17</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2,500 r/min: 60 - 100 Hz</td>
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<td>Racing: Frequency increases in response to racing.</td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON</td>
<td>Intake air temperature: -20°C</td>
<td>Code No. 13A-21</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Intake air temperature: 0°C</td>
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<td></td>
<td>Intake air temperature: 20°C</td>
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<td></td>
<td>Intake air temperature: 40°C</td>
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<td></td>
<td></td>
<td>Intake air temperature: 80°C</td>
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<tr>
<td>Item No.</td>
<td>Check items</td>
<td>Requirements</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
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</tr>
</tbody>
</table>
| 14      | Throttle position sensor (2nd channel) | • Engine coolant temperature: 80 - 95°C  
• Ignition switch: ON (Engine stopped) | Release the accelerator pedal.  
Depress the accelerator pedal gradually.  
Depress the accelerator pedal fully. | Code No. P0225 | 13A-52 |
|         |             |              | 4,000 mV or more | Voltage decreases in response to the pedal depression. | |
| 16      | Power supply voltage | Ignition switch: ON | System voltage | Procedure No.25 | 13A-98 |
| 18      | Cranking signal (Ignition switch - ST) | Transmission: Neutral | Engine: Stopped OFF | Procedure No.27 | 13A-99 |
|         |             | Engine: Cranking | ON | | |
| 21      | Engine coolant temperature sensor | Ignition switch: ON | Engine coolant temperature: -20°C  
Engine coolant temperature: 0°C  
Engine coolant temperature: 20°C  
Engine coolant temperature: 40°C  
|         |             |              | -20°C | | |
|         |             |              | 0°C | | |
|         |             |              | 20°C | | |
|         |             |              | 40°C | | |
|         |             |              | 80°C | | |
| 22      | Crank angle sensor | • Engine: cranking  
• Tachometer: Connected | Compare the engine speed readings on the tachometer and the MUT-II. | Code No. P0335 | 13A-56 |
|         |             | • Engine: Idling  
• Accelerator pedal position switch: ON | Engine coolant temperature: -20°C  
Engine coolant temperature: 0°C  
Engine coolant temperature: 20°C  
Engine coolant temperature: 40°C  
Engine coolant temperature: 80°C | | |
|         |             |              | 1,250 - 1,450 r/min  
1,100 - 1,300 r/min  
1,000 - 1,200 r/min  
900 - 1,100 r/min  
550 - 650 r/min*1 | | |
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check items</th>
<th>Requirements</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON</td>
<td>Altitude: 0 m</td>
<td>101 kPa</td>
<td>Code No. P0105</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Altitude: 600 m</td>
<td>95 kPa</td>
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<td></td>
<td></td>
<td>Altitude: 1,200 m</td>
<td>88 kPa</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Altitude: 1,800 m</td>
<td>81 kPa</td>
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<tr>
<td>26</td>
<td>Accelerator pedal position switch</td>
<td>Ignition switch: ON (Depress and release the accel-</td>
<td>Release the accel-</td>
<td>ON</td>
<td>Procedure No.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>erator pedal several times)</td>
<td>rator pedal.</td>
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<td></td>
<td></td>
<td>Depress the accel-</td>
<td>OFF</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>rator pedal slight-</td>
<td></td>
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</tr>
<tr>
<td>27</td>
<td>Power steering fluid pressure switch</td>
<td>Engine: Idling</td>
<td>Steering wheel stationary</td>
<td>OFF</td>
<td>Procedure No.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steering wheel turning</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>A/C switch</td>
<td>Engine: Idling (The A/C compressor is running when the A/C switch is on.)</td>
<td>A/C switch: OFF</td>
<td>OFF</td>
<td>Procedure No.31</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>A/C switch: ON</td>
<td>ON</td>
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</tr>
<tr>
<td>31</td>
<td>Small lamp switch</td>
<td>Engine: Idling</td>
<td>Lighting switch: OFF</td>
<td>OFF</td>
<td>Procedure No.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lighting switch: ON</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Air flow sensor reset signal</td>
<td>Engine: After having warmed up</td>
<td>Engine is idling</td>
<td>ON</td>
<td>Code No. P0100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3,000 r/min</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Volumetric efficiency</td>
<td>• Engine coolant temperature: 80 - 95°C</td>
<td>Engine is idling</td>
<td>20 - 40%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lamps, electric cooling fan and all accessories:</td>
<td>2,500 r/min</td>
<td>10 - 30%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>Engine is suddenly raced</td>
<td>Volumetric efficiency increases in response to racing</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Crank angle sensor</td>
<td>• Engine: Cranking [reading is possible at 2,000 r/min or less]</td>
<td>Engine speeds displayed on the MUT-II and tachometer are identical.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Item No.</td>
<td>Check items</td>
<td>Requirements</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
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</tr>
</tbody>
</table>
| 41      | Injector drive time *2 | • Engine coolant temperature: 80 - 95°C  
• Lamps, electric cooling fan and all accessories: OFF  
• Transmission: Neutral | Idling  
2,500 r/min  
Sudden racing | - | - |
| 44      | Ignition advance | • Engine: After warm-up  
• Set a timing light. | Idling  
2,500 r/min | Code No. P0300  
13A-53 |
| 49      | A/C relay | Engine: After warm-up, idling  
A/C switch: OFF  
A/C switch: ON | OFF (compressor clutch is not operating)  
ON (compressor clutch is operating) | Procedure No.31  
13A-102 |
| 59      | Oxygen sensor (rear) | • Transmission: 2nd gear  
• Drive with throttle widely open | 3,500 r/min  
600 - 1,000 mV | Code No. P0136  
13A-31 |
| 67      | Stop lamp switch | Ignition switch: ON  
Brake pedal: Depressed  
Brake pedal: Released | OFF  
ON | Procedure No.32  
13A-103 |
| 68      | EGR valve | • Engine coolant temperature: 80 - 95°C  
• Lamps, electric cooling fan and all accessories: OFF  
• Transmission: Neutral | Idling  
2,500 r/min  
0 - 10 STEP | Code No. P0403  
13A-60 |
| 74      | Fuel pressure sensor | • Engine coolant temperature: 80 - 95°C  
• Lamps, electric cooling fan and all accessories: OFF  
• Transmission: Neutral | Engine: Idling  
4 - 6.9 MPa | Code No. P0190  
13A-36 |
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check items</th>
<th>Requirements</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Accelerator pedal position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>985 - 1085 mV</td>
<td>Code No.P1225</td>
</tr>
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<td></td>
<td>Code No.P0220</td>
</tr>
<tr>
<td>78</td>
<td>Accelerator pedal position sensor (1st channel) *3</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>985 - 1085 mV</td>
<td>Code No.P1225</td>
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<tr>
<td>79</td>
<td>Throttle position sensor (1st channel)</td>
<td>Engine coolant temperature: 80 - 95°C</td>
<td>Release the accelerator pedal.</td>
<td>400 - 800 mV</td>
<td>Code No.P0220</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Engine: After warm-up, idling</td>
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<td></td>
<td></td>
<td>A/C switch: OFF → ON</td>
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</tr>
<tr>
<td>99</td>
<td>Fuel injection mode</td>
<td>Engine: After warm up</td>
<td>Idling (after four minutes or more have passed since engine start)</td>
<td>Lean compression</td>
<td>-</td>
</tr>
<tr>
<td>Item No.</td>
<td>Inspection item</td>
<td>Drive contents</td>
<td>Inspection contents</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
</tr>
<tr>
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</tr>
<tr>
<td>01</td>
<td>Injectors</td>
<td>Cut fuel to No. 1 injector</td>
<td>Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don’t affect idling.)</td>
<td>Idling condition becomes different (becomes unstable).</td>
<td>Code No. P0201</td>
</tr>
<tr>
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<td>Code No. P0202</td>
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<td>Code No. P0203</td>
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<td>04</td>
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<td></td>
<td>Code No. P0204</td>
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<tr>
<td>05</td>
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<td></td>
<td>Code No. P0205</td>
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<tr>
<td>06</td>
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<td></td>
<td></td>
<td>Code No. P0206</td>
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<tr>
<td>07</td>
<td>Fuel pump (low pressure)</td>
<td>Fuel pump operates and fuel is recirculated.</td>
<td>Ignition switch: ON</td>
<td>Sound of operation is heard.</td>
<td>Procedure No. 29</td>
</tr>
<tr>
<td>08</td>
<td>Purge control solenoid valve</td>
<td>Solenoid valve turns from OFF to ON.</td>
<td>Ignition switch: ON</td>
<td>Sound of operation can be heard when solenoid valve is driven.</td>
<td>Code No. P0443</td>
</tr>
<tr>
<td>17</td>
<td>Basic ignition timing</td>
<td>Set the engine-ECU to ignition timing adjustment mode</td>
<td>Idling after engine warm up</td>
<td>5°BTDC</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>Condenser fan</td>
<td>Drive the fan motor</td>
<td>Ignition switch: ON</td>
<td>The fan motor operates</td>
<td>Procedure No.21</td>
</tr>
<tr>
<td>34</td>
<td>Electronic-controlled throttle valve system</td>
<td>Stop the throttle control servo.</td>
<td>Ignition switch: ON</td>
<td>Throttle valve is opened slightly.</td>
<td>Code No. P1220</td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check requirements (engine condition)</td>
<td>Normal condition</td>
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<td>------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
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</tr>
<tr>
<td>1</td>
<td>No.1 injector</td>
<td>Engine: Warm up, and then depress the accelerator pedal suddenly from the idle speed.</td>
<td>Decreases slightly for short time from 9 - 13 V.</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>No.2 injector</td>
<td></td>
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<tr>
<td>24</td>
<td>No.3 injector</td>
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<tr>
<td>2</td>
<td>No.4 injector</td>
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<tr>
<td>10</td>
<td>No.5 injector</td>
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<tr>
<td>25</td>
<td>No.6 injector</td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>No.1 ignition coil</td>
<td>Engine: 3,000 r/min</td>
<td>0.3 - 3.0 V.</td>
<td></td>
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<tr>
<td>12</td>
<td>No.2 ignition coil</td>
<td></td>
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<tr>
<td>26</td>
<td>No.3 ignition coil</td>
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<tr>
<td>4</td>
<td>No.4 ignition coil</td>
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<tr>
<td>13</td>
<td>No.5 ignition coil</td>
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<tr>
<td>27</td>
<td>No.6 ignition coil</td>
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<tr>
<td>5</td>
<td>EGR valve (D)</td>
<td>Ignition switch: Immediately after turning ON</td>
<td>5 - 8 V (fluctuates for approx. three seconds)</td>
<td></td>
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<tr>
<td>6</td>
<td>EGR valve (C)</td>
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<tr>
<td>32</td>
<td>EGR valve (B)</td>
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<tr>
<td>34</td>
<td>EGR valve (A)</td>
<td></td>
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<tr>
<td>8</td>
<td>Alternator G terminal</td>
<td>● Engine: Warm up, and then idling&lt;br&gt;● Radiator fan: not operating&lt;br&gt;● Headlamp: OFF → ON&lt;br&gt;● Stop lamp: OFF → ON&lt;br&gt;● Rear defogger switch: OFF → ON</td>
<td>Voltage increases by 0.2 - 3.5 V</td>
<td></td>
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<tr>
<td>14</td>
<td>GDI ECO indication lamp</td>
<td>Ignition switch: OFF → ON</td>
<td>0 - 3 V (system voltage after five seconds)</td>
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<tr>
<td></td>
<td></td>
<td>Engine: When the accelerator pedal is suddenly depressed while the engine is idling</td>
<td>System voltage</td>
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<td>Terminal No.</td>
<td>Check item</td>
<td>Check requirements (engine condition)</td>
<td>Normal condition</td>
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<tr>
<td>16</td>
<td>Purge control solenoid valve</td>
<td>• Engine coolant temperature: 80 - 95°C</td>
<td>System voltage</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Ignition switch: ON</td>
<td>Voltage decreases.</td>
<td></td>
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<td></td>
<td></td>
<td>Engine: stopped</td>
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<td></td>
<td></td>
<td>Engine: Start the engine, and then increase engine speed up to 3,500 r/min.</td>
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<tr>
<td>18</td>
<td>Condenser fan relay</td>
<td>Condenser fan is not operating.</td>
<td>System voltage</td>
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<tr>
<td></td>
<td></td>
<td>Condenser fan is operating.</td>
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<td></td>
<td></td>
<td>0 - 3 V</td>
<td></td>
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<tr>
<td>20</td>
<td>Fuel pump relay</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
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<td></td>
<td>Engine: stopped</td>
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<td></td>
<td></td>
<td>Engine: idling</td>
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<td></td>
<td></td>
<td>0 - 3 V</td>
<td></td>
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<tr>
<td>21</td>
<td>A/C relay</td>
<td>• Engine: idling</td>
<td>System voltage, or changes from momentarily 6 V or more to 0 → 3 V</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>A/C switch: OFF → ON</td>
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<td></td>
<td></td>
<td>(Compressor is operating)</td>
<td></td>
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<tr>
<td>31</td>
<td>Engine warning lamp</td>
<td>Ignition switch: OFF → ON</td>
<td>0 - 3 V → System voltage</td>
<td></td>
<td></td>
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<td></td>
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<td>(after several seconds)</td>
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</tr>
<tr>
<td>41</td>
<td>Sensor power supply</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
<td></td>
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</tr>
<tr>
<td>42</td>
<td>Power supply to accelerator pedal position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
<td></td>
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<tr>
<td>43</td>
<td>Crank angle sensor</td>
<td>Engine: Cranking</td>
<td>0.4 - 4.0 V</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>1.5 - 2.5 V</td>
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<tr>
<td>44</td>
<td>Engine coolant temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 - 3.5 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine coolant temperature: 0 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine coolant temperature: 20 °C</td>
<td>2.3 - 2.9 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine coolant temperature: 40 °C</td>
<td>1.5 - 2.1 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine coolant temperature: 80 °C</td>
<td>0.4 - 1.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Engine ignition signal</td>
<td>Engine: 3,000 r/min</td>
<td>0.3 - 3.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check requirements (engine condition)</td>
<td>Normal condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------</td>
<td>---------------------------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Camshaft position sensor</td>
<td>Engine: Cranking</td>
<td>0.4 - 3.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>0.5 - 2.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Altitude: 0 m</td>
<td>3.7 - 4.3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Altitude: 1,200 m</td>
<td>3.2 - 3.8 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Alternator FR terminal</td>
<td>• Engine: Warm up, and then idling</td>
<td>Voltage decreases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Radiator fan: not operating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Headlamp: OFF → ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stop lamp: OFF → ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rear defogger: OFF → ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Oxygen sensor (rear)</td>
<td>• Transmission: 2nd gear</td>
<td>0.6 - 1.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 3,500 r/min or more</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• Driving with the throttle valve widely open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Power steering fluid pressure switch</td>
<td>Engine: Warm up, and then idling</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steering wheel stationary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steering wheel turning</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Injector driver relay</td>
<td>Ignition switch: OFF</td>
<td>0 - 0.1 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>0.5 - 1.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>Throttle valve control servo relay</td>
<td>Ignition switch: OFF</td>
<td>0 - 0.3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>0.5 - 1.0 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Engine control relay</td>
<td>Ignition switch: OFF</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Back-up power source</td>
<td>Ignition switch: OFF</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Air flow sensor</td>
<td>Engine: Idling</td>
<td>2.2 - 3.2 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 2,500 r/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON</td>
<td>Intake air temperature: 0°C</td>
<td>3.2 - 3.8 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intake air temperature: 20°C</td>
<td>2.3 - 2.9 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intake air temperature: 40°C</td>
<td>1.5 - 2.1 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intake air temperature: 80°C</td>
<td>0.4 - 1.0 V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check requirements (engine condition)</td>
<td>Normal condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
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<td>---------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>63</td>
<td>Stop lamp switch</td>
<td>Depress the brake pedal.</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Release the brake pedal.</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>A/C switch (2nd channel)</td>
<td>Refer to GROUP 55 - Troubleshooting “Check at the A/C-ECU terminal, engine-ECU output terminals.”</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>66</td>
<td>Clutch switch</td>
<td>Depress the clutch pedal.</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Release the clutch pedal.</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Ignition switch-ST</td>
<td>Engine: Cranking</td>
<td>8V or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Oxygen sensor (front)</td>
<td>Engine: Warm up, and then hold the engine speed at 2,500r/min (Use a digital voltmeter).</td>
<td>0 ↔ 0.8 V alternates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Air flow sensor reset signal</td>
<td>Engine: Idling</td>
<td>0 - 1 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,000 r/min</td>
<td>6 - 9 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Throttle position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>4.5 - 5.5 V</td>
<td></td>
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<tr>
<td>79</td>
<td>Accelerator pedal position switch</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>0 - 1 V</td>
<td></td>
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<tr>
<td>80</td>
<td>Vehicle speed sensor</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>83</td>
<td>A/C switch (1st channel)</td>
<td>Engine: Idling</td>
<td>A/C switch: OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 - 3 V</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>A/C switch: ON (Compressor is operating)</td>
<td>System voltage</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>Small lamp switch</td>
<td>Lighting switch: OFF</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lighting switch: ON (Taillamp: ON)</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>Oxygen sensor heater (front)</td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,500 r/min</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Oxygen sensor heater (rear)</td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,500 r/min</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>Fuel pressure sensor</td>
<td>Engine: Idling</td>
<td>0.3 - 4.7 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check requirements (engine condition)</td>
<td>Normal condition</td>
<td></td>
<td></td>
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<tr>
<td>-------------</td>
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<td></td>
</tr>
<tr>
<td>94</td>
<td>Accelerator pedal position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal. 0.3 - 1.0 V<em>1 Depress the accelerator pedal fully. 4.2 - 5.5 V</em>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>Injector open circuit check signal</td>
<td>Engine: Increase engine speed from idle speed to 4,000 r/min.</td>
<td>Decreases slightly (approx. 0.7V) from 4.5 V - 5.0 V.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Ignition switch - IG</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
Check if the difference in output between *1 and *2 is 4 V or more.

---

**CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS**

1. Turn the ignition switch to OFF.
2. Disconnect the engine-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU 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 earth, damage may be caused to the vehicle wiring, sensors, engine-ECU 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 then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.
## Engine-ECU Harness Side Connector Terminal Arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Standard value, normal condition (check requirements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 47</td>
<td>EGR valve (D)</td>
<td>15 - 20 ( \Omega ) (at 20°C)</td>
</tr>
<tr>
<td>6 - 47</td>
<td>EGR valve (C)</td>
<td></td>
</tr>
<tr>
<td>32 - 47</td>
<td>EGR valve (B)</td>
<td></td>
</tr>
<tr>
<td>34 - 47</td>
<td>EGR valve (A)</td>
<td></td>
</tr>
<tr>
<td>16 - 47</td>
<td>Purge control solenoid valve</td>
<td>36 - 44 ( \Omega ) (at 20°C)</td>
</tr>
<tr>
<td>44 - 72</td>
<td>Engine coolant temperature sensor</td>
<td>5.1 - 6.5 k( \Omega ) (when engine coolant temperature is 0°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1 - 2.7 k( \Omega ) (when engine coolant temperature is 20°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.9 - 1.3 k( \Omega ) (when engine coolant temperature is 40°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.26 - 0.36 k( \Omega ) (when engine coolant temperature is 80°C)</td>
</tr>
<tr>
<td>46 - Body earth</td>
<td>Earth</td>
<td>Continuity (0 ( \Omega ))</td>
</tr>
<tr>
<td>58 - Body earth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62 - 72</td>
<td>Intake air temperature sensor</td>
<td>5.3 - 6.7 k( \Omega ) (when intake air temperature is 0°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3 - 3.0 k( \Omega ) (when intake air temperature is 20°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0 - 1.5 k( \Omega ) (when intake air temperature is 40°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.30 - 0.42 k( \Omega ) (when intake air temperature is 80°C)</td>
</tr>
<tr>
<td>79 - 49</td>
<td>Accelerator pedal position switch</td>
<td>Continuity (when the accelerator pedal is released)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No continuity (when the accelerator pedal is slightly depressed)</td>
</tr>
<tr>
<td>89 - 47</td>
<td>Oxygen sensor heater control (front)</td>
<td>4.5 - 8.0 ( \Omega ) (at 20°C)</td>
</tr>
<tr>
<td>90 - 47</td>
<td>Oxygen sensor heater (rear)</td>
<td>4.5 - 8.0 ( \Omega ) (at 20°C)</td>
</tr>
</tbody>
</table>
### Throttle Valve Controller Terminal Arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Check condition (Engine condition)</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throttle control servo (U)</td>
<td>Ignition switch: ON</td>
<td>Changes</td>
</tr>
<tr>
<td>14</td>
<td>Throttle control servo (V)</td>
<td>Accelerator pedal: From released position to fully depressed position</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Throttle control servo (W)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Throttle control servo power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>5</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>6</td>
<td>Sensor applied voltage</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td>7</td>
<td>Throttle position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal: 0.4 - 0.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully: 4.2 - 4.8 V</td>
</tr>
<tr>
<td>18</td>
<td>Backup power supply</td>
<td>Ignition switch: OFF</td>
<td>System voltage</td>
</tr>
<tr>
<td>20</td>
<td>Accelerator pedal position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal: 0.985 - 1.085 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully: 4.0 V or higher</td>
</tr>
<tr>
<td>22</td>
<td>Ignition switch-IG</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE USING AN ANALYZER
AIR FLOW SENSOR (AFS)

Measurement Method
1. Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to air flow sensor connector terminal 3.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-ECU terminal 61.

Standard Wave Pattern

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>

Observation conditions

Standard wave pattern

The time (cycle time) T is reduced when the amount of intake air increases.
Times T1 and T2 are equal.

Observation conditions (from conditions above engine speed is increased by racing.)

Wave Pattern Observation Points
Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.
Examples of Abnormal Wave Patterns

- Example 1
  **Cause of problem**
  Sensor interface malfunction
  **Wave pattern characteristics**
  Rectangular wave pattern is output even when the engine is not started.

- Example 2
  **Cause of problem**
  Damaged rectifier or vortex generation column
  **Wave pattern characteristics**
  Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.

**CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR**

**Measurement Method**

1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to camshaft position sensor terminal 2.
3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
4. Connect the analyzer special patterns pickup to crank angle sensor terminal 2.

**Alternate Method (Test harness not available)**

1. Connect the analyzer special patterns pickup to engine-ECU terminal 50. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 43. (When checking the crank angle sensor signal wave pattern.)

**Standard Wave Pattern**

**Observation conditions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>
Standard wave pattern

Wave Pattern Observation Points

Check that cycle time $T$ becomes shorter when the engine speed increases.

Examples of Abnormal Wave Patterns

- Example 1
  
  **Cause of problem**
  
  Sensor interface malfunction

  **Wave pattern characteristics**
  
  Rectangular wave pattern is output even when the engine is not started.

- Example 2
  
  **Cause of problem**
  
  Loose timing belt
  Abnormality in sensor disk

  **Wave pattern characteristics**
  
  Wave pattern is displaced to the left or right.
INJECTORS AND INJECTOR OPEN CIRCUIT CHECK SIGNAL

Measurement Method
1. Connect the analyzer special patterns pickup to terminal 1 (No.1 injector) of the engine-ECU connector.
2. Connect the analyzer special patterns pickup to terminal 96 (injector open circuit check signal) of the engine-ECU connector.
3. After checking terminal 1, check terminal 9 (No.2 injector), terminal 24 (No.3 injector) and terminal 2 (No.4 injector), terminal 10 (No.5 injector), terminal 25 (No.6 injector).

Standard Wave Pattern

Observation conditions

<table>
<thead>
<tr>
<th>Function</th>
<th>Special pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>

Standard wave pattern

Wave Pattern Observation Points
- Check that the injector drive time is identical to the time displayed on the MUT-II.
- Check that the injector signals become greatly extended but soon return to their normal wave length when the engine is suddenly raced.
- Check that the injector open circuit check signal is synchronized with each rising portion of the injector drive signal.
IGNITION COIL AND POWER TRANSISTOR
Power transistor control signal

Measurement Method
1. Disconnect the ignition coil connector, and connect the special tool (test harness: MB991658) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to terminal 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-ECU terminal 3 (No. 1 ignition coil), terminal 12 (No. 2 ignition coil), terminal 26 (No. 3 ignition coil), terminal 4 (No. 4 ignition coil), terminal 13 (No.5 ignition coil), terminal 27 (No.6 ignition coil) respectively.

Standard Wave Pattern

<table>
<thead>
<tr>
<th>Operation</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special patterns</td>
<td>Low</td>
</tr>
<tr>
<td>Display</td>
<td></td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Approx. 1,200 r/min</td>
</tr>
</tbody>
</table>

Standard wave pattern

T: Revolution time corresponding to a crank angle of 180°
T1: Time calculated by the engine-ECU
θ: Spark advance angle
Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

<table>
<thead>
<tr>
<th>Condition of wave pattern build-up section and maximum voltage</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rises from approx. 2V to approx. 4.5V at the top-right</td>
<td>Normal</td>
</tr>
<tr>
<td>2V rectangular wave</td>
<td>Open-circuit in ignition primary circuit</td>
</tr>
<tr>
<td>Rectangular wave at power voltage</td>
<td>Power transistor malfunction</td>
</tr>
</tbody>
</table>

Examples of Abnormal Wave Patterns

- **Example 1**
  - Wave pattern during engine cranking
  - **Cause of problem**
    - Open-circuit in ignition primary circuit
  - **Wave pattern characteristics**
    - Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.

- **Example 2**
  - Wave pattern during engine cranking
  - **Cause of problem**
    - Malfunction in power transistor
  - **Wave pattern characteristics**
    - Power voltage results when the power transistor is ON.
EGR VALVE (STEPPER MOTOR)

Measurement Method
1. Disconnect the EGR valve connector, and connect the special tool (test harness: MB991658) in between.
2. Connect the analyzer special patterns pickup to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-ECU terminal 32, connection terminal 34, connection terminal 5, and connection terminal 6 respectively.

Standard Wave Pattern

Observation conditions

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>High</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine condition</td>
<td>When the engine coolant temperature is 20°C or below, turn the ignition switch from OFF to ON (without starting the engine). While the engine is idling, turn the A/C switch to ON. Immediately after starting the warm engine</td>
</tr>
</tbody>
</table>

Standard wave pattern

- The wave pattern appears for an instant, but soon disappears.
- Point B: Coil reverse electromotive force (Approx. 3 x 10V)
- Point A: Induced electromotive force from the motor turning
Wave Pattern Observation Points
Check that the standard wave pattern appears when the EGR control servo is operating.
Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

<table>
<thead>
<tr>
<th>Contrast with standard wave pattern</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induced electromotive force does not appear or is extremely small.</td>
<td>Motor is malfunctioning</td>
</tr>
</tbody>
</table>

Point B: Height of coil reverse electromotive force

<table>
<thead>
<tr>
<th>Contrast with standard wave pattern</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil reverse electromotive force does not appear or is extremely small.</td>
<td>Short in the coil</td>
</tr>
</tbody>
</table>

Examples of Abnormal Wave Pattern
- Example 1
  
  **Cause of problem**
  Motor is malfunctioning. (Motor is not operating.)

  **Wave pattern characteristics**
  Induced electromotive force from the motor turning does not appear.

- Example 2
  
  **Cause of problem**
  Open circuit in the line between the EGR valve and the engine-ECU

  **Wave pattern characteristics**
  Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 V.) Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.
TROUBLESHOOTING <A/T>

STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

NOTE
When replacing the engine-A/T-ECU, replace immobilizer-ECU as well at the same time.

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the GDI system, the engine warning lamp will illuminate. If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output. However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

<table>
<thead>
<tr>
<th>Engine warning lamp inspection items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air flow sensor</td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
</tr>
<tr>
<td>Oxygen sensor</td>
</tr>
<tr>
<td>Oxygen sensor heater</td>
</tr>
<tr>
<td>Fuel system malfunction</td>
</tr>
<tr>
<td>Abnormal fuel pressure</td>
</tr>
<tr>
<td>Injector</td>
</tr>
<tr>
<td>Throttle position sensor (1st channel)</td>
</tr>
<tr>
<td>Throttle position sensor (2nd channel)</td>
</tr>
<tr>
<td>Accelerator pedal position sensor (1st channel)</td>
</tr>
<tr>
<td>Accelerator pedal position sensor (2nd channel)</td>
</tr>
</tbody>
</table>

Ignition coil (power transistor)
Detonation sensor
Crank angle sensor
Camshaft position sensor
EGR valve
Purge control solenoid valve
Injector driver
Electronic-controlled throttle valve system
Throttle control servo
Throttle valve controller
Immobilizer system
Engine-A/T-ECU

Caution
If a malfunction occurred inside the engine-A/T-ECU, the engine warning lamp will remain illuminated.

NOTE
The engine warning lamp will flash when the electronic-controlled throttle valve system is suspended by the fail-safe function.
METHOD OF READING AND ERASING DIAGNOSIS CODES
Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE
1. Switch the diagnosis mode of the engine-A/T-ECU to DIAGNOSIS 2 mode using the MUT-II, and then carry out a road test.
2. Take a reading of the diagnosis code and repair the problem location.
3. Turn the ignition switch to the LOCK (OFF) position, and then back to ON again.
   NOTE
   By turning the ignition switch to the LOCK (OFF) position, the engine-A/T-ECU will switch the DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.
4. Erase the diagnosis codes.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING
1. Carry out inspection by means of the data list and actuator test function. If there is an abnormality, check and repair the chassis harnesses and components.
2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the MUT-II, and then start the engine again and carry out a road test to confirm that the problem has disappeared.
## FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

<table>
<thead>
<tr>
<th>Malfunctioning item</th>
<th>Control contents during malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air flow sensor</td>
<td>1. Suspends lean burn operation.</td>
</tr>
<tr>
<td></td>
<td>2. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping.</td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>Controls as if the intake air temperature is 25°C.</td>
</tr>
<tr>
<td>Throttle position sensor (2nd channel)</td>
<td>1. Suspends lean burn operation.</td>
</tr>
<tr>
<td></td>
<td>2. Controls the throttle opening angle feedback (half as much as the opening rate in the normal condition) by using signals from the throttle position sensor (1st channel). However, this controlling system is not applied if the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.</td>
</tr>
<tr>
<td></td>
<td>3. Refrains from controlling the throttle opening angle feedback if the throttle position sensor (1st channel) is also defective.</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>Controls as if the engine coolant temperature is 80°C. (Moreover, the control system is working until the ignition switch is turned OFF if the sensor signal returns to normal.)</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>Cuts the fuel supply once a malfunction is detected. (Only when there has been no occasion of detecting No.1 cylinder top dead centre after the ignition switch is turned ON.)</td>
</tr>
<tr>
<td>Vehicle speed sensor</td>
<td>1. Suspends lean burn operation. However, the control is cancelled as a certain time passes by with the engine speed of 1,500 r/min or more.</td>
</tr>
<tr>
<td></td>
<td>2. Suspends lean burn operation during the engine idling.</td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
<td>Controls as if the barometric pressure is 101 kPa.</td>
</tr>
<tr>
<td>Detonation sensor</td>
<td>Fixes the ignition timing as that for regular gasoline.</td>
</tr>
<tr>
<td>Injector</td>
<td>1. Suspends lean burn operation.</td>
</tr>
<tr>
<td></td>
<td>2. Suspends the exhaust gas recirculation.</td>
</tr>
<tr>
<td>Ignition coil (incorporating power transistor)</td>
<td>1. Suspends lean burn operation.</td>
</tr>
<tr>
<td></td>
<td>2. Cuts off the fuel supply to cylinders with an abnormal ignition signal.</td>
</tr>
<tr>
<td>Fuel pressure sensor</td>
<td>1. Controls as if the fuel pressure is 5MPa.</td>
</tr>
<tr>
<td></td>
<td>2. Suspends fuel injection. (when the low pressure is detected and the engine speed is more than 3,000r/min)</td>
</tr>
<tr>
<td>Alternator FR terminal</td>
<td>Refrains from controlling to suppress the alternator output to electrical load. (Operated as a normal alternator)</td>
</tr>
<tr>
<td>Accelerator pedal position sensor (2nd channel)</td>
<td>1. Suspends lean burn operation.</td>
</tr>
<tr>
<td></td>
<td>2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (1st channel). However, the control system is not applicable if the difference from the accelerator pedal position sensor (1st channel) output voltage is 1.0V or higher.</td>
</tr>
<tr>
<td></td>
<td>3. Suspends the electronic controlled throttle valve system if accelerator pedal position sensor (1st channel) is also defective.</td>
</tr>
<tr>
<td>Malfunctioning item</td>
<td>Control contents during malfunction</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Accelerator pedal position sensor (1st channel) | 1. Suspends lean burn operation.  
2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (2nd channel). (However, this control is not applicable if the voltage difference between the accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) is 1.0 V or higher.)  
3. Also suspends the electronic-controlled throttle valve system when the accelerator pedal position sensor (2nd channel) is defective. |
| Throttle position sensor (1st channel)       | 1. Suspends lean burn operation.  
2. Controls throttle opening angle feedback by using signals from throttle position sensor (2nd channel). (However, the controlling system is not applied when the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.)  
3. Refrains from controlling the throttle opening angle feedback when throttle position sensor (2nd channel) is also defective. |
| Electronic-controlled throttle valve system   | 1. Suspends the electronic controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the idle speed feedback control. |
| Throttle valve position feedback              | 1. Suspends the electronic controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control.  
However, if the throttle valve opening angle is significantly wide, this system carries out the following controls.  
1. Always cuts the fuel supply to three cylinders.  
2. Cuts the fuel supply when the engine speed reaches 3,000 r/min or more. |
| Throttle control servo                        | 1. Suspends the electronic-controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control. |
| Communication line between the throttle valve controller and the ECU | 1. Communication error between the throttle valve controller and the engine-A/T-ECU:  
   - Suspends lean burn operation.  
   - Cuts the fuel supply when the engine speed reaches 3,000 r/min or more.  
   - Suspends the cruise-control.  
2. Communication error between the throttle valve controller and the engine-A/T-ECU:  
   - Suspends lean burn operation.  
   - Cuts the fuel supply when the engine speed reaches 3,000 r/min or more.  
   - Suspends the cruise-control.  
   - The throttle valve controller controls the throttle valve opening angle by using signals from accelerator pedal position sensor (2nd channel). |
| Throttle valve controller                     | 1. Suspends the electronic-controlled throttle valve system.  
2. Suspends lean burn operation.  
3. Suspends the engine speed feedback control. |

**NOTE**  
If the electronic-controlled throttle valve system is suspended, the engine warning lamp will illuminate.
<table>
<thead>
<tr>
<th>Code No.</th>
<th>Diagnosis item</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Oxygen sensor system</td>
<td>13A-131</td>
</tr>
<tr>
<td>12</td>
<td>Air flow sensor system</td>
<td>13A-133</td>
</tr>
<tr>
<td>13</td>
<td>Intake air temperature sensor system</td>
<td>13A-135</td>
</tr>
<tr>
<td>14</td>
<td>Throttle position sensor (2nd channel) system</td>
<td>13A-137</td>
</tr>
<tr>
<td>21</td>
<td>Engine coolant temperature sensor system</td>
<td>13A-138</td>
</tr>
<tr>
<td>22</td>
<td>Crank angle sensor system</td>
<td>13A-140</td>
</tr>
<tr>
<td>23</td>
<td>Camshaft position sensor system</td>
<td>13A-142</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed sensor system</td>
<td>13A-144</td>
</tr>
<tr>
<td>25</td>
<td>Barometric pressure sensor system</td>
<td>13A-145</td>
</tr>
<tr>
<td>31</td>
<td>Detonation sensor system</td>
<td>13A-146</td>
</tr>
<tr>
<td>41</td>
<td>Injector system</td>
<td>13A-147</td>
</tr>
<tr>
<td>44</td>
<td>Ignition coil (incorporating power transistor) system (for No. 1 and No. 4 cylinders)</td>
<td>13A-148</td>
</tr>
<tr>
<td>52</td>
<td>Ignition coil (incorporating power transistor) system (for No. 2 and No. 5 cylinders)</td>
<td>13A-148</td>
</tr>
<tr>
<td>53</td>
<td>Ignition coil (incorporating power transistor) system (for No. 3 and No. 6 cylinders)</td>
<td>13A-148</td>
</tr>
<tr>
<td>54</td>
<td>Immobilizer system</td>
<td>13A-150</td>
</tr>
<tr>
<td>56</td>
<td>Abnormal fuel pressure system</td>
<td>13A-151</td>
</tr>
<tr>
<td>64</td>
<td>Alternator FR terminal system</td>
<td>13A-153</td>
</tr>
<tr>
<td>77</td>
<td>Accelerator pedal position sensor (2nd channel) system</td>
<td>13A-154</td>
</tr>
<tr>
<td>78</td>
<td>Accelerator pedal position sensor (1st channel) system</td>
<td>13A-156</td>
</tr>
<tr>
<td>79</td>
<td>Throttle position sensor (1st channel) system</td>
<td>13A-158</td>
</tr>
<tr>
<td>89</td>
<td>Abnormality in fuel pressure system</td>
<td>13A-160</td>
</tr>
<tr>
<td>91</td>
<td>Electronic-controlled throttle valve system</td>
<td>13A-161</td>
</tr>
<tr>
<td>92</td>
<td>Throttle valve position feedback system</td>
<td>13A-162</td>
</tr>
<tr>
<td>93</td>
<td>Throttle valve control servo system</td>
<td>13A-163</td>
</tr>
<tr>
<td>94</td>
<td>Communication line system with throttle valve controller</td>
<td>13A-164</td>
</tr>
<tr>
<td>96</td>
<td>Throttle valve controller system</td>
<td>13A-165</td>
</tr>
</tbody>
</table>

**NOTE**
Code No. 56 may be also output when air is sucked in high-pressure fuel line due to no fuel supply.
### INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

**Code No. 11 Oxygen sensor system**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Three minutes have been passed since the engine has been started.</td>
<td>• Malfunction of oxygen sensor</td>
</tr>
<tr>
<td>• The engine coolant temperature is approx. 80°C or more.</td>
<td>• Open or short circuit in the oxygen sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>• Intake air temperature is 20 - 30°C</td>
<td>• Malfunction of engine-A/T-ECU</td>
</tr>
<tr>
<td>• Engine speed is 1,200 r/min or more</td>
<td></td>
</tr>
<tr>
<td>• Driving on a level surface at constant speed.</td>
<td></td>
</tr>
<tr>
<td><strong>Set Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>• The oxygen sensor output voltage is 4.5 V or more when the sensor output</td>
<td></td>
</tr>
<tr>
<td>voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen</td>
<td></td>
</tr>
<tr>
<td>sensor inside the engine-A/T-ECU.</td>
<td></td>
</tr>
<tr>
<td>• Malfunction of oxygen sensor</td>
<td></td>
</tr>
<tr>
<td>• Open or short circuit in the oxygen sensor circuit or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>• Malfunction of engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>
Check the following connector: C-20

OK

NG

Repair

Check the following connector: C-20
- Disconnect the connector and measure at the harness side.
- Resistance between terminal 2 and earth
  OK: 2 Ω or less

OK

NG

Measure at oxygen sensor (front) connector C-20.

OK

NG

Repair

Measure at oxygen sensor connector C-20.
- Use the test harness (MD998464) to connect the connector, and measure at the pick-up harness side.
- Engine: 2,500r/min (after warming up)
- Selector lever position: P
(1) Voltage between terminal 2 and earth
  OK: 0.5 V or less
(2) Voltage between terminal 4 and earth
  OK: 0 V and 0.8 V alternate.

OK

NG

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor and the engine-A/T-ECU.

OK

NG

Check the trouble symptoms.

Replace the engine-A/T-ECU.

NG

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor and the engine-A/T-ECU, and repair if necessary.

OK

NG

Check the oxygen sensor. (Refer to P.13A-230.)

OK

NG

Repair

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor and the engine-A/T-ECU, and repair if necessary.

OK

NG

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor and the engine-A/T-ECU, and repair if necessary.

OK

NG

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the harness wire between the oxygen sensor and the engine-A/T-ECU, and repair if necessary.

OK

NG

Check the following connectors: D-121, E-116

OK

NG

Repair

Check the trouble symptoms.

NG

Replace the engine-ECU.

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.

OK

NG

OK

NG

Replace the engine-ECU.
Code No.12 Air flow sensor system

Probable cause
- Malfunction of air flow sensor
- Open or short circuit in air flow sensor circuit or loose connector contact
- Malfunction of engine-A/T-ECU

Range of Check
- Engine speed: 500 r/min or more
- The sensor output frequency is 3.3 Hz or less for four seconds.

Set Conditions
- The sensor output frequency is 3.3 Hz or less for four seconds.

Measure at air flow sensor connector B-120.
- Disconnect the connector and measure at the harness side.
(1) Voltage between terminal 3 and earth (Ignition switch: ON)
OK: 4.8 - 5.2 V
(2) Voltage between terminal 4 and earth (Ignition switch: ON)
OK: System voltage
(3) Resistance between terminal 5 and earth
OK: 2 Ω or less

NG
Check the following connector:
B-120
OK

NG
Repair

OK

Check the following connector:
D-120

OK
Measure at engine-A/T-ECU connector D-120.
- Measure the voltage at the engine-A/T-ECU terminal.
- Voltage between terminal 65 and earth
OK: 4.8 - 5.2 V

NG
Check the following connector:
D-120
OK
Check the harness between the air flow sensor and the engine-A/T-ECU, and repair if necessary.

NG
Repair

OK
Check the trouble symptoms.

NG
Replace the engine-A/T-ECU.

OK
Check the harness between the air flow sensor and the engine control relay, and repair if necessary.

NG
Repair

OK
Check the trouble symptoms.

NG
Replace the engine-A/T-ECU.

OK
Check the harness between the air flow sensor and the engine-A/T-ECU.

NG
Repair

OK
Check the trouble symptoms.

NG
Replace the engine-A/T-ECU.

OK
Check the harness between the air flow sensor and the engine-A/T-ECU.

NG
Repair

OK
Replace the air flow sensor.
Check the harness between the air flow sensor and the engine-A/T-ECU.  
OK  
NG  
Repair

Check the trouble symptoms.  
OK  
NG  
Repair

Replace the engine-A/T-ECU.

Check the harness between the air flow sensor and the engine-A/T-ECU and between the air flow sensor and the engine control relay, and repair if necessary.

Check the trouble symptoms.  
OK  
NG  
Repair

Replace the engine-A/T-ECU.

Measure at air flow sensor connector B-120.  
• Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.  
• Selector lever position: P  
• Voltage between terminal 7 and earth  
OK:  
- Engine: Idling  
  0 - 1 V  
- Engine speed: 3,000 r/min  
  6 - 9 V

OK  
NG  
Replace the air flow sensor.

Check the following connectors:  
D-119  
D-120, D-121, B-25X

Check the trouble symptoms.  
OK

Check the harnesses between the air flow sensor and the engine-A/T-ECU and between the air flow sensor and the engine control relay, and repair if necessary.

Measure the output waveform from at air flow sensor connector B-120 (by using an analyzer).  
• Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.  
• Engine: Idling  
• Selector lever position: P  
• Voltage between terminal 3 and earth  
OK:  
- Waveform should be displayed on P.13A-211 (Inspection Procedure Using an Analyzer) and noise should not be displayed in the waveform

OK  
NG  
Replace the air flow sensor.

Check the following connector:  
D-119

Check the trouble symptoms.  
OK

Replace the engine-A/T-ECU.
### Code No.13 Intake air temperature sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed.</td>
<td>- Malfunction of intake air temperature sensor</td>
</tr>
<tr>
<td>- The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air temperature) or</td>
<td>- Open or short circuit in intake air temperature sensor or loose connector contact</td>
</tr>
<tr>
<td>- The sensor output voltage is 0.2 V or more for four seconds (equivalent to 125°C of intake air temperature)</td>
<td>- Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set Conditions</th>
<th>OK:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Roughly the same as ambient temperature.</td>
<td>Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)</td>
</tr>
</tbody>
</table>

### MUT-II Data list

**13 Intake air temperature sensor**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the intake air temperature sensor itself. (Refer to P.13A-227.)</td>
<td>Repair</td>
</tr>
</tbody>
</table>

| OK | NG |
| Check the trouble symptoms. | Replace the engine-A/T-ECU. |

### Check the following connector: B-67

**Measure at air flow sensor connector B-120.**

- Resistance between terminal 5 and earth
  - OK: 2 Ω or less
- Voltage between terminal 6 and earth (Ignition switch: ON)
  - OK: 4.8 - 5.2 V

<table>
<thead>
<tr>
<th>(1) NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the following connector: D-121</td>
<td>Repair</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(2) NG</th>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the trouble symptoms.</td>
<td>Replace the engine-A/T-ECU.</td>
<td></td>
</tr>
</tbody>
</table>

### Check the following connector: D-120

- Measure at engine-A/T-ECU connector D-120.
  - Measure the voltage at the engine-A/T-ECU terminal.
  - Disconnect connector B-120.
  - Ignition switch: ON
  - Voltage between terminal 64 and earth
    - OK: 4.8 - 5.2 V

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the following connector: D-120</td>
<td>Repair</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the trouble symptoms.</td>
<td>Replace the engine-A/T-ECU.</td>
</tr>
</tbody>
</table>

To the next page
Measure at air flow sensor connector B-120.
- Use the test harness (MB991709) to connect only terminals 5 and 6, and then measure at the pickup harness.
- Ignition switch: ON
- Voltage between terminal 6 and earth
  OK:  Ambient temperature 0°C 3.2 - 3.8 V
       Ambient temperature 20°C  2.3 - 2.9 V
       Ambient temperature 40°C  1.5 - 2.1 V
       Ambient temperature 80°C  0.4 - 1.0 V
  NG

OK

Check the following connectors:
D-120, D-121

Check the harness between the air flow sensor and the engine-A/T-ECU, and repair if necessary.

NG

OK

Replace the engine-A/T-ECU.

NG
Code No.14 Throttle position sensor (2nd channel) system

The throttle valve controller judges a malfunction, and then transmits the result to the engine-A/T-ECU.

Probable cause

- Malfunction of throttle position sensor (2nd channel)
- Open or short circuit in the throttle position sensor (2nd channel) circuit or loose connector contact
- Malfunction of throttle valve controller
- Malfunction of engine-A/T-ECU

Range of Check

- Ignition switch: ON
- The throttle position sensor (1st channel) is normal.

Set Conditions

- The sensor output voltage is 0.2 V or less for four seconds.
- The sensor output voltage is 4.85 V or more and the throttle position sensor (1st channel) output voltage is 1.2 V or more for four seconds.
- The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.

Check the trouble symptoms.

To the next page

MUT-II Data list

14 Throttle position sensor (2nd channel) (Refer to P.13A-198, DATA LIST REFERENCE TABLE.)

OK

NG

NG

Check the throttle position sensor (2nd channel). (Refer to P.13A-228.)

NG

Check the following connector: B-102

OK

NG

NG

NG

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NG
Measure at throttle valve controller connector D-121.
- Measure voltage at the throttle valve controller terminals.
- Ignition switch: ON
- Voltage between terminal 7 and earth
  OK: 0.5 V or less
  (3) Voltage between terminal 4 and earth
  OK: Accelerator pedal fully released: 4.0 V or more
  Accelerator pedal fully depressed: 0.4 - 0.6 V

NG
Check the following connector: D-121
OK
Repair

Check the harness wire between the throttle position sensor (2nd channel) and the throttle valve controller, and repair if necessary.

Check the trouble symptoms.
Replace the engine-A/T-ECU.

Code No.21 Engine coolant temperature sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Check</td>
<td>Engine: Two seconds after the engine has been started</td>
</tr>
<tr>
<td>Engine: Two seconds after the engine has been started</td>
<td>Malfunction of engine coolant temperature sensor</td>
</tr>
</tbody>
</table>

Set Conditions
- The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of engine coolant temperature)
- The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C of engine coolant temperature)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of engine coolant temperature sensor</td>
</tr>
<tr>
<td>Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>

Range of Check
- Engine: After starting

Set Conditions
- The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of engine coolant temperature sensor</td>
</tr>
<tr>
<td>Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>
### GDI - Troubleshooting <A/T> 13A-139

**MUT-II Data list**

<table>
<thead>
<tr>
<th>21 Engine coolant temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK:</strong> When the engine is cold, the temperature is roughly the same as ambient temperature. If warm, it is 80 - 120°C.</td>
</tr>
</tbody>
</table>

**Transient malfunction**

(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

---

**Check the harness wire between the engine coolant temperature sensor and the engine-A/T-ECU.**

**OK**

**Measure at engine coolant temperature sensor connector B-56.**

- Disconnect the connector and measure at the harness side.
- Resistance between terminals 1 and 2
  - **OK:** At 20°C of engine coolant temperature: 2.1 - 2.7 kΩ
  - At 80°C of engine coolant temperature: 0.26 - 0.36 kΩ

**NG**

**Replace**

**Check the following connector: B-56**

- **OK**

**Measure at engine coolant temperature sensor connector B-56.**

- Disconnect the connector and measure at the harness side.

1. **Voltage between terminal 1 and earth**
   - **Ignition switch: ON**
   - **OK:** 4.8 - 5.2 V
2. **Resistance between terminal 2 and earth**
   - **OK:** 2 Ω or less

**NG**

**Repair**

**Check the following connector:**

- **NG**

**OK**

**Measure at engine-ECU connector D-120.**

- Measure the voltage at the engine-A/T-ECU terminal.
- Disconnect connector B-56.
- **Ignition switch: ON**
- **Voltage between terminal 44 and earth**
  - **OK:** 4.8 - 5.2 V

**NG**

**Repair**

**Check the following connector:**

- **D-120**

**OK**

**Check the harness wire between the engine coolant temperature sensor and the engine-A/T-ECU.**

**NG**

**Repair**

**Check the trouble symptoms.**

**NG**

**Replace the engine-A/T-ECU.**

---

**Check the trouble symptoms.**

**NG**

**Replace the engine-A/T-ECU.**

---

**To the next page**
From the previous page

OK

Measure at engine coolant temperature sensor connector B-56.
- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
- Voltage between terminal 1 and earth
  OK: At 0°C of engine coolant temperature: 3.2 - 3.8 V
  At 20°C of engine coolant temperature: 2.3 - 2.9 V
  At 40°C of engine coolant temperature: 1.3 - 1.9 V
  At 80°C of engine coolant temperature: 0.3 - 0.9 V

NG

Check the engine coolant temperature sensor.
(Refer to P.13A-227.)

OK

Check the following connectors:
D-120, D-121

NG

Check the harness wire between the engine coolant temperature sensor and the engine-A/T-ECU, and repair if necessary.

NG

Repair

Replace the engine-A/T-ECU.

OK

Check the trouble symptoms.

NG

Repair

Code No.22 Crank angle sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine is cranking</td>
<td>● Malfunction of the crank angle sensor.</td>
</tr>
<tr>
<td>Sensor output voltage does not change for 4 seconds (no pulse signal input).</td>
<td>● Open or short circuit in the crank angle sensor circuit or loose connector contact.</td>
</tr>
<tr>
<td></td>
<td>● Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>
### Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

#### Check the harness wire between the crank angle sensor and the engine-A/T-ECU, and repair if necessary.

**OK**

#### Use an analyzer to measure the output waveform at the crank angle sensor connector B-52.
- **OK:** A normal waveform should be displayed as described on P.13A-212 (Inspection Procedure Using an Analyzer). Its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

**NG**

#### Check the following connectors:
- **B-52**
- **D-120**
- **B-25X**

**Check the crank angle sensor vane**

**OK**

**Repair**

**Check the trouble symptoms.**

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Measure at the crank angle sensor connector B-52.
- **OK:** 2 Ω or less
- **(2)** The voltage between terminal 2 and earth
  - **Ignition switch: ON**
  - **OK:** 4.8 - 5.2 V
- **(3)** The voltage between terminal 3 and earth
  - **Ignition switch: ON**
  - **OK:** System voltage

**NG**

#### Check the following connector:
- **B-52**

**OK**

#### Measure at engine-A/T-ECU connector D-120.
- **OK:** The voltage between terminal 45 and earth.
  - **OK:** 4.8 - 5.2 V

**NG**

#### Check the following connectors:
- **D-120**
- **B-25X**

**OK**

#### Check the harness wire between the crank angle sensor and the engine control relay, and repair if necessary.

**OK**

#### Replace the crank angle sensor

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Use the test harness (MD998478) to connect the connector, and measure at the pickup harness side.

**OK**

**NG**

**Repair**

**Check the trouble symptoms.**

**NG**

**Repair**

**Check the following connectors:**
- **B-25X, D-120**

**OK**

#### Check the harness wire between the crank angle sensor and the engine-A/T-ECU, and repair if necessary.

**NG**

**Replace**

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Check the harness wire between the crank angle sensor and earth, and repair if necessary.

**NG**

**Repair**

**OK**

#### Measure at the crank angle sensor connector B-52.
- **OK:** 2 Ω or less
- **(2)** The voltage between terminal 2 and earth
  - **Ignition switch: ON**
  - **OK:** 4.8 - 5.2 V
- **(3)** The voltage between terminal 3 and earth
  - **Ignition switch: ON**
  - **OK:** System voltage

**NG**

#### Check the following connector:
- **B-52**

**OK**

#### Measure the voltage at the engine-A/T-ECU terminal.
- **OK:** The voltage between terminal 45 and earth.
  - **OK:** 4.8 - 5.2 V

**NG**

#### Check the following connector:
- **D-120**

**OK**

#### Check the harness wire between the crank angle sensor and earth, and repair if necessary.

**NG**

**Repair**

**OK**

#### Measure at the crank angle sensor connector B-52.
- **OK:** 2 Ω or less
- **(2)** The voltage between terminal 2 and earth
  - **Ignition switch: ON**
  - **OK:** 4.8 - 5.2 V
- **(3)** The voltage between terminal 3 and earth
  - **Ignition switch: ON**
  - **OK:** System voltage

**NG**

#### Check the following connector:
- **B-52**

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Check the harness wire between the crank angle sensor and the engine-A/T-ECU, and repair if necessary.

**NG**

**Repair**

**OK**

#### Measure at the crank angle sensor connector B-52.
- **OK:** 2 Ω or less
- **(2)** The voltage between terminal 2 and earth
  - **Ignition switch: ON**
  - **OK:** 4.8 - 5.2 V
- **(3)** The voltage between terminal 3 and earth
  - **Ignition switch: ON**
  - **OK:** System voltage

**NG**

#### Check the following connector:
- **B-52**

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Measure at the harness side.

**OK**

#### Disconnect the connector and measure at the harness side.

**(1) NG**

#### Measure at the crank angle sensor connector B-52.
- **OK:** 2 Ω or less
- **(2)** The voltage between terminal 2 and earth
  - **Ignition switch: ON**
  - **OK:** 4.8 - 5.2 V
- **(3)** The voltage between terminal 3 and earth
  - **Ignition switch: ON**
  - **OK:** System voltage

**NG**

#### Check the following connector:
- **B-52**

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Use an analyzer to measure the output waveform at the crank angle sensor connector B-52.
- **OK:** A normal waveform should be displayed as described on P.13A-212 (Inspection Procedure Using an Analyzer). Its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

**NG**

#### Check the trouble symptoms.

**NG**

**Repair**

**OK**

#### Check the harness wire between the crank angle sensor and the engine-A/T-ECU, and repair if necessary.

**NG**

**Repair**

**OK**

#### Check the trouble symptoms.

**NG**

**Repair**

**OK**

#### Check the harness wire between the crank angle sensor and the engine-A/T-ECU, and repair if necessary.

**NG**

**Replace**

**OK**

#### Check the trouble symptoms.

**NG**

**Replace the engine-A/T-ECU.**

**OK**

#### Check the harness wires between the crank angle sensor and the engine-A/T-ECU, crank angle sensor and the engine control relay, and the crank angle sensor and earth. Then, repair if necessary.
<table>
<thead>
<tr>
<th>Code No.23 Camshaft position sensor system</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Check</td>
<td>● Malfunction of the camshaft position sensor</td>
</tr>
<tr>
<td>● After the engine was started</td>
<td>● Open or short circuit in the camshaft position</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>sensor circuit or loose connector contact.</td>
</tr>
<tr>
<td>● The sensor output voltage does not</td>
<td>● Malfunction of engine-A/T-ECU</td>
</tr>
<tr>
<td>change for 4 seconds (no pulse signal</td>
<td></td>
</tr>
<tr>
<td>input).</td>
<td></td>
</tr>
</tbody>
</table>

Check the following connector: B-110

1. OK

Check the following connector: B-25X

OK

Check the harness wire between the intermediate connector and the engine-A/T-ECU. Repair if necessary.

NG

Measure at engine-A/T-ECU connector D-120.
1. OK: 4.8 - 5.2 V

Disconnect connector B-110.
2. Ignition switch: ON

The voltage between terminal 50 and earth
3. OK: System voltage

NG

Check the trouble symptoms.

OK

Check the harness wire between the intermediate connector and the engine control relay. Repair if necessary.

NG

NG

OK

NG

Repair

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.

NG

Replace

NG

Check the harness wire between the intermediate connector and earth, and repair if necessary.

NG

OK

NG

Repair

OK

Check the trouble symptoms.

NG

Replace

OK

Check the harness wire between the intermediate connector and earth, and repair if necessary.

NG

OK

NG

Repair

OK

Check the harness wire between the intermediate connector and the engine-A/T-ECU. Repair if necessary.

NG

NG

Repair

OK

Check the trouble symptoms.

NG

Replace

OK

Check the harness wire between the intermediate connector and the engine-A/T-ECU, the intermediate connector and the engine control relay, and the intermediate connector and earth. Then, repair if necessary.

NG

Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
**Code No.24 Vehicle speed sensor system**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine: Two seconds after the engine was started</td>
<td>● Malfunction of the vehicle speed sensor</td>
</tr>
<tr>
<td>● Idle switch: OFF</td>
<td>● Open or short circuit in the vehicle speed sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>● Engine speed: 2,500 r/min or more</td>
<td>● Malfunction of engine-A/T-ECU</td>
</tr>
<tr>
<td>● During high engine load</td>
<td></td>
</tr>
</tbody>
</table>

**Set Conditions**

- The sensor output voltage does not change for 4 seconds (no pulse signal input).

**Check the vehicle speed sensor**

(Refer to GROUP 54 - Combination Meter.)

**Use an analyzer to measure the output waveform of the vehicle speed sensor at engine-A/T-ECU connector C-09.**

- Driving the vehicle
- Selector lever position: P
- The voltage between terminal 80 and earth

**OK:** A normal waveform should be displayed as described in OSCILLOSCOPE INSPECTION PROCEDURE, and noise should not be displayed in the waveform. (Refer to GROUP 23 - Troubleshooting.)

**NG**

Check the following connectors: C-09, E-13

**OK**

Check the harness wire between intermediate connector E-13 and the engine-A/T-ECU, and repair if necessary.

**NG**

Check the following connector: C-09

**OK**

Check the trouble symptoms.

**NG**

Replace the engine-A/T-ECU.

Does the speedometer operate normally?

**NO**

Check the vehicle speed sensor

(Refer to GROUP 54 - Combination Meter.)

**YES**

NG

Check the following connectors: C-09, E-13

**OK**

Repair

**NG**

Check the following connector: C-09

**OK**

Repair

Check the trouble symptoms.

**NG**

Replace the engine-A/T-ECU.
Code No.25 Barometric pressure sensor system

Probable cause

- Malfunction of barometric pressure sensor
- Open or short circuit in barometric pressure sensor circuit or loose connector contact
- Malfunction of engine-A/T-ECU

Range of Check
- Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed.
- Battery voltage: 8 V or more

Set Conditions
- The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure)
- The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure)

MUT-II Data list

25 Barometric pressure sensor
(Refer to P.13A-198, DATA LIST REFERENCE TABLE.)

Check the following connector:
B-120

NG

Measure at air flow sensor connector B-120.
- Disconnect the connector and measure at the harness side.
  1. Voltage between terminal 1 and earth (Ignition switch: ON)
     OK: 4.8 - 5.2 V
  2. Resistance between terminal 5 and earth
     OK: 2 Ω or less

OK

To the next page

NG

Measure at engine-A/T-ECU connector D-121.
- Measure the voltage at the engine-A/T-ECU terminal.
- Voltage between terminal 87 and earth
  OK: 4.8 - 5.2 V

NG

Check the harness between the air flow sensor and the engine-A/T-ECU, and repair if necessary.

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.

NG

Check the harness between the air flow sensor and the engine-A/T-ECU.

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.

NG

Check the harness between the air flow sensor and the engine-A/T-ECU.

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.

NG

Check the harness between the air flow sensor and the engine-A/T-ECU.

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.

NG

Check the harness between the air flow sensor and the engine-A/T-ECU, and repair if necessary.

OK

Check the trouble symptoms.

NG

Replace the engine-A/T-ECU.
Check the harness between the air flow sensor and the engine-A/T-ECU, and repair if necessary.

Check the trouble symptoms.

Replace the engine-A/T-ECU.

---

### Code No.31 Detonation sensor system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine: Two seconds after the engine has been started</td>
<td>● Malfunction of the detonation sensor</td>
</tr>
<tr>
<td>● Changes in sensor output voltage (detonation sensor peak voltage per 1/3 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less.</td>
<td>● Open or short circuit in the detonation sensor circuit or loose connector contact</td>
</tr>
<tr>
<td>● Malfunction of engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>

### Check the following connector: B-05

- Measure at the detonation sensor connector B-05.
  - Disconnect the connector and measure at the harness side.
  - The resistance between terminal 2 and earth
  - OK: 2 Ω or less

- Check the trouble symptoms.

- Replace the detonation sensor.

- Check the trouble symptoms.

- Replace the engine-A/T-ECU.

---

### Check the following connector: D-120

- Check the trouble symptoms.

- Replace the engine-A/T-ECU.
Code No.41 Injector system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The engine speed is 4,000 r/min or less.</td>
<td>- Malfunction of injector</td>
</tr>
<tr>
<td>- The battery voltage is 10 V or more.</td>
<td>- Open or short circuit in the injector circuit or loose connector contact</td>
</tr>
<tr>
<td>- The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress.</td>
<td>- Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>

Set Conditions

- The injector driver is not transmitting a injector open circuit check signal for four seconds.

**MUT-ll Actuator Test**

01 No.1 injector
02 No.2 injector
03 No.3 injector
04 No.4 injector
05 No.5 injector
06 No.6 injector

**OK:** The idling condition should change.

NG: Malfunction of injector
- Open or short circuit in the injector circuit or loose connector contact
- Malfunction of engine-A/T-ECU

**Check the trouble symptoms.**

**OK**

**NG**

Replace the injector driver.

**Check the trouble symptoms.**

NG

Replace the engine-A/T-ECU.

**Check the following connector:**

B-105

NG

Repair

**Check the following connectors:**

B-117 <No.1 injector>, B-114 <No.2 injector>, B-115 <No.4 injector>, B-103 <No.5 injector>, B-104 <No.6 injector>

**OK**

Check the harness wire between injector and the intermediate connector.

**NG**

Replace the injector.

**Check the harness wire between the injector driver and the intermediate connector.**

NG

Repair

**Check the following connector:**

D-119

NG

Repair

**Check the harness wire between the injector driver and the engine-A/T-ECU.**

NG

Repair

To the next page
Use an analyzer to measure the signal waveform at engine-A/T-ECU connectors D-119 and D-120.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal 1 and earth
  OK: A normal waveform should be displayed as described on P.13A-214 (INSPECTION PROCEDURE USING AN ANALYZER).

OK

Check the following connector:
- B-61

NG

Repair

Check the following connectors:
- B-117 <No.1 injector>, B-114 <No.2 injector>, B-115 <No.3 injector>, B-118 <No.4 injector>, B-103 <No.5 injector>, B-104 <No.6 injector>

NG

Check the harness wire between the injector and the intermediate connector.

OK

Replace the engine-A/T-ECU.

OK

Check the harness wire between the injector and the intermediate connector.

OK

Replace the injector.

OK

Check the trouble symptoms.

NG

Replace the injector driver.

**Code No.44, 52, 53 Ignition coil (incorporating power transistor) system**

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Engine speed is approx. 50 - 4,000 r/min.</td>
<td>● Malfunction of the ignition coil</td>
</tr>
<tr>
<td>● Engine is not cranking.</td>
<td>● Malfunction of the ignition failure sensor</td>
</tr>
<tr>
<td>● The ignition failure sensor does not send a signal about a certain cylinder for four seconds. However, except that the ignition failure sensor does not send a signal about all of cylinders.</td>
<td>● Malfunction of spark plug</td>
</tr>
<tr>
<td></td>
<td>● Open or short circuit in the primary ignition circuit or loose connector contact</td>
</tr>
<tr>
<td></td>
<td>● Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>
Check the ignition coil. (Refer to GROUP 16 - Ignition System.)

Check the ignition failure sensor. (Refer to GROUP 16 - Ignition System.)

- Disconnect the connector, and measure at the harness side.
  (1) Voltage between 1 and earth (Ignition switch: ON)
  **OK:** System voltage
  **NG:**
  (2) Voltage between 3 and earth (Engine: cranking)
  **OK:** 0.5 - 4.0 V
  **NG:**
  (3) Continuity between 2 and earth
  **OK:** Continuity

Check the following connectors: B-101, B-108, B-112, B-113, B-116, B-119

Check the ignition coil. (Refer to GROUP 16 - Ignition System.)

Measure at the ignition failure sensor connector B-04.
- Disconnect the connector, and measure at the harness side.
  (1) Voltage between 2 and earth (Ignition switch: ON)
  **OK:** 4 V or more
  **NG:**
  (2) Continuity between 1 and earth
  **OK:** Continuity

Measure at the engine-A/T-ECU connector D-120.
- Connect the connector.
- Voltage between 45 and earth (Engine: 3,000 r/min)
  **OK:** 0.3 - 3.0 V
  **NG:**

Check the following connectors: B-07, B-107, E-13, D-223 (LHD)

Check the following connectors: B-107, D-119

Check the harness wire between the engine-A/T-ECU and the ignition coil.
Check and repair the harness wire between the ignition coil and ignition switch.
Check and repair the harness wire between the ignition failure sensor and ignition switch.

Check and repair the harness wire between the ignition coil and ignition failure sensor.
Check and repair the harness wire between the ignition failure sensor and ignition switch.

There is short circuit or open circuit in the ignition signal output harness of the ignition failure sensor. Check and repair the harness.
Check and repair the harness wire between the ignition failure sensor and earth.

Check the following connectors: B-04, D-120

Check the harness wire between the engine-A/T-ECU and the ignition failure sensor.

Replace the engine-A/T-ECU.
Replace the ignition failure sensor.
Code No. 54 Immobilizer system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ignition switch: ON</td>
<td>• Open or short circuit, or loose connector contact</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>• Malfunction of the immobilizer-ECU</td>
</tr>
<tr>
<td>• Improper communication between the engine-A/T-ECU and the immobilizer-ECU</td>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

NOTE
(1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
(2) This code may be displayed when registering the key encrypted code.

<table>
<thead>
<tr>
<th>Check the following connectors: D-122, D-202, E-13</th>
<th>NG -&gt; Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

Check the harness wire between the immobilizer-ECU and the engine-A/T-ECU, and repair if necessary.

<table>
<thead>
<tr>
<th>NG -&gt; Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

Check the trouble symptoms.

<table>
<thead>
<tr>
<th>NG -&gt; Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the immobilizer-ECU</td>
</tr>
</tbody>
</table>

Check the trouble symptoms.

<table>
<thead>
<tr>
<th>NG -&gt; Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the engine-A/T-ECU</td>
</tr>
</tbody>
</table>
### Code No. 56 Abnormal fuel pressure

**Probable cause**
- Malfunction of fuel pressure sensor
- Open or short circuit in the fuel pressure sensor circuit or loose connector contact
- Malfunction of engine-A/T-ECU

**Possible causes**
- Malfunction of fuel pressure sensor
- Open or short circuit in the fuel pressure sensor circuit or loose connector contact
- Malfunction of engine-A/T-ECU

#### Range of Check
- The sensor output voltage is 4.8V or more, or 0.2V or less for four seconds.

**Set Conditions**
- The fuel pressure is 6.9 MPa or more, or 2 MPa or less for four seconds.

#### Range of Check
- The following conditions are detected temporarily after the engine has been started.
  1. Engine speed: 1,000 r/min or more
  2. Engine running
- The fuel pressure is 6.9 MPa or more, or 2 MPa or less for four seconds.

This diagnosis code will also be output when air is trapped into the high-pressure fuel lines (such as poor fuel level). In that case, the air can be evacuated by operating the engine for at least 15 seconds at 2,000 r/min. After the repair, use the MUT-II to erase the diagnosis code.

#### Check the following connector:
- B-35

**Measure at intermediate connector B-110**
- Disconnect the connector, and measure at the engine-A/T-ECU harness side.
  1. Voltage between terminal 4 and earth (Ignition switch: ON)
     - OK: 4.8 - 5.2 V
  2. Resistance between terminal 6 and earth
     - OK: 2 Ω or less

**MUT-II Data list**
- 74 Fuel pressure sensor (Refer to 13A-198, DATA LIST REFERENCE TABLE.)

**OK**
- Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

**NG**
- Repair

**Check the following connector:**
- OK

**Check the following connector:**
- D-121

**Check the trouble symptoms.**
- NG

**Replace the engine-A/T-ECU.**

**Check the harness wire between the intermediate connector and the engine-A/T-ECU.**

**Check the trouble symptoms.**
- NG

**Replace the engine-A/T-ECU.**

To the next page
Measure at intermediate connector B-110.
- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Engine: Idling
- Selector lever position: P
(1) Voltage between terminal 4 and earth
  OK: 4.8 - 5.2 V
(2) Voltage between terminal 5 and earth
  OK: 0.3 - 4.7 V
(3) Voltage between terminal 6 and earth
  OK: 0.5 V or less

OK

Check the following connector: B-111
OK

Check the harness wire between the fuel pressure sensor and the intermediate connector.
OK

Check the following connector: D-121
OK

Check the harness wire between the intermediate connector and the engine-A/T-ECU, and repair if necessary.
OK

Check the following connector: B-111
OK

Check the harness wire between the fuel pressure sensor and the intermediate connector.
OK

Replace the fuel pressure sensor.
OK

Check the trouble symptoms.

OK

Replace the engine-A/T-ECU.
### Code No.64 Alternator FR terminal system

**Range of Check**
- Engine speed: 50 r/min or more

**Probable cause**
- Open circuit in alternator FR terminal circuit
- Malfunction of engine-A/T-ECU

#### Set Conditions
- Input voltage from the alternator FR terminal is system voltage for 20 seconds.

#### Probable Cause

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repair</td>
</tr>
</tbody>
</table>

- Check the following connector: B-41
- Measure at intermediate connector B-41.
  - Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
  - Ignition switch: ON
  - The voltage between terminal 2 and earth
    - **OK:** The voltage drops when the Headlamp are turned on.

- Check the trouble symptoms.

- NG
  - Measure at engine-A/T-ECU connector D-120.
    - Measure the voltage at the engine-A/T-ECU terminal.
    - Ignition switch: ON
    - The voltage between terminal 54 and earth
      - **OK:** 9 - 10 V

- Check the following connector: D-120
- NG
  - Check the harness wire between the intermediate connector and the engine-A/T-ECU, and repair if necessary.

- NG
  - Measure at engine-A/T-ECU connector D-120.
    - Measure the voltage at the engine-A/T-ECU terminal.
    - Ignition switch: ON
    - The voltage between terminal 54 and earth
      - **OK:** 9 - 10 V

- Check the following connector: D-120
- NG
  - Check the harness wire between the intermediate connector and the engine-A/T-ECU, and repair if necessary.

- NG
  - Check the harness wire between the intermediate connector and the engine-A/T-ECU.

- NG
  - Check the trouble symptoms.

- NG
  - Replace the engine-A/T-ECU.

- NG
  - Measure at intermediate connector B-41.
    - Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
    - Engine:idling (After warming up)
    - Selector lever position: P
    - Radiator fan: Not operating
    - The voltage between terminal 2 and earth
      - **OK:** The voltage drops when the Headlamp are turned on.

- Check the harness wire between the intermediate connector and the engine-A/T-ECU.
- OK
  - Measure at engine-A/T-ECU connector D-120.
    - Measure the voltage at the engine-A/T-ECU terminal.
    - Ignition switch: ON
    - The voltage between terminal 54 and earth
      - **OK:** 9 - 10 V

- Check the following connector: D-120
- NG
  - Check the harness wire between the intermediate connector and the engine-A/T-ECU.

- NG
  - Check the harness wire between the intermediate connector and the engine-A/T-ECU.

- NG
  - Replace the engine-A/T-ECU.

- NG
  - Check the trouble symptoms.

- NG
  - Replace the alternator.

- NG
  - Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

- OK
  - Replace the engine-A/T-ECU.

- NG
  - Replace the alternator.
**Code No.77 Accelerator pedal position sensor (2nd channel) system**

**Probable cause**
- Malfunction of accelerator pedal position sensor (2nd channel)
- Open or short circuit in accelerator pedal position sensor (2nd channel) circuit or loose connector contact
- Malfunction of the throttle valve controller
- Malfunction of engine-A/T-ECU

**Range of Check**
- Accelerator pedal position sensor (1st channel) is normal.
- Communication between the engine-A/T-ECU and the throttle valve controller is normal.

**Set Conditions**
- Output voltage of the accelerator pedal position sensor (2nd channel) is 0.2 V or less for one second
- Output voltage of the accelerator pedal position sensor (1st channel) is 2.5 V or less, and output voltage of the accelerator pedal position sensor (2nd channel) is 4.5 V or more for one second.
- Difference between the accelerometer pedal position sensor (1st and 2nd channels) output voltages exceeds 1.0 V (i.e. when the throttle valve opening angle changes slightly).

**MUT-II Data list**

<table>
<thead>
<tr>
<th>77 Accelerator pedal position sensor (2nd channel) (Refer to P. 13A-198, DATA LIST REFERENCE TABLE.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

**Check the accelerator pedal position sensor (Refer to P.13A-229.)**

- OK
- NG

**Check the following connector:**
- D-45

**Measure at accelerator pedal position sensor connector D-135**
- Disconnect the connector and measure at the harness side.
- (1) The resistance between terminal 7 and earth
  - OK: 2 \( \Omega \) or less
- (2) The voltage between terminal 8 and earth (Ignition switch: ON)
  - OK: 4.8 - 5.2 V

**NG**

**Replace**

**OK**

**Check the trouble symptoms.**

**Check the following connector:**
- D-11

**Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller.**

**OK**

**NG**

**Repair**

**OK**

**Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller, and repair if necessary.**

**NG**

**Replace the throttle valve controller.**

**To the next page**
From the previous page

OK

Measure at throttle valve controller connector D-11.
- Measure voltage at the throttle valve controller connector terminals.
- Ignition switch: ON
- The resistance between 20 and earth
  OK: Accelerator pedal fully released: 0.985 - 1.085 V
    Accelerator pedal fully depressed: 4.0 V or higher

NG

Adjust the accelerator pedal position sensor (2nd channel). (Refer to P.13A-221.)

NG

OK

Check the following connector: D-11

NG

Repair

Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller.

NG

Repair

Check the following connector: D-11

OK

Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller.

OK

OK

Check the following connector: D-11

OK

Check the harness wire between accelerator pedal position sensor (2nd channel) and the throttle valve controller.

NG

NG

OK

Check the trouble symptoms.

NG

Replace the throttle valve controller.
Code No.78 Accelerator pedal position sensor (1st channel) system

Probable cause

- Malfunction of accelerator pedal position sensor (1st channel)
- Open or short circuit in the accelerator pedal position sensor (2nd channel) circuit or loose connector contact
- Malfunction of throttle valve controller
- Malfunction of engine-A/T-ECU

Range of Check
- Accelerator pedal position sensor (2nd channel) is normal.
- Communication between the engine-A/T-ECU and the throttle valve controller is normal.

Set Conditions
- The output voltage of accelerator pedal position sensor (1st channel) is 0.2 V or less for one second.
- The output voltage of accelerator pedal position sensor (2nd channel) is 2.5 V or less, and that of accelerator pedal position sensor (1st channel) is 4.5 V or more for one second
- The difference between accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) output voltages is 1.0 V or more (i.e. the throttle opening angle changes slightly).
- The output voltage of accelerator pedal position sensor (1st channel) is 1.1 V or more for one second when the accelerator pedal position switch is turned on.

MUT-II Data list

26 Accelerator pedal position switch 
(Refer to 13A-198, DATA LIST REFERENCE TABLE.)

OK

OK

NG

NG

OK

OK

OK

OK

OK

NG

NG

OK

NG

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NG

OK

NG
Measure at accelerator pedal position sensor connector D-135.
- Connect connector terminals No. 1, No. 2 and No. 3 only by using test harness (MB991658), and measure at the pick-up harness.
- Ignition switch: ON
  1) Voltage between terminal 1 and earth
     OK: 0.5 V or less
  2) Voltage between terminal 2 and earth
     OK: 4.8 - 5.2 V
  3) Voltage between terminal 3 and earth
     OK: Accelerator pedal fully released: 0.985 - 1.085 V
         Accelerator pedal fully depressed: 4.0 V or higher

From the previous page

(1), (2) NG
Check the following connector:
D-32
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-
A/T-ECU, and repair if necessary.

(3) NG
Adjust the accelerator pedal position sensor. (Refer to P.13A-221.)

Check the following connector:
D-31
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-
A/T-ECU, and repair if necessary.

Check the following connector:
D-121
OK
Check the harness wire between accelerator pedal position sensor (1st channel) and the engine-
A/T-ECU, and repair if necessary.

Check the following connector:
D-121
OK
Check the trouble symptoms.

Replace the engine-A/T-ECU.
# Code No.79 Throttle position sensor (1st channel) system

The throttle valve controller judges a malfunction, and then transmit the result to the engine-A/T-ECU.

## Range of Check
- Ignition switch: ON

## Set Conditions
- The sensor output voltage is 0.2 V or less.
- The sensor output voltage is 4.85 V or more and the throttle position sensor (2nd channel) output voltage is 2.5V or more.
- The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6V.
- The opening angle of throttle position sensor (1st channel) is different from its target by 1V or more.
- The throttle position sensor (1st channel) output changes within 25 mV when the throttle valve control servo moves one step.

## Probable cause
- Malfunction of throttle position sensor
- Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact
- Malfunction of throttle valve controller
- Malfunction of engine-A/T-ECU

## MUT-II Data list

### 79 Throttle position sensor (1st channel) (Refer to P.13A-198, DATA LIST REFERENCE TABLE.)

- **OK**
  - Check the trouble symptoms.
  - Check the harness wire between the throttle position sensor and the throttle valve controller.

### NG

- **NG**
  - Replace

### Check the following connector: B-102

- **NG**
  - Repair

### Measure at throttle position sensor connector B-102.

- Disconnect the connector and measure at the harness side.
- **OK**
  - Voltage between terminal 1 and earth
    - Ignition switch: ON
    - OK: 4.8 - 5.2 V
- **NG**
  - Resistance between terminal 3 and earth
    - OK: 2 \( \Omega \) or less

### OK

- **OK**
  - Check the trouble symptoms.
  - Replace the throttle valve controller.

### NG

- **NG**
  - Repair

### Check the harness wire between the throttle position sensor and the throttle valve controller.

- **OK**
  - OK
- **NG**
  - NG

### Repair

- **OK**
  - Check the trouble symptoms.

### NG

- **NG**
  - Replace the throttle valve controller.

- **OK**
  - Check the trouble symptoms.

- **NG**
  - Replace the throttle valve controller.
Measure at throttle position sensor connector B-102.
- Use test harness (MB991536) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
(1) Voltage between terminal 1 and earth
   OK: 4.8 - 5.2 V
(2) Voltage between terminal 2 and earth
   OK: Accelerator pedal fully released: 0.4 - 0.8 V
       Accelerator pedal fully depressed: 4.2 - 4.8 V
(3) Voltage between terminal 3 and earth
   OK: 0.5 V or less

OK

Measure at throttle valve controller connector D-11.
- Measure voltage at the throttle valve controller connector terminals.
- Ignition switch: ON
- Voltage between terminal 7 and earth
  OK: Accelerator pedal fully released: 0.4 - 0.8 V
      Accelerator pedal fully depressed: 4.2 - 4.8 V

NG

| (1) NG | Check the following connector: D-11 | NG | Repair |
| (3) NG | Check the harness wire between the throttle position sensor and the throttle valve controller, and repair if necessary. | OK |

(2) NG

Adjust the throttle position sensor.
(Refer to P.13A-220.)

NG | Repair |

OK

Check the trouble symptoms.

NG

Replace the throttle valve controller.
### Code No.89 Abnormal fuel system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Engine: Being learning the air-fuel ratio</td>
<td>• Malfunction of fuel supply system</td>
</tr>
<tr>
<td>• Ten seconds or more have been passed while the fuel injection amount</td>
<td>• Malfunction of oxygen sensor</td>
</tr>
<tr>
<td>compensation value is too low.</td>
<td>• Malfunction of intake air temperature sensor</td>
</tr>
<tr>
<td>or</td>
<td>• Malfunction of barometric pressure sensor</td>
</tr>
<tr>
<td>• Ten seconds or more have been passed while the fuel injection amount</td>
<td>• Malfunction of air flow sensor</td>
</tr>
<tr>
<td>compensation value is too high.</td>
<td>• Malfunction of engine-A/T-ECU</td>
</tr>
</tbody>
</table>

#### MUT-II Self-Diag Code

Is any diagnosis code other than No.89 output?

<table>
<thead>
<tr>
<th>YES</th>
<th>Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO</strong></td>
<td></td>
</tr>
</tbody>
</table>

Check the air intake from the intake hose and right bank intake manifold.

<table>
<thead>
<tr>
<th>NO</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NG</strong></td>
<td></td>
</tr>
</tbody>
</table>

Check the exhaust gas leaks from the right bank exhaust manifold.

<table>
<thead>
<tr>
<th>NG</th>
<th>Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td></td>
</tr>
</tbody>
</table>

Check the throttle body (around the throttle valve), and clean if necessary. (Refer to P.13A-220).

<table>
<thead>
<tr>
<th>NG</th>
<th>Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td></td>
</tr>
</tbody>
</table>

### MUT-II Data list

- 74 Fuel pressure sensor (Refer to 13A-198, DATA LIST REFERENCE TABLE.)

- Check fuel leakage around the fuel pump (high-pressure) line.

<table>
<thead>
<tr>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td></td>
</tr>
</tbody>
</table>

Replace the fuel pump (high-pressure).

- Refer to the Inspection procedure for the sensor, which is indicated by the abnormal service data. (Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.)

#### MUT-II Data list

- 11 Oxygen sensor
- 12 Air flow sensor
- 13 Intake air temperature sensor
- 21 Engine coolant temperature sensor
- 25 Barometric pressure sensor (Refer to 13A-198, DATA LIST REFERENCE TABLE.)

Reference

If all the service data is normal, go to “OK.”

If any abnormal service is found, go to “NG.”

OK

Check the oxygen sensor (Refer to P.13A-230.)

<table>
<thead>
<tr>
<th>NG</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td></td>
</tr>
</tbody>
</table>

Check the purge control solenoid valve (Refer to GROUP 17 - Emission Control).

<table>
<thead>
<tr>
<th>NG</th>
<th>Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td></td>
</tr>
</tbody>
</table>

To the next page
OK
Check the right bank injectors for clogging or leaks.

OK
Check the right bank fuel lines for fuel leaks.

OK
Check the fuel pressure between the fuel pump (low-pressure) and the fuel pump (high-pressure) (Refer to P.13A-112).

Check the trouble symptoms.

Replace the engine-A/T-ECU.

From the previous page

NG
Check the EGR valve (Refer to GROUP 17 - Emission Control).

OK
Check the fuel line between the fuel pump (low-pressure) and the fuel pump (high-pressure) (Refer to P.13A-222).

OK
Replace the engine-A/T-ECU.

Replace the EGR valve (Refer to GROUP 17 - Emission Control).

OK
Check the trouble symptoms.

OK
Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

NG
Replace the engine-A/T-ECU.

Check the harness wire between the throttle valve controller and the engine-A/T-ECU.

Check the trouble symptoms.

Replace the throttle valve controller.

Check the trouble symptoms.

Code No.91 Electronic-controlled throttle valve system

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Check</td>
<td>● Short in communication line</td>
</tr>
<tr>
<td>Set Conditions</td>
<td>● Malfunction of the engine-A/T-ECU</td>
</tr>
<tr>
<td>Range of Check</td>
<td>● Malfunction of the throttle valve controller</td>
</tr>
</tbody>
</table>

Check the following connectors: D-11, D-119, D-122

NG
Repair

OK
Check the trouble symptoms.
**Code No.92 Throttle valve position feedback system**

The throttle valve controller judges a malfunction, and then transmit the result to the engine-A/T-ECU.

**Range of Check**
- Ignition switch: ON
- Battery voltage: 10 V or more

**Set Conditions**
- Failure in the position feedback
  - [The engine-A/T-ECU detects that the current in the motor is excessive and the opening angle difference between the target value of throttle position sensor (1st channel) and the actual value of throttle position sensor (1st channel) is 2.0V or more]

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of throttle position sensor (1st channel)</td>
</tr>
<tr>
<td>- Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact</td>
</tr>
<tr>
<td>- Malfunction of the throttle valve controller</td>
</tr>
</tbody>
</table>

### MUT-II Self-Diag Code

**Is code No.79 set?**

- **YES**
  - Refer to Code No.79, Throttle position sensor (1st channel) system. (Refer to P.13A-158.)

- **NO**
  - Adjust the throttle position sensor. (Refer to P.13A-220.)

**Is Code No.93 set?**

- **YES**
  - Refer to Code No.93, Throttle valve control servo system (Refer to P.13A-163.)

- **NO**
  - **Check the throttle valve control servo. (Refer to 13A-232.)**
  - **OK**
    - Replace the throttle body assembly.
  - **NG**
    - **Check the following connectors: B-102, B-122, D-11**
    - **OK**
      - Replace the throttle body assembly.
    - **NG**
      - **Repair**

- **Check the harness wires between the throttle position sensor and the throttle valve controller, and between the throttle valve control servo and the throttle valve controller.**

- **Check the trouble symptoms.**

- **Replace the throttle valve controller.**
**Code No.93 Throttle valve control servo system**

The throttle valve controller judges a malfunction, and then transmit the result to the engine-A/T-ECU.

**Range of Check**
- Throttle valve control servo relay: ON

**Set Conditions**
- Short circuit of the throttle valve control servo drive circuit to earth
- Power is supplied to the throttle valve control servo circuit from other sources.
- Open circuit in the throttle valve control servo power supply circuit

**Probable cause**
- Malfunction of the throttle valve control servo
- Open circuit in the throttle valve control servo power supply circuit
- Open or short circuit in the throttle valve control servo circuit or loose connector contact
- Malfunction of throttle valve controller

---

**Check the operation of the throttle valve control servo.**

**OK:** The throttle valve opens or closes when the accelerator pedal is depressed or released.

**NG**

**Check the throttle valve control servo. (Refer to P.13A-232.)**

**NG**

**Check the following connector:**

**B-122**

**OK**

**NG**

**Measure at the throttle valve control servo connector B-122**

- Use test harness (MB991658) to connect the connector, and measure at the pick-up harness.
- Ignition switch: ON
- The voltage between terminal 1 and earth
- The voltage between terminal 2 and earth
- The voltage between terminal 3 and earth

**OK:** Voltage changes between 5 - 7 V when the accelerator pedal is operated.

**NOTE:** Erase the diagnosis code before the measurement since a diagnosis code is recorded when the harness is disconnected.

**NG**

**Check the trouble symptoms.**

**OK**

**NG**

**Replace the throttle valve controller.**

**NG**

**Replace the engine-A/T-ECU.**
<table>
<thead>
<tr>
<th>Code No.94 Communication line system with the throttle valve controller</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| **Range of Check**  
- Ignition switch: ON  
- Battery voltage: 8 V or more.  
- Engine: not cranking  
Set Conditions  
- System detects an error in communication line between the engine-A/T-ECU and the throttle valve controller, and between the throttle valve controller and the engine-A/T-ECU. |  
- Short in communication line  
- Malfunction of engine-A/T-ECU  
- Malfunction of throttle valve controller |

| **MUT-II Self-Diag Code**  
Is Code No.91 output? | **YES**  
Refer to Code No.91, Electronic-controlled throttle valve system (Refer to P13A-161.)  
**NO**  
**Repair** |
|-----------------|----------------|
| **Check the following connector:**  
D-11 | **OK**  
**Measure at throttle valve controller connector D-11.**  
- Measure voltage at the throttle valve controller terminals.  
- Ignition switch: ON  
(1) The voltage between terminal 5 and earth  
OK: System voltage  
(2) The voltage between terminal 22 and earth  
OK: System voltage  
(3) The voltage between terminal 3 and earth  
The voltage between terminal 4 and earth  
The voltage between terminal 16 and earth  
OK: 0.5 V or less |
| **(1) NG**  
Check the following connectors: B-25X, D-128  
**OK**  
**Repair**  
Check the harness wire between the throttle valve controller and the engine control relay, and repair if necessary.  
**NG**  
**Repair**  
Check the following connectors: D-208, D-223, E-13  
**OK**  
**Repair**  
Check the harness wire between the throttle valve controller and the ignition switch, and repair if necessary.  
**NG**  
**Repair**  
Check the following connector: D-14  
**OK**  
**Repair**  
Check the harness wire between the throttle valve controller and earth, and repair if necessary.  
**NG**  
**Repair**  
Check the following connectors: D-119, D-122  
**OK**  
**Repair**  
Check the harness wire between the throttle valve controller and the engine-A/T-ECU.  
**NG**  
**Repair**  
Check the trouble symptoms.  
**NG**  
Replace the throttle valve controller.  
**NG**  
Check the trouble symptoms.  
**NG**  
Replace the engine-A/T-ECU. |
<table>
<thead>
<tr>
<th>Code No.96 Throttle valve controller system</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Conditions</td>
<td></td>
</tr>
<tr>
<td>• Errors in reading or writing to the throttle valve controller ROM.</td>
<td>• Malfunction of the throttle valve controller</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace the throttle valve controller.</td>
<td></td>
</tr>
</tbody>
</table>
## INSPECTION CHART FOR TROUBLE SYMPTOMS

<table>
<thead>
<tr>
<th>Trouble symptom</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication with MUT-II is impossible.</td>
<td>1</td>
<td>13A-169</td>
</tr>
<tr>
<td>Communication with all systems is not possible.</td>
<td>2</td>
<td>13A-169</td>
</tr>
<tr>
<td>Engine warning lamp and related parts</td>
<td>3</td>
<td>13A-170</td>
</tr>
<tr>
<td>The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.</td>
<td>3</td>
<td>13A-170</td>
</tr>
<tr>
<td>The engine warning lamp remains illuminating and never goes out.</td>
<td>4</td>
<td>13A-170</td>
</tr>
<tr>
<td>Starting</td>
<td>5</td>
<td>13A-171</td>
</tr>
<tr>
<td>No initial combustion (starting impossible)</td>
<td>5</td>
<td>13A-171</td>
</tr>
<tr>
<td>Initial combustion but no complete combustion (starting impossible)</td>
<td>6</td>
<td>13A-172</td>
</tr>
<tr>
<td>Long time to start (improper starting)</td>
<td>7</td>
<td>13A-174</td>
</tr>
<tr>
<td>Unstable idling (Rough idling, hunting)</td>
<td>7</td>
<td>13A-174</td>
</tr>
<tr>
<td>Idling speed is high. (Improper idling speed)</td>
<td>8</td>
<td>13A-176</td>
</tr>
<tr>
<td>Idling speed is low. (Improper idling speed)</td>
<td>9</td>
<td>13A-176</td>
</tr>
<tr>
<td>Idling stability (Improper idling)</td>
<td>9</td>
<td>13A-177</td>
</tr>
<tr>
<td>When the engine is cold, it stalls at idling. (Die out)</td>
<td>9</td>
<td>13A-177</td>
</tr>
<tr>
<td>When the engine is hot, it stalls at idling. (Die out)</td>
<td>9</td>
<td>13A-178</td>
</tr>
<tr>
<td>The engine stalls when starting the car. (Pass out)</td>
<td>11</td>
<td>13A-180</td>
</tr>
<tr>
<td>The engine stalls when decelerating.</td>
<td>12</td>
<td>13A-181</td>
</tr>
<tr>
<td>Driving</td>
<td>13</td>
<td>13A-182</td>
</tr>
<tr>
<td>Hesitation, sag or stumble</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor acceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The feeling of impact or vibration when accelerating</td>
<td>14</td>
<td>13A-183</td>
</tr>
<tr>
<td>The feeling of impact or vibration when decelerating</td>
<td>15</td>
<td>13A-184</td>
</tr>
<tr>
<td>Knocking</td>
<td>16</td>
<td>13A-184</td>
</tr>
<tr>
<td>Dieseling</td>
<td>17</td>
<td>13A-184</td>
</tr>
<tr>
<td>Too high CO and HC concentration when idling</td>
<td>18</td>
<td>13A-185</td>
</tr>
<tr>
<td>Low alternator output voltage (approx. 12.3 V)</td>
<td>19</td>
<td>13A-186</td>
</tr>
<tr>
<td>Engine idle speed is incorrect while the A/C is on (A/C switch 2 signal).</td>
<td>20</td>
<td>13A-187</td>
</tr>
<tr>
<td>Fans (radiator fan, A/C condenser fan) are inoperative</td>
<td>21</td>
<td>13A-187</td>
</tr>
<tr>
<td>GDI ECO indicator lamp system</td>
<td>22</td>
<td>13A-188</td>
</tr>
<tr>
<td>GDI ECO indicator lamp does not illuminate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDI ECO indicator lamp remains illuminated and does not go off.</td>
<td>23</td>
<td>13A-188</td>
</tr>
</tbody>
</table>
## PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

<table>
<thead>
<tr>
<th>Items</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting</strong></td>
<td></td>
</tr>
<tr>
<td>Won’t start</td>
<td>The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won’t start.</td>
</tr>
<tr>
<td>Fires up and dies</td>
<td>There is combustion within the cylinders, but then the engine soon stalls.</td>
</tr>
<tr>
<td>Hard starting</td>
<td>Engine starts after cranking a while.</td>
</tr>
<tr>
<td><strong>Idling stability</strong></td>
<td></td>
</tr>
<tr>
<td>Hunting</td>
<td>Engine speed doesn’t remain constant; changes at idle.</td>
</tr>
<tr>
<td>Rough idle</td>
<td>Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.</td>
</tr>
<tr>
<td>Incorrect idle speed</td>
<td>The engine doesn’t idle at the usual correct speed.</td>
</tr>
<tr>
<td>Engine stall (Die out)</td>
<td>The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not.</td>
</tr>
<tr>
<td>Engine stall (Pass out)</td>
<td>The engine stalls when the accelerator pedal is depressed or while it is being used.</td>
</tr>
<tr>
<td><strong>Driving</strong></td>
<td></td>
</tr>
<tr>
<td>Hesitation, Sag</td>
<td>“Hesitation” is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine speed) during such acceleration. Serious hesitation is called “sag”.</td>
</tr>
<tr>
<td>Poor acceleration</td>
<td>Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.</td>
</tr>
<tr>
<td>Stumble</td>
<td>Engine speed increase is delayed when the accelerator pedal is initially depressed for acceleration.</td>
</tr>
<tr>
<td>Items</td>
<td>Symptom</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Driving</td>
<td><strong>Shock</strong> The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.</td>
</tr>
<tr>
<td></td>
<td><strong>Surge</strong> This is repeated surging ahead during constant speed travel or during variable speed travel.</td>
</tr>
<tr>
<td></td>
<td><strong>Knocking</strong> A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.</td>
</tr>
<tr>
<td>Stopping</td>
<td><strong>Run on</strong> (&quot;Dieseling&quot;) The condition in which the engine continues to run after the ignition switch is turned to OFF. Also called &quot;Dieseling&quot;.</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection procedure 1

**Communication with all systems is not possible.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably a defect in the power supply system (including earth) for the diagnosis line.</td>
<td></td>
</tr>
</tbody>
</table>

- Malfunction of the diagnosis connector
- Open circuit or short-circuited between engine-A/T-ECU and diagnosis connector circuit
- Malfunction of the MUT-II

1. **Check the following connectors:** D-27, D-210, D-211
   - OK: Battery voltage
   - Continuity between 4 and earth
   - OK: Continuity

2. **Check the harness wire between diagnosis connector and the engine-A/T-ECU.**
   - OK: Repair

   - NG: Replace the MUT-II.

**Communication with engine-A/T-ECU is not possible.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably a defect in the engine-A/T-ECU power supply circuit (including earth).</td>
<td></td>
</tr>
</tbody>
</table>

- Open circuit or short-circuited harness wire in the engine-A/T-ECU power supply circuit.
- Open circuit between engine-A/T-ECU and diagnosis connector
- Malfunction of the engine-A/T-ECU

1. **Check the following connectors:** D-06, D-23, D-122, D-128, D-222, E-13
   - OK: Repair

2. **Check the trouble symptoms.**
   - NG: Replace the MUT-II.

3. **Check the harness wire between engine-A/T-ECU and diagnosis connector.**
   - OK: Check the engine-A/T-ECU power supply and earth circuit.
      - (Refer to P. 13A-189, Inspection procedure 24.)

**NOTE**

On vehicles with multi communication system (MMCS) or RV meter, if a malfunction cannot be resolved after the procedure above, check the multi center display unit or RV meter and replace if necessary. (Refer to GROUP 54 - Clock, multi center display and RV meter.)
Inspection procedure 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Burnt-out bulb</td>
</tr>
<tr>
<td>• Open circuit or short-circuit between the engine warning lamp and engine-A/T-ECU.</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

Because there is a burnt-out bulb, the engine-A/T-ECU causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON.

If the engine warning lamp does not illuminate immediately after the ignition switch is turned to ON, one of the malfunction listed at right has probably occurred.

---

**MUT-II Data list**

16 Engine-A/T-ECU power supply voltage
(Refer to P.13A-198.)

OK: Check the engine-A/T-ECU power supply and earth circuit (Refer to P.13A-189, Inspection procedure 24.)

NG: NG: NG: NG: NG:

Measure at the engine-A/T-ECU connector D-119.
- Disconnect the connector, and measure at the harness side.
- Earth the terminal 22 (Ignition switch: ON)
  OK: Engine warning lamp illuminates.

Check the following connector:

NG: Repair

OK: Check the trouble symptoms.
NG: Replace the engine-A/T-ECU.

Check a burnt-out bulb.

OK: NG: NG: NG: NG:

Measure at the combination meter connector D-01.
- Disconnect the connector, and measure at the harness side.
- Voltage between 62 and earth (Ignition switch: ON)
  OK: Battery voltage

Check the engine warning lamp power supply circuit, and repair if necessary.

---

Inspection procedure 4

The engine warning lamp remains illuminating and never goes out.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Short-circuit between the engine warning lamp and engine-A/T-ECU</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

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

---

**MUT-II Self-Diag Code**

Is a diagnosis code set?

YES: Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

NO: NG: NG: NG: NG:

Measure at the combination connector D-02.
- Disconnect the connector, and measure at the harness side.
- Disconnect the engine-A/T-ECU connector
- Continuity between 38 and earth
  OK: No continuity

Check the harness wire between combination meter and engine-A/T-ECU connector, and repair if necessary.

Replace the engine-A/T-ECU.
Inspection procedure 5

**No initial combustion (starting impossible)**

In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the fuel supply system</td>
</tr>
<tr>
<td>Malfunction of the ignition system</td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

**Check battery voltage when cranking.**

OK: 8 V or higher

NG

Check the battery.

**MUT-II Self-Diag Code**

Is a diagnosis code set?

YES

Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES

NO

**MUT-II Data list**

16 Battery voltage (Refer to P.13A-198.)

NG

Check the engine control relay and ignition switch-IG system

(Refer to P.13A-190, Inspection procedure 25.)

OK

**MUT-II Actuator Test**

07 Fuel pump (low pressure) (Refer to P.13A-203.)

NG

Check fuel pump (low pressure) system

(Refer to P.13A-193, Inspection procedure 29.)

OK

**MUT-II Data list**

22 Crank angle sensor (Refer to P.13A-198.)

NG

Check the crank angle sensor system.

(Refer to P.13A-140, code No.22.)

OK

**MUT-II Data list**

21 Engine coolant temperature sensor (Refer to P.13A-198.)

NG

Check the engine coolant temperature sensor system

(Refer to P.13A-138, code No.21.)

OK

**MUT-II Data list**

79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

NG

Check the throttle position sensor (1st channel) system

(Refer to P.13A-158, code No.79.)

YES

- Clean the throttle valve area. (Refer to P.13A-220.)
- Check and adjust the throttle position sensor (Refer to P.13A-220.)

NO

Adjust the throttle position sensor (Refer to P.13A-220.)

NG

**Measure at injector driver connector B-19**

- Disconnect the connector, and measure at the harness side.
- The voltage between terminals 4, 12, 21 and earth (Ignition switch: ON)

OK Battery voltage

NG

Check the injector driver system.

(Refer to P.13A-196, Inspection procedure 34.)

OK

**Check fuel leakage (Refer to P.13A-225.)**

NG

Repair

OK

**Measure low fuel pressure between the fuel pump (low pressure) and fuel pump (high pressure) (Refer to P.13A-222.)**

NG

Repair

OK
Check the following items in that order.

1. Check the spark plug.
2. Check the compression pressure.
3. Check if foreign materials (water, alcohol, etc.) got into fuel.

Check the trouble symptoms.

Replace the injector.

Inspection procedure 6

**Initial combustion but no complete combustion (starting impossible), long time to start (hard starting)**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Check the battery voltage when cranking. OK: 8 V or higher</th>
<th>Check the battery.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of fuel supply system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction of fuel pressure control solenoid valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction of the ignition system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction of the electronic-controlled throttle valve system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Check the battery voltage when cranking. OK: 8 V or higher

MUT-II Self-Diag Code

Is a diagnosis code set?

No

YES

Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

NG

Check the battery.

MUT-II Actuator Test

07 Fuel pump (low pressure) (Refer to P.13A-203.)

NG

Check fuel pump system (low-pressure) (Refer to P.13A-193, Inspection procedure 29.)

OK

MUT-II Data list

21 Engine coolant temperature sensor (Refer to P.13A-198.)

NG

Check the engine coolant temperature sensor system (Refer to P.13A-138, code No.21.)

To the next page
From the previous page

**MUT-II Data list**
18 Cranking signal (Refer to P.13A-198.)

**MUT-II Actuator Test**
74 Fuel pressure sensor (Refer to P.13A-203.)

Check fuel leakage. (Refer to P.13A-225.)

**MUT-II Data list**
79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

Check ignition coil spark for each cylinder.
1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.

**Caution**
Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
3. Disconnect the injector intermediate connector.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

**MUT-II Data list**
18 Throttle position sensor (2nd channel) (Refer to P.13A-198.)

Check the throttle valve position feedback system. (Refer to P.13A-162, code No.92.)

**MUT-II Data list**
18 Throttle position sensor (1st channel) (Refer to P.13A-198.)

Is starting good if the engine is cranked with the accelerator pedal slightly depressed?

OK: Approx. 5 °BTDC

NG

Adjust the throttle position sensor (Refer to P.13A-220.)

Check the ignition timing when cranking.
OK

NG

Check fuel leakage. (Refer to P.13A-225.)

OK

Check abnormal fuel pressure. (Refer to P.13A-151, code No.56.)

Check the ignition switch-ST system and inhibitor switch (Refer to 13A-191, Inspection procedure 27.)

Check the throttle valve area. (Refer to P.13A-220)

Adjust the throttle position sensor (Refer to P.13A-220.)

Check that the crank angle sensor and timing belt cover are installed properly.

Replace the ignition coil.

Check the trouble symptoms.

NG

Replace the injector.
Inspection procedure 7

Unstable idling (Rough idling, hunting)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition system</td>
</tr>
<tr>
<td>• Malfunction of the air/fuel ratio control system</td>
</tr>
<tr>
<td>• Malfunction of the electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>• Poor compression</td>
</tr>
<tr>
<td>• Air sucking into the air intake system</td>
</tr>
</tbody>
</table>

- The cause is probably a malfunction of the ignition system, air/fuel ratio control system, electronic controlled throttle valve system, compression pressure, etc. As many causes can be suspected, diagnose from easier items.

Has the battery been disconnected recently?  

- YES: After warming-up, let the engine run at idling for 10 minutes.

MUT-II Self-Diag Code
Is a diagnosis code set?

- NO

MUT-II Data list
79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

- OK

Does the idling speed fluctuate excessively?

- YES: Clean around the throttle valve. (Refer to P.13A-220)

- NG: Adjust the throttle position sensor (Refer to P.13A-220)

MUT-II Data list
26 Accelerator pedal position switch (Refer to P.13A-198.)

- OK

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-198.)

- OK

- NG: Check the barometric pressure sensor system (Refer to P.13A-145, code No.25.)

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-198.)

- OK

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-198.)

- OK

- NG: Check the engine coolant temperature sensor system (Refer to P.13A-138, code No.21.)

MUT-II Actuator Test
08 Purge control solenoid valve (Refer to P.13A-203.)

- OK

MUT-II Data list
11 Oxygen sensor (Refer to P.13A-198.)

- OK: 600 - 1,000 mV when the engine is suddenly raced

- NG: Check that air is sucked in the air intake system.
  - Broken intake manifold gasket
  - Damaged vacuum hose
  - Damaged air intake hose

- NO

MUT-II Data list
11 Oxygen sensor (Refer to P.13A-198.)

- OK: 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for 2 minutes after the engine is started).

- NG: Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-222.)

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Check the trouble symptoms.

Air is sucked in the air intake system, or EGR gas leaks.
- Broken intake manifold gasket
- Damaged air intake hose
- Damaged vacuum hose
- Faulty EGR valve seat
### Inspection procedure 8

<table>
<thead>
<tr>
<th>Idling speed is high or low (Improper idling speed)</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| The cause is probably that the intake air amount during idling is too great or too small. | • Malfunction of the electronic-controlled throttle valve system  
• Malfunction of the throttle body |

#### MUT-II Self-Diag Code
Is a diagnosis code set?

**YES**
- Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

**NO**

#### MUT-II Data list

<table>
<thead>
<tr>
<th>Item</th>
<th>OK</th>
<th>NG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>79 Throttle position sensor (1st channel) (Refer to P.13A-198.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the throttle valve position feedback system (Refer to P.13A-162, code No.92.)</td>
</tr>
<tr>
<td>08 Purge control solenoid valve (Refer to P.13A-203.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the purge control solenoid valve system (Refer to P.13A-197, Inspection procedure 36.)</td>
</tr>
<tr>
<td>26 Accelerator pedal position switch (Refer to P.13A-198.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the accelerator pedal position switch system (Refer to P.13A-192, Inspection procedure 28.)</td>
</tr>
<tr>
<td>21 Engine coolant temperature sensor (Refer to P.13A-198.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the engine coolant temperature sensor system (Refer to P.13A-138, code No.21.)</td>
</tr>
<tr>
<td>28 A/C switch (Refer to P.13A-198.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the A/C switch and A/C relay system (Refer to P.13A-194, Inspection procedure 31.)</td>
</tr>
<tr>
<td>67 Stop lamp switch (Refer to P.13A-198.)</td>
<td>OK</td>
<td>NG</td>
<td>Check the stop lamp switch system (Refer to P.13A-195, Inspection procedure 32.)</td>
</tr>
</tbody>
</table>

- Clean around the throttle valve. (Refer to P.13A-220.)  
- Adjust the throttle position sensor (Refer to P.13A-220.)
**Inspection procedure 9**

**When the engine is cold, it stalls at idling. (Die out)**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>- Malfunction of the throttle body</td>
</tr>
</tbody>
</table>

**In such cases as the above, the cause is probably that the air/fuel mixture is inappropriate when the engine is cold, or that the intake air volume is insufficient.**

**Check the trouble symptoms.**

**Check the following items in that order.**

- Check the spark plug
- Check the compression pressure
- Check the engine oil viscosity.

**Check the trouble symptoms.**

**Replace the injector.**
### Inspection procedure 10

**When the engine becomes hot, it stalls at idling. (Die out)**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the ignition system</td>
</tr>
<tr>
<td>- Malfunction of the air/fuel ratio control system</td>
</tr>
<tr>
<td>- Malfunction of the electronic-controlled throttle valve system</td>
</tr>
<tr>
<td>- Malfunction of the throttle body</td>
</tr>
<tr>
<td>- Improper connector contact</td>
</tr>
<tr>
<td>- Drawing air into intake system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has the battery been disconnected recently?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
<tr>
<td>After warming-up, let the engine run at idling for 10 minutes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Self-Diag Code Is a diagnosis code set?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
</tr>
<tr>
<td>Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 79 Throttle position sensor (1st channel) (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Check the throttle valve position feedback system. (Refer to P.13A-162, code No.92.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Check the engine coolant temperature sensor system. (Refer to P.13A-138, code No.21.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 13 Intake air temperature sensor (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Check the intake air temperature sensor system. (Refer to P.13A-135, code No.13.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 25 Barometric pressure sensor (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Check the barometric pressure sensor system. (Refer to P.13A-145, code No.25.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 11 Oxygen sensor (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK 600 - 1,000 mV when the engine is suddenly raced.</td>
</tr>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Check Oxygen sensor system. (Refer to P.13A-131, code No.11.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUT-II Data list 11 Oxygen sensor (Refer to P.13A-198.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for 2 minutes after the engine is started.)</td>
</tr>
<tr>
<td>NG</td>
</tr>
<tr>
<td>Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-222.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To the next page</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
</tr>
</tbody>
</table>

- Broken intake manifold gasket
- Damaged vacuum hose
- Damaged air intake hose
Check the spark plug

Check the compression pressure

Check if foreign materials (water, kerosine, etc.) got into fuel.

Check the EGR valve system (Refer to P.13A-196, Inspection procedure 35.)

Does the engine stall right after the accelerator pedal is released?

YES: Clean around the throttle valve. (Refer to P.13A-220.)

NO: Check the ignition timing. (Refer to GROUP 11A - Engine Adjustment.)

Check ignition coil spark for each cylinder.

1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.

Caution
Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

OK: 3,900 - 4,800 mV

Clean around the throttle valve. (Refer to P.13A-220.)

Check the air flow sensor system (Refer to P.13A-133, code No. 12.)

Check the small lamp switch system (Refer to P.13A-195, Inspection procedure 33.)

Check the A/C switch and A/C relay system (Refer to P.13A-194, Inspection procedure 31.)

Check the power steering oil pressure switch system (Refer to P.13A-194, Inspection procedure 30.)

Replace the ignition coil.

Check the following items in that order.
- Check the spark plug
- Check the compression pressure
- Check if foreign materials (water, kerosine, etc.) got into fuel.
The engine stalls when starting the car. (Pass out)

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition system</td>
</tr>
<tr>
<td>• Malfunction of the EGR valve</td>
</tr>
<tr>
<td>• Air stuck in the air intake system</td>
</tr>
</tbody>
</table>

MUT-II Self-Diag Code

Is a diagnosis code set?

YES

Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

NO

MUT-II Data list

68 EGR valve (Refer to P.13A-198)

NG

Check the EGR valve system (Refer to P.13A-196, Inspection procedure 35.)

OK

MUT-II Actuator Test

08 Purge control solenoid valve (Refer to P.13A-203.)

NG

Check the purge control solenoid valve system (Refer to P.13A-197, Inspection procedure 36.)

OK

Check ignition coil spark for each cylinder.
1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.

Caution
Never touch the connector terminal as approx. 100 mV is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

NG

Replace the ignition coil.

OK

Check the following items in that order.
• Check the spark plug
• Check that air is sucked in the air intake system.
• Broken intake manifold gasket
• Damaged or disconnected vacuum hose
• Damaged air intake hose
### Inspection procedure 12

**The engine stalls when decelerating.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the electronic-controlled throttle valve system</td>
<td></td>
</tr>
<tr>
<td>• Malfunction of the EGR valve</td>
<td></td>
</tr>
</tbody>
</table>

1. **Has the battery been disconnected recently?**
   - **YES**
     - After warming-up, let the engine run at idling for 10 minutes.
   - **NO**

2. **MUT-II Self-Diag Code**
   - Is a diagnosis code set?
     - **YES**
       - Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.
     - **NO**

3. **MUT-II Data list**
   - 26 Accelerator pedal position switch (Refer to P.13A-198.)
     - **OK**
       - Check the throttle valve position feedback system (Refer to P.13A-162, code No.P92)
     - **NG**
       - Check the accelerator pedal position switch system (Refer to P.13A-192, Inspection procedure 28)

4. **MUT-II Data list**
   - 79 Throttle position sensor (1st channel) (Refer to P.13A-198.)
     - **OK**
     - **NG**
       - Repair

5. **MUT-II Data list**
   - 68 EGR valve (Refer to P.13A-198.)
     - **OK**
     - **NG**
       - Check the EGR valve system (Refer to P.13A-196, Inspection procedure 35.)

6. **Check ignition coil spark for each cylinder.**
   - 1. Remove the ignition coil.
   - 2. Install a new spark plug to the removed ignition coil.
   - 3. Disconnect the injector intermediate connector.
   - **Caution**
     - Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
   - 4. Earth the spark plug electrode securely.
   - 5. Check that the spark plug ignites when the engine is cranked.

7. **Check the following items in that order.**
   - Check the spark plug
   - Clean around the throttle valve. (Refer to P.13A-220.)
   - Adjust the throttle position sensor (Refer to P.13A-220.)
Inspection procedure 13

<table>
<thead>
<tr>
<th>Hesitation, sag, stumble, poor acceleration or surge</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| The cause is probably a malfunction of the ignition system, air/fuel ratio control system, electronic controlled throttle valve system, compression pressure, etc. | - Malfunction of the ignition system  
- Malfunction of the air/fuel ratio control system  
- Malfunction of the electronic-controlled throttle valve system  
- Improper compression pressure  
- Air stuck in the air intake system |

MUT-II Self-Diag Code

Is a diagnosis code displayed?

YES

Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

NO

Check the ignition timing. (Refer to GROUP11A - Engine Adjustment)

NG

Check that the crank angle sensor and timing belt cover are properly installed.

OK

NG

MUT-II Data list

26 Accelerator pedal position switch (Refer to P.13A-198.)

NG

Check the accelerator pedal position switch system. (Refer to P.13A-192, Inspection procedure 28.)

OK

NG

MUT-II Data list

13 Intake air temperature sensor (Refer to P.13A-198.)

NG

Check the intake air temperature sensor system (Refer to P.13A-135, code No.13.)

OK

NG

MUT-II Data list

25 Barometric pressure sensor (Refer to P.13A-198.)

NG

Check the barometric pressure sensor system (Refer to P.13A-145, code No.25.)

OK

NG

MUT-II Data list

21 Engine coolant temperature sensor (Refer to P.13A-198.)

NG

Check the engine coolant temperature sensor system (Refer to P.13A-138, code No.21.)

OK

NG

MUT-II Data list

79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

NG

Check the throttle valve position feedback system (Refer to P.13A-162, code No.92.)

OK

NG

MUT-II Data list

11 Oxygen sensor (Refer to P.13A-198.)

OK: 600 - 1,000 mV when the engine is suddenly raced

NG

Check the oxygen sensor system. (Refer to P.13A-131, code No.11.)

OK

NG

MUT-II Data list

11 Oxygen sensor (Refer to P.13A-198.)

OK: 0 - 400 mV and 600 - 1,000 mV alternates when the engine is idling (wait for 2 minutes after the engine is started).

NG

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-222.)

OK

NG

MUT-II Data list

68 EGR valve (Refer to P.13A-198.)

NG

Check the EGR valve system (Refer to P.13A-196, Inspection procedure 35.)

To the next page
From the previous page

OK

MUT-II Actuator Test
08 Purge control solenoid valve (Refer to P.13A-203.)

NG

Check the purge control solenoid valve system (Refer to P.13A-197, Inspection procedure 36.)

OK

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-222.)

NG

Repair

NG

Replace the ignition coil.

OK

Check spark coil spark for each cylinder.
1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.

Caution
Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

OK

Check the following items in that order.
• Check the spark plug
• Check the EGR control system
• Check the compression pressure
• Check the fuel filter or fuel line for clogging

NG

Replace the injector.

Inspection procedure 14

Check the trouble symptoms.

OK

Check the spark plug

NG

Replace

NG

Check the throttle sensor (1st channel) (Refer to P.13A-198.)

NG

Check the throttle position feedback system (Refer to P.13A-162, code No.92.)

NG

Replace

Check the trouble symptoms.

NG

Replace the ignition coil.

The feeling of impact or vibration when accelerating

Probable cause

In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.

• Malfunction of the ignition system

MUT-II Self-Diag Code
Is a diagnosis code displayed?

YES

Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

NO

NG

MUT-II Data list
79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

OK

Check the throttle position feedback system (Refer to P.13A-162, code No.92.)

NG

Replace
Inspection procedure 15

<table>
<thead>
<tr>
<th>The feeling of impact or vibration when decelerating</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably insufficient intake air due to a faulty electronic-controlled throttle valve system.</td>
<td>• Malfunction of the electronic-controlled throttle valve system</td>
</tr>
</tbody>
</table>

**MUT-II Self-Diag Code**

Are diagnosis codes displayed?

- YES
  - Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

- NO

**MUT-II Data list**

79 Throttle position sensor (1st channel) (Refer to P.13A-198.)

- OK

- NG
  - Check the throttle valve position feedback system (Refer to P.13A-162, code No.92.)

26 Accelerator pedal position switch (Refer to P.13A-198.)

- OK

- NG
  - Check the accelerator pedal position switch system (Refer to P.13A-192, Inspection procedure 28.)

Clean around the throttle valve. (Refer to P.13A-220.)

Inspection procedure 16

<table>
<thead>
<tr>
<th>Knocking</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| In case as the above, the cause is probably that the heat value of the spark plug is inappropriate. | • Malfunction of the detonation sensor  
• Improper heat range of the spark plugs. |

**MUT-II Self-Diag Code**

Is a diagnosis code set?

- YES
  - Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.

- NO
  - Check the detonation sensor system. (Refer to P.13A-146, code No.31.)

Does knocking occur when the vehicle is driven with the detonation sensor disconnected?  
(At this time, use the MUT-II to check whether the ignition timing is retarded from when the detonation sensor connector is connected.)

- YES

Check the following items in that order.  
• Spark plugs  
• Check if foreign materials (water, kerosine,etc.) got into fuel.

- NO

Inspection procedure 17

<table>
<thead>
<tr>
<th>Run-on (Dieseling)</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel leakage from injectors is suspected.</td>
<td>• Malfunction of the injector</td>
</tr>
</tbody>
</table>

Replace the injector.
Too high CO and HC concentration when idling

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal air-fuel ratio is suspected.</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**MUT-II Self-Diag Code**

<table>
<thead>
<tr>
<th>Are diagnosis codes displayed?</th>
<th>YES</th>
<th>Refer to P.13A-130, INSPECTION CHART FOR DIAGNOSIS CODES.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the ignition timing. (Refer to GROUP 11A - Engine Adjustment.)</td>
<td>NO</td>
<td>Check that the crank angle sensor and timing belt cover are properly installed.</td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td>Check the engine coolant temperature sensor system (Refer to P.13A-138, code No.21.)</td>
</tr>
</tbody>
</table>
| **MUT-II Data list**
21 Engine coolant temperature sensor (Refer to P.13A-198.) | OK | Check the intake air temperature sensor system (Refer to P.13A-135, code No.13.) |
| | NG | Check the barometric pressure sensor system (Refer to P.13A-145, code No.25.) |
| **MUT-II Data list**
25 Barometric pressure sensor (Refer to P.13A-198.) | OK | Check the EGR valve system (Refer to P.13A-196, Inspection procedure 35.) |
| | NG | Check the purge control solenoid valve system (Refer to P.13A-197, Inspection procedure 36.) |
| **MUT-II Data list**
68 EGR valve (Refer to P.13A-198.) | OK | Check the oxygen sensor system. (Refer to P.13A-131, code No.11.) |
| | NG | Replace the oxygen sensor. |

**MUT-II Actuator Test**

<table>
<thead>
<tr>
<th>Purge control solenoid valve (Refer to P.13A-203.)</th>
<th>OK</th>
<th>Check the trouble symptoms.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NG</td>
<td>NG</td>
</tr>
</tbody>
</table>

Measure fuel high-pressure between the fuel pump (high pressure) and injector. (Refer to P.13A-223.)

Check ignition coil spark for each cylinder.
1. Remove the ignition coil.
2. Install a new spark plug to the removed ignition coil.
3. Disconnect the injector intermediate connector.

**Caution**

Never touch the connector terminal as approx. 100 V is applied to the injector, or you are seriously injured.
4. Earth the spark plug electrode securely.
5. Check that the spark plug ignites when the engine is cranked.

Replace the ignition coil.
### Inspection procedure 19

**Low alternator output voltage (approx. 12.3 V)**

<table>
<thead>
<tr>
<th>The cause is probably a malfunction of the alternator or one of the problems listed at right.</th>
</tr>
</thead>
</table>

**Measure at alternator connector B-59**
- Connect the connector.
  (Use test harness: MB991519)
- The voltage between terminal 1 (black clip) and earth
  (Engine: Idling)
  (Headlamp: OFF to ON)
  (Stop lamp: OFF to ON)
  (Rear defogger switch: OFF to ON)
  **OK:** The voltage increases by 0.2 - 3.5 V
  **NG:** Measure at alternator connector B-59
- Disconnect the connector, and measure at the harness side.
- Disconnect the engine-A/T-ECU connector
- The continuity between terminal 1 and earth
  **OK:** No continuity
  **NG:** Check the harness wire between the alternator and the engine-A/T-ECU, and repair if necessary.

**Measure at alternator connector B-59**
- Disconnect the connector, and measure at the harness side.
- Disconnect the engine-A/T-ECU connector
- The continuity between terminal 1 and earth
  **OK:** No continuity
  **NG:** Check the harness wire between the alternator and the engine-A/T-ECU, and repair if necessary.

**Check the following connectors:**
B-41, D-119
- **OK:** Repair
- **NG:** Repair

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the injector.

**Check the trouble symptoms.**
- **NG:** Replace the injector.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.

**Check the trouble symptoms.**
- **NG:** Replace the catalytic converter.
**Inspection procedure 20**

### Idling speed is improper when A/C is operating (A/C switch 2 signal)

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the A/C control system</td>
<td></td>
</tr>
<tr>
<td>Open or short circuit, or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>

The A/C-ECU judges if load caused by air conditioner is high or low, and converts it to A/C switch 2 signal to send the engine-A/T-ECU it. Based on this signal, the engine-A/T-ECU operates the throttle control servo to control the idle-up speed.

<table>
<thead>
<tr>
<th>Check the following connectors: D-120, D-131, E-13</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the trouble symptoms.</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Check the harness wire between the engine-A/T-ECU and the A/C-ECU.</td>
<td>NG</td>
<td>Repair</td>
</tr>
<tr>
<td>Check the A/C system (Refer to GROUP 55 - Troubleshooting.)</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

**Inspection procedure 21**

### A/C condenser fan is inoperative

<table>
<thead>
<tr>
<th>Probable cause</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the A/C condenser fan relay.</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the A/C condenser fan motor.</td>
<td></td>
</tr>
<tr>
<td>Open or short circuit, or loose connector contact</td>
<td></td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>

The fan motor relay is controlled by turning on and off the power transistor in the engine-A/T-ECU.

<table>
<thead>
<tr>
<th>Measure at the engine-A/T-ECU connector D-119.</th>
<th>NG</th>
<th>Check the condenser fan circuit. (Refer to ELECTRICAL WIRING.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disconnect the connector, and measure at the harness side.</td>
<td>OK</td>
<td>Check the following connector: D-119</td>
</tr>
<tr>
<td>• Check condition of the condenser fan. (Ignition switch: ON)</td>
<td>OK</td>
<td>Check the trouble symptoms.</td>
</tr>
<tr>
<td>• The voltage between terminal 18 and earth (Ignition switch: ON)</td>
<td>OK</td>
<td>Replace the engine-A/T-ECU.</td>
</tr>
<tr>
<td>• Connect terminal 18 to earth. (Ignition switch: ON)</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

- A/C condenser fan rotates.
### Inspection procedure 22

<table>
<thead>
<tr>
<th>GDI ECO indicator lamp does not illuminate.</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| If the GDI ECO indicator lamp does not illuminate after turning switch, the causes listed in the right column are suspected. | • Burned-out GDI ECO indicator lamp bulb  
• Open circuit or short-circuited harness wire in the GDI ECO indicator lamp circuit  
• Malfunction of the engine-A/T-ECU  
• Malfunction of the GDI ECO indicator lamp ECU |

**Measure at the engine-A/T-ECU connector D-119.**
- Disconnect the connector, and measure at the harness side.
- Earth terminal 14 (Ignition switch: ON)
  - **OK:** The GDI ECO indicator lamp illuminates.
- **NG**

**Check the following connector: D-119**
- **OK**
- **NG**

**Check the following connectors: E-13, E-112**
- **OK**
- **NG**

- Repair

**Check trouble symptom.**

**Check the harness wire between the GDI ECO indicator lamp ECU and engine-A/T-ECU.**
- **OK**
- **NG**

**Repair**

**Check the relative circuit of GDI ECO indicator lamp. (Refer to GROUP 54A - Troubleshooting.)**

### Inspection procedure 23

<table>
<thead>
<tr>
<th>GDI ECO indicator lamp remains illuminated and does not go off.</th>
<th>Probable cause</th>
</tr>
</thead>
</table>
| If the GDI ECO indicator lamp does not go off during high load operation, the causes listed in the right column are suspected. | • Short circuit between the GDI ECO indicator lamp and engine-A/T-ECU  
• Malfunction of the engine-A/T-ECU  
• Malfunction of the GDI ECO indicator lamp ECU |

**Measure at GDI ECO indicator lamp ECU connector E-112.**
- Disconnect the connector, and measure at the harness side.
- Continuity between terminal 3 and earth
  - **OK:** No continuity
- **NG**

**Check the harness wire between the GDI ECO indicator lamp ECU and engine-A/T-ECU, and repair if necessary.**

**Check the relative circuit of GDI ECO indicator lamp. (Refer to GROUP 54A - Troubleshooting.)**

**OK**

**Replace the engine-A/T-ECU.**
Inspection procedure 24

<table>
<thead>
<tr>
<th>Engine-A/T-ECU power supply and earth circuit system</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cause is probably the malfunction of the engine-A/T-ECU, or the malfunctions listed at right.</td>
<td>● Open circuit or short-circuited harness wire in the engine-A/T-ECU power supply circuit.</td>
</tr>
<tr>
<td></td>
<td>● Open circuit or short-circuited harness wire to earth in the engine-A/T-ECU.</td>
</tr>
<tr>
<td></td>
<td>● Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

Measure at engine-A/T-ECU connectors D-120, D-121.
- Disconnect the connector, and measure at the harness side.
  (1) The voltage between terminal 98 and earth.
    OK: System voltage
  (2) The voltage between terminal 49 and earth.
    OK: System voltage
  (3) The voltage between terminals 41 and 47 and earth.
    OK: System voltage
    (When terminal 49 was connected to earth)
  (4) The continuity between terminals 42 and 48 and earth.
    OK: Continuity
  (5) The voltage between terminal 66 and earth
    OK: System voltage

Check the following connectors:
- D-120, D-121

(1) NG
  Check the following connectors:
  D-208, D-223 <LHD>, E-13
  OK
  Check the trouble symptoms.
  NG
  Repair

(2), (3) NG
  Check the harness wire between the engine-A/T-ECU and the ignition switch.
  OK
  Check the trouble symptoms.
  NG
  Repair

(4) NG
  Check the following connector:
  D-128
  OK
  Check the trouble symptoms.
  NG
  Repair

(5) NG
  Check the following connector:
  D-14
  OK
  Check the trouble symptoms.
  NG
  Repair
  Check the harness wire between the engine-A/T-ECU and the engine control relay, and repair if necessary.

Check the following connectors:
- D-27, D-31 <LHD>, D-223 <LHD>, E-13
  OK
  Check the trouble symptoms.
  NG
  Repair
  Check the harness wire between the engine-A/T-ECU and earth, and repair if necessary.

Check the following connectors:
- D-27, D-31 <LHD>, D-223 <LHD>, E-13
  OK
  Check the trouble symptoms.
  NG
  Repair
  Check the harness wire between the engine-A/T-ECU and the battery, and repair if necessary.
### Inspection procedure 25

**Engine control relay, ignition switch-IG system**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Malfunction of the ignition switch</td>
</tr>
<tr>
<td>● Malfunction of the control relay.</td>
</tr>
<tr>
<td>● Open circuit or short-circuited harness wire in the engine control relay circuit.</td>
</tr>
<tr>
<td>● Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

When an ignition switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU turns the control relay ON. This causes system voltage to be supplied to the engine-A/T-ECU, sensors, and actuators.

| Check the control relay. (Refer to P.13A-227.) | NG | Replace |
| Measure at control relay connector B-25X. | NG | Check the harness wire between the battery and the engine control relay, and repair if necessary. |
| ● Disconnect the connector, and measure at the harness side. | OK | Check the engine-A/T-ECU power supply and earth circuit. (Refer to P.13A-189, Inspection procedure 24.) |
| ● The voltage between 2, 3 and earth | OK: System voltage |

### Inspection procedure 26

**Injector driver relay system**

When an ignition switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU turns the injector driver relay ON. This causes system voltage to be supplied to the injector driver.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Malfunction of the injector driver relay.</td>
</tr>
<tr>
<td>● Open or short circuit, or loose connector contact</td>
</tr>
<tr>
<td>● Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

When an ignition switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU turns the injector driver relay ON. This causes system voltage to be supplied to the injector driver.

| OK | Check the trouble symptoms. |
| NG | Replace |

| Check the injector driver (Refer to P.13A-227.) | NG | Replace |
| Measure at the injector driver relay connector B-28X. | NG | Check the harness wire between the injector driver relay and the battery, and repair if necessary. |
| ● Disconnect the connector, and measure at the harness side. | OK | Check the following connectors: D-208, D-223 <LHD>, E-13 |
| (1) The voltage between terminal 3 and earth | OK: System voltage |
| (2) The voltage between terminal 4 and earth (Ignition switch: ON) | OK: System voltage |
| NG | Check the trouble symptoms. |

| OK | NG | Repair |
| Check the trial symptoms. |

| Measure at engine-A/T-ECU connector D-119. | NG | Check the harness wire between the injector driver relay and the ignition switch, and repair if necessary. |
| ● Disconnect the connector, and measure at the harness side. | OK | Check the following connector: B-28X |
| ● The voltage between terminal 6 and earth (Ignition switch: ON) | OK: System voltage |
| Check the following connector: D-119 | OK | NG | Repair |
| Check the trouble symptoms. |

| NG | Repair |
| Check the harness wire between the injector driver relay and the engine-A/T-ECU, and repair if necessary. |

| Measure at injector driver connector B-121. | NG | Check the trouble symptoms. |
| ● Connect the connector. | OK | NG | Repair |
| ● The voltage between terminal 4, 12, 21 and earth (Ignition switch: ON) | OK: System voltage |
| OK | NG | Repair |
| Check the following connector: B-28X |

| OK | NG | Repair |
| Check the harness wire between the injector driver relay and the injector driver, and repair if necessary. |

| Measure at the injector driver relay connector B-28X. | NG | Check the following connector: B-28X |
| Disconnect the connector, and measure at the harness side. | OK | NG | Repair |
| The voltage between terminal 3 and earth | OK: System voltage |
| The voltage between terminal 4 and earth (Ignition switch: ON) | OK: System voltage |
### Inspection procedure 27

**Ignition switch-ST and inhibitor switch system**

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the ignition switch</td>
</tr>
<tr>
<td>• Malfunction of the inhibitor switch</td>
</tr>
<tr>
<td>• Open circuit or short-circuited harness wire between the ignition switch and the inhibitor switch, or improper connector contact.</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

The ignition switch-ST inputs a HIGH signal to the engine-A/T-ECU while the engine is cranking. The engine-A/T-ECU controls fuel injection, etc. during starting based on this input.

The inhibitor switch inputs the position of the selector lever to the engine-A/T-ECU. The engine-A/T-ECU uses this signal to carry out idle speed control.

**MUT-II Data list**

Confirm the data list concerning the A/T system.
61 Inhibitor switch  
(Refer to GROUP 23 -Troubleshooting.)

- **OK**
- **NG**

- **Check the inhibitor switch.**
  - The continuity between terminals 9 and 10  
    (Refer to GROUP 23 - On-vehicle Service.)

- **OK**
- **NG**

- **Check the following connector:**
  - **C-05**

- **OK**
- **NG**

**Measure at inhibitor switch connector C-05.**

- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 10 and earth (Ignition switch: ON)
- **OK:** System voltage

- **OK**
- **NG**

- **Repair**

**Check the following connector:**

- **D-120**

- **OK**
- **NG**

- **Repair**

- **Check the trouble symptoms.**

**Check the inhibitor switch system.**

(Refer to GROUP 23 -Troubleshooting.)

- **OK**
- **NG**

- **Replace**

**Check the following connector:**

- **E-114**

- **OK**
- **NG**

- **Repair**

**Check the trouble symptoms.**

- **OK**
- **NG**

- **Repair**

**Check the trouble symptoms.**

- **OK**
- **NG**

- **Repair**

**Check the harness between the inhibitor switch and the ignition switch.**

**Ignition switch check**

(Refer to GROUP 54 - Ignition Switch.)

**Check the following connector:**

- **C-05**

- **OK**
- **NG**

- **Repair**

- **Check the trouble symptoms.**

**Check the harness wire between the inhibitor switch and the engine-A/T-ECU, and repair if necessary.**

- **OK**
- **NG**

- **Repair**

**Check the trouble symptoms.**

- **OK**
- **NG**

- **Repair**

**Replace the engine-A/T-ECU.**
### Accelerator pedal position switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maladjustment of the accelerator pedal position switch and the accelerator pedal position sensor.</td>
</tr>
<tr>
<td>• Open circuit or short-circuited harness wire in the accelerator pedal position switch system, or poor connector contact</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

---

#### Inspection procedure 28

**Probable cause**

- The accelerator pedal position switch detects that the accelerator pedal is fully closed, and sends a signal to the engine-A/T-ECU. The engine-A/T-ECU uses this signal to carry out idle speed control.

**Probable cause**

- Maladjustment of the accelerator pedal position switch and the accelerator pedal position sensor.
- Open circuit or short-circuited harness wire in the accelerator pedal position switch system, or poor connector contact.
- Malfunction of the engine-A/T-ECU.

---

**Check the trouble symptoms.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Inspection procedure 29

**Fuel pump (low pressure) system**

The engine-A/T-ECU turns on the fuel pump relay while the engine is cranking or running, and supplies power source to the fuel pump (low pressure).

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the fuel pump relay</td>
</tr>
<tr>
<td>- Malfunction of the fuel pump (low pressure)</td>
</tr>
<tr>
<td>- Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>- Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

**MUT-II Actuator Test**

07 Fuel pump  
(Refer to P.13A-203.)

- **OK** → Normal
- **NG** → Replace

Check the fuel pump relay  
(Refer to P.13A-227.)

- **OK**
- **NG** → Repair

Check the following connectors: D-208, D-213, E-10

- **OK**
- **NG** → Check the trouble symptoms.

Check the harness wire between the fuel pump relay and the ignition switch.

- **OK**
- **NG** → Repair

Check the ignition switch  
(Refer to GROUP54 - Ignition Switch.)

Measure at the fuel pump relay connector B-27X.
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 3, 4 and earth  
  (Ignition switch: ON)  
  **OK**: System voltage  
  **NG**

Check the following connector: D-119

- **OK**
- **NG** → Repair

Check the trouble symptoms.

Replace the engine-A/T-ECU.

Measure at the engine-A/T-ECU connector D-119.
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 21 and earth  
  (Ignition switch: ON)  
  **OK**: System voltage  
  **NG**

Check the following connector: D-119

- **OK**
- **NG** → Repair

Check the trouble symptoms.

Replace the engine-A/T-ECU.

Measure at fuel pump (low pressure) connector G-12.
- Disconnect the connector, and measure at the harness side.
  1. The voltage between terminal 5 and earth  
     (Ignition switch: ON)  
     **OK**: System voltage  
     **NG**
  2. The continuity between terminal 4 and earth  
     **OK**: Continuity

Check the following connector: G-12

- **OK**
- **NG** → Repair

Check the trouble symptoms.

Replace the fuel pump (low pressure).
## Inspection procedure 30

### Power steering fluid pressure switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the power steering fluid pressure switch.</td>
</tr>
<tr>
<td>- Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>- Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

### Possible causes
- Malfunction of the power steering fluid pressure switch.
- Improper connector contact, open circuit or short-circuited harness wire
- Malfunction of the engine-A/T-ECU

### Measures
- **Check the power steering fluid pressure switch (Refer to GROUP 37A - On-vehicle Service.)**
  - OK: Replace
  - NG: Repair
- **Measure at power steering fluid pressure switch connector B-51.**
  - Disconnect the connector, and measure at the harness side.
  - The voltage between terminal 1 and earth (Ignition switch: ON)
  - OK: System voltage
  - NG: Repair
- **Check the following connector:**
  - B-51
  - OK: Replace
  - NG: Repair

### Inspection procedure 31

### A/C switch and A/C relay system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Malfunction of the A/C control system</td>
</tr>
<tr>
<td>- Malfunction of the A/C switch</td>
</tr>
<tr>
<td>- Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>- Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

### Possible causes
- Malfunction of the A/C control system
- Malfunction of the A/C switch
- Improper connector contact, open circuit or short-circuited harness wire
- Malfunction of the engine-A/T-ECU

### Measures
- **Service the A/C compressor relay.** (Refer to GROUP 55 - On-vehicle Service.)
  - OK: Replace
  - NG: Repair
- **Measure at engine-A/T-ECU connectors D-119, D-121.**
  - Disconnect the connector, and measure at the harness side.
  - The voltage between terminal 20, 83 and earth (Ignition switch: ON)
  - OK: 0 - 3 V (A/C switch: OFF)
    - System voltage (A/C switch: ON)
  - OK: A/C compressor clutch turns on.
  - NG: Replace
- **Check the following connectors:**
  - D-119, D-121
  - OK: Replace
  - NG: Repair
- **Check the A/C system (Refer to GROUP 55 - Troubleshooting.)**
  - OK: Replace
  - NG: Repair
**Inspection procedure 32**

### Stop lamp switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Malfunction of the stop lamp switch</td>
</tr>
<tr>
<td>• Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

**Check the following connectors:**

- D-26 <LHD>, D-27, D-124 <RHD>

**NG**

Replace

**Measure at stop lamp switch connector D-136.**
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 2 and earth
  - OK: System voltage

**NG**

Replace

**OK**

Measure at the engine-A/T-ECU connector D-122.
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 123 and earth
  - OK: System voltage (when the brake pedal is depressed)
  - OK: 0 - 3 V (when the brake pedal is not depressed)

**NG**

Check the trouble symptoms.

**OK**

Check the harness wire between the battery and the stop lamp switch, and repair if necessary.

**NG**

Check the trouble symptoms.

**OK**

Measure at engine-A/T-ECU connector D-122.
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 86 and earth (Lighting switch: ON)
  - OK: System voltage

**NG**

Check the trouble symptoms.

**OK**

Check the trouble symptoms.

**NG**

Replace the engine-A/T-ECU.

### Inspection procedure 33

### Small lamp switch system

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>• Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

**Check the following connector:**

- D-121

**NG**

Replace

**OK**

Check the trouble symptoms.

**NG**

Replace the engine-A/T-ECU.

**Measure at engine-A/T-ECU connector D-121,**
- Disconnect the connector, and measure at the harness side.
- The voltage between terminal 86 and earth (Lighting switch: ON)
  - OK: System voltage

**OK**

**NG**

Check the tail lamp circuit. (Refer to ELECTRICAL WIRING.)

**NG**

Replace

**OK**

Check the trouble symptoms.

**NG**

Replace the engine-A/T-ECU.
Inspection procedure 34

**Injector driver**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>The engine-A/T-ECU drives the injector by the drive signal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the injector driver</td>
<td>Improper connector contact, open circuit or short-circuited harness wire</td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>

Check the following connectors: B-121, D-119

- OK: Repair
- NG: Replace

Check the harness wire between the injector driver and engine-A/T-ECU.

- OK: Repair
- NG: Replace

Use a analyzer to measure the signal waveform at the engine-A/T-ECU connectors D-119 and D-120.

- Engine: idling
- Selector lever position: P
- Voltage between 96 and earth, and between 1 and earth

**OK:** A normal waveform should be displayed as described on P.13A-214 (INSPECTION PROCEDURE USING AN ANALYZER).

Check the trouble symptoms.

- OK: Replace the injector driver.
- NG: Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)

Replace the engine-A/T-ECU.

---

Inspection procedure 35

**EGR valve (stepper motor) system**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>The engine-A/T-ECU controls the EGR valve (stepper motor) in order to control the amount of exhaust gas mixed in the intake air.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the EGR valve</td>
<td>Open circuit or short-circuited harness wire in the EGR valve circuit</td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
<td></td>
</tr>
</tbody>
</table>

Check the EGR valve. (Refer to GROUP 17 - Emission Control System.)

- OK: Replace
- NG: Repair

Measure at the EGR valve connector B-60.
- Disconnect the connector, and measure at the harness side.
- Voltage between 2, 5 and earth (Ignition switch: ON)

**OK:** System voltage

Check the following connector: B-25X

- OK: Repair
- NG: Check the harness wire between the EGR valve and the engine control relay, and repair if necessary.

Check the trouble symptoms.

Check the following connector: B-60

- OK: Repair
- NG: Check the harness wire between the engine-A/T-ECU and EGR valve, and repair if necessary.

Check the trouble symptoms.

Check the following connector: D-120

- OK: Repair
- NG: Replace the engine-A/T-ECU.
Inspection procedure 36

### Purge control solenoid valve system

The engine-A/T-ECU controls the purge control solenoid valve in order to control the purge air coming from the canister.

<table>
<thead>
<tr>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malfunction of the purge control solenoid valve</td>
</tr>
<tr>
<td>Open circuit or short-circuited harness wire in the purge control solenoid valve circuit</td>
</tr>
<tr>
<td>Malfunction of the engine-A/T-ECU</td>
</tr>
</tbody>
</table>

#### Check the trouble symptoms.

**Check the purge control solenoid valve.**

(Refer to GROUP 17 - On-vehicle Service.)

**NG** Replace

**OK**

**Measure at the purge control solenoid valve connector B-106.**
- Disconnect the connector, and measure at the harness side.
- Voltage between 2 and earth (Ignition switch: ON)
  - **OK:** System voltage
  - **NG**

**Check the trouble symptoms.**

**NG**

**OK**

**Measure at the engine-A/T-ECU connector D-120.**
- Disconnect the connector, and measure at the harness side.
- Voltage between 5 and earth (Ignition switch: ON)
  - **OK:** System voltage
  - **NG**

**Check the following connector:**

B-106

**NG** Repair

**OK**

**Check the trouble symptoms.**

**NG**

**OK**

**Check the following connector:**

D-120

**NG** Repair

**OK**

**Check the trouble symptoms.**

**NG** Replace the engine-A/T-ECU.
Caution
When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE
*1: Injector running time indicates the time where the power voltage is 11 V and the cranking speed is 250 r/min or less. As the engine speed increases and the time passes by, the injector running time decreases.
*2: There may be occasions of taking the injector running time approximately 10% longer than usual when a vehicle has not been driven for a long time (mileage is no more than 500 km.)
*3: It is normal that the idle switch turns from ON to OFF when accelerator pedal position sensor (1st channel) voltage increases by 200 - 600 mV from the idling position. Moreover, adjust the idle switch and accelerator pedal position sensor if the idle switch keeps turning after the accelerator pedal is depressed.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Inspection item</th>
<th>Inspection contents</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Oxygen sensor</td>
<td>Engine: After having warmed up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)</td>
<td>When at 4,000 r/min, engine is decelerated</td>
<td>Code No. 11</td>
<td>13A-131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Race the engine suddenly.</td>
<td>200 mV or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: After having warmed up (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition by the engine-A/T-ECU.)</td>
<td>Idling (after six minutes)</td>
<td>600 - 1,000 mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>400 mV or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>600 - 1,000 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,500 r/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Air flow sensor</td>
<td>• Engine coolant temperature: 80 - 95°C</td>
<td>Idling</td>
<td>Code No. 12</td>
<td>13A-133</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lamps and all accessories: OFF</td>
<td>22 - 48 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Transmission: P range</td>
<td>60 - 100 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency increases in response to racing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,500 r/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON or with engine running</td>
<td>When intake air temperature is -20°C</td>
<td>Code No. 13</td>
<td>13A-135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When intake air temperature is 0°C</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>0°C</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>When intake air is 20°C</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>20°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When intake air is 40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Inspection item</td>
<td>Inspection contents</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>---------------------</td>
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<td>--------------------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| 14      | Throttle position sensor (2nd channel) | - Engine: After having warmed up  
- Ignition switch: ON (Engine: Stopped) | Release the accelerator pedal.  
Depress the accelerator pedal gradually.  
Depress the accelerator pedal fully. | Code No. 14 | 13A-137 |
|         |                 |                     | 4,000 mV or more | System voltage | Procedure No. 13A-190 |
| 16      | System voltage  | Ignition switch: ON | System voltage | Procedure No. 27 | 13A-191 |
| 18      | Cranking signal (ignition switch: ST) | Ignition switch: ON | Engine: Stopped  
Engine: Cranking | Procedure No. 27 | 13A-191 |
| 21      | Engine coolant temperature sensor | Ignition switch: ON or with engine running | When engine coolant temperature is -20°C  
When engine coolant temperature is 0°C  
When engine coolant temperature is 20°C  
When engine coolant temperature is 40°C | Code No. 21 | 13A-138 |
| 22      | Crank angle sensor | - Engine: Cranking  
- Tachometer: Connected  
- Engine: Idling  
- Idle position switch: ON  
- Within six minutes after engine starting (Only when engine coolant temperature is 80°C) | Compare the tachometer with the MUT-II reading. | Code No. 22 | 13A-140 |
<p>|         |                 |                     | 1,250 - 1,450 r/min | 1,100 - 1,300 r/min | 1,000 - 1,200 r/min | 900 - 1,100 r/min | 550 - 650 r/min |</p>
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Inspection item</th>
<th>Inspection contents</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON at altitude of 0 m 101 kPa</td>
<td>Code No. 13A-145</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>At altitude of 600 m 95 kPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>At altitude of 1,200 m 88 kPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>At altitude of 1,800 m 81 kPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Accelerator pedal position switch</td>
<td>Ignition switch: ON Release the accelerator pedal. ON</td>
<td>Procedure No. 13A-192</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Depress and release the accelerator pedal several times) Depress the accelerator pedal slightly. OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Power steering fluid pressure switch</td>
<td>Engine: Idling When steering wheel is turned ON</td>
<td>Procedure No. 13A-194</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>A/C switch</td>
<td>Engine: Idling When steering wheel is turned A/C switch: OFF A/C switch: ON</td>
<td>Procedure No. 13A-194</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(The A/C compressor is running when the A/C switch is on.) A/C switch: ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Small lamp switch</td>
<td>Engine: Idling Lighting switch: OFF Lighting switch: ON</td>
<td>Procedure No. 13A-195</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Air flow sensor reset signal</td>
<td>Engine: After having warmed up 3,000 r/min ON</td>
<td>Code No. 13A-133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Volumetric efficiency</td>
<td>• Engine coolant temperature: 85 - 95°C • Lamps and all accessories: OFF • Transmission: P range</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Crank angle sensor</td>
<td>• Engine: Cranking (reading is possible at 2,000 r/min or less) • Tachometer: Connected</td>
<td>Engine speeds displayed on the MUT-II and tachometer are identical. -</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Inspection item</td>
<td>Inspection contents</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
</tr>
<tr>
<td>---------</td>
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<td>------------------</td>
<td>------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>41</td>
<td>Injector drive time*1</td>
<td>• Engine: Cranking</td>
<td>When engine coolant temperature is 0°C</td>
<td>120 - 160 ms</td>
<td>Code No. 41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When engine coolant temperature is 20°C</td>
<td>70 - 90 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When engine coolant temperature is 80°C</td>
<td>20 - 35 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lamps and all accessories: OFF</td>
<td>Increases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Ignition advance value</td>
<td>• Engine: After having warmed up</td>
<td>Idling</td>
<td>12 - 28° BTDC</td>
<td>Code No. 44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.)</td>
<td>2,500 r/min</td>
<td>15 - 35° BTDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Within six minutes after engine starting</td>
<td>0.3 - 0.8 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>A/C relay</td>
<td>Engine: After having warmed up, idling</td>
<td>A/C switch: OFF</td>
<td>OFF (compressor clutch is not operating)</td>
<td>Procedure No.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A/C switch: ON</td>
<td>ON (compressor clutch is operating)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Stop lamp switch</td>
<td>Ignition switch: ON</td>
<td>Brake pedal: Depressed</td>
<td>OFF</td>
<td>Procedure No.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brake pedal: Released</td>
<td>ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>EGR valve</td>
<td>• Engine coolant temperature: 85 - 95°C</td>
<td>Idling</td>
<td>2 - 20 STEP</td>
<td>Procedure No.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lamps and all accessories: OFF</td>
<td>2,500 r/min</td>
<td>0 - 10 STEP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmission: P range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Fuel pressure sensor</td>
<td>• Engine coolant temperature: 85 - 95°C</td>
<td>Engine: Cranking</td>
<td>2 MPa or more</td>
<td>Code No. 56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lamps and all accessories: OFF</td>
<td>Engine: Idling</td>
<td>4.0 - 6.9 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmission: P range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Inspection item</td>
<td>Inspection contents</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>77</td>
<td>Accelerator pedal position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>985 - 1,085 mV</td>
<td>Code No. 13A-154</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal gradually.</td>
<td>Increases in response to the pedal depression stroke.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully.</td>
<td>4,000 mV or more</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Accelerator pedal position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal.</td>
<td>985 - 1085 mV</td>
<td>Code No. 13A-156</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal gradually.</td>
<td>Increases in response to the pedal depression stroke.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully.</td>
<td>4,000 mV or more</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Throttle position sensor (1st channel)</td>
<td>Engine: After having warmed up</td>
<td>Release the accelerator pedal.</td>
<td>400 - 800 mV</td>
<td>Code No. 13A-158</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON (Engine stopped)</td>
<td>Depress the accelerator pedal gradually.</td>
<td>Increases in response to the pedal depression stroke.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully.</td>
<td>4,200 - 4,800 mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idling after warming-up</td>
<td>No load</td>
<td>450 - 1,000 mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A/C switch: OFF to ON</td>
<td>Increases by 100 - 600 mV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transmission: P to D range</td>
<td>Increases by 0 - 200 mV</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Combustion mode</td>
<td>Engine: After having warmed up</td>
<td>Idling (several minutes after starting)</td>
<td>Compression lean</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,500 r/min</td>
<td>Stoichiometric feedback</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Race the engine suddenly while the engine is idling.</td>
<td>Open loop</td>
<td>-</td>
</tr>
</tbody>
</table>
# ACTUATOR TEST REFERENCE TABLE

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Inspection Item</th>
<th>Drive Contents</th>
<th>Inspection contents</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Injector</td>
<td>Cut fuel to the No.1 injector</td>
<td>Engine: Idling after warming-up (Cut the fuel supply to each injector in turn and check cylinders which does not affect idling.)</td>
<td>Idling condition becomes different (becomes unstable, or the engine stalls).</td>
<td>Code No. 41</td>
<td>13A-147</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>Cut fuel to the No.2 injector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>Cut fuel to the No.3 injector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td></td>
<td>Cut fuel to the No.4 injector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td></td>
<td>Cut fuel to the No.5 injector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td></td>
<td>Cut fuel to the No.6 injector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>Fuel pump (low-pressure)</td>
<td>Operates the fuel pump (low-pressure) to circulate fuel</td>
<td>Ignition switch: ON</td>
<td>Pulse is felt.</td>
<td>Procedure No.29</td>
<td>13A-193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pinch the return hose with fingers to feel the pulse of the fuel being circulated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08</td>
<td>Purge control solenoid valve</td>
<td>Solenoid valve turns from OFF to ON</td>
<td>Ignition switch: ON</td>
<td>Sound of operation can be heard when solenoid valve is driven.</td>
<td>Procedure No.36</td>
<td>13A-197</td>
</tr>
</tbody>
</table>
| 17       | Basic ignition timing | Solenoid valve turns from OFF to ON | ● Engine: Idling  
● Set a timing light. | 5° BTDC | - | - |
| 21       | Condenser fan | Drive the fan motor | ● Ignition switch: ON  
● A/C switch: ON | Fan motor runs | Procedure No.21 | 13A-187 |
| 34       | Electronic-controlled throttle valve system | Stop the throttle control servo | Ignition switch: ON | The throttle valve opens slightly | Code No. 91 | 13A-161 |
CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

Engine-A/T-ECU Connector Terminal Arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Check condition (Engine condition)</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No.1 injector</td>
<td>While engine is idling after having warmed up, suddenly depress the accelerator pedal.</td>
<td>From 9 - 13 V, momentarily drops slightly</td>
</tr>
<tr>
<td>9</td>
<td>No.2 injector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>No.3 injector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No.4 injector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>No.5 injector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>No.6 injector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oxygen sensor heater</td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 5,000 r/min</td>
<td>System voltage</td>
</tr>
<tr>
<td>6</td>
<td>Injector driver relay</td>
<td>Ignition switch: OFF</td>
<td>0 - 0.1 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>0.5 - 1.0 V</td>
</tr>
</tbody>
</table>
| 8            | Alternator G terminal | Engine: Idling after warming-up  
Radiator fan: Not operating  
Headlamp: off to on  
Stop lamp: off to on  
Defogger switch: OFF to ON | The voltage increases by 0.2 - 3.5 V |
| 54           | Alternator FR terminal | Engine: Idling after warming-up  
Radiator fan: Not operating  
Headlamp: off to on  
Stop lamp: off to on  
Defogger switch: OFF to ON | The voltage drops |
<p>| 11           | No.1 ignition coil | Engine speed: 3,000 r/min                                                                       | 0.3 - 3.0 V            |
| 31           | No.2 ignition coil |                                                                                               |                        |
| 13           | No.3 ignition coil |                                                                                               |                        |
| 30           | No.4 ignition coil |                                                                                               |                        |
| 12           | No.5 ignition coil |                                                                                               |                        |
| 32           | No.6 ignition coil |                                                                                               |                        |
| 14           | Throttle control servo relay | Ignition switch: OFF                                                                            | 0 - 0.1 V              |
|              |                | Ignition switch: ON                                                                             | 0.5 - 1.0 V            |</p>
<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Check condition (Engine condition)</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Condenser fan relay</td>
<td>Condenser fan not operating</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Condenser fan operating</td>
<td>0 - 3 V or more</td>
</tr>
<tr>
<td>19</td>
<td>Air flow sensor reset signal</td>
<td>Engine: Idling</td>
<td>0 - 1 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine speed: 3,000 r/min</td>
<td>6 - 9 V</td>
</tr>
<tr>
<td>20</td>
<td>A/C relay</td>
<td>● Engine: Idling</td>
<td>System voltage or changes momentarily 6 V or more to 0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● A/C switch: OFF to ON (Compressor operating)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Fuel pump relay</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td>22</td>
<td>Engine warning lamp</td>
<td>Ignition switch: OFF to ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>23</td>
<td>GDI ECO indication lamp</td>
<td>Ignition switch: OFF to ON</td>
<td>0 - 3 V (system voltage after five seconds)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rev the engine suddenly.</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Purge control solenoid valve</td>
<td>● Engine coolant temperature: 80 - 95 °C</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: stopped</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: After starting, increase the engine speed up to 3,500 r/min</td>
<td>The voltage drops</td>
</tr>
<tr>
<td>41</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Engine ignition signal</td>
<td>Engine speed: 3,000 r/min</td>
<td>0.3 - 3.0 V</td>
</tr>
<tr>
<td>44</td>
<td>Engine coolant temperature sensor</td>
<td>Ignition switch: ON</td>
<td>When engine coolant temperature is 0°C 3.2 - 3.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 20°C 2.3 - 2.9 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 40°C 1.3 - 1.9 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 80°C 0.3 - 0.9 V</td>
</tr>
<tr>
<td>45</td>
<td>Crank angle sensor</td>
<td>Engine: Cranking</td>
<td>0.4 - 4.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>1.5 - 2.5 V</td>
</tr>
<tr>
<td>46</td>
<td>Power supply voltage applied to accelerator pedal position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check condition (Engine condition)</td>
<td>Normal condition</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>49</td>
<td>Engine control relay</td>
<td>Ignition switch: OFF</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>51</td>
<td>EGR valve (A)</td>
<td>Ignition switch: OFF to ON</td>
<td>5 - 8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Repeatedly changes for approx. 3 seconds)</td>
</tr>
<tr>
<td>53</td>
<td>EGR valve (C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>EGR valve (B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>EGR valve (C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Power steering fluid pressure</td>
<td>Engine: Idling after warming-up</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td>switch</td>
<td>When steering wheel is stationary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When steering wheel is turned</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td>55</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON</td>
<td>At an altitude of 0 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>At an altitude of 1,200 m</td>
</tr>
<tr>
<td>56</td>
<td>Camshaft position sensor</td>
<td>Engine: Cranking</td>
<td>0.4 - 3.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>0.5 - 2.0 V</td>
</tr>
<tr>
<td>58</td>
<td>Ignition switch-ST</td>
<td>Engine: Cranking</td>
<td>8 V or more</td>
</tr>
<tr>
<td>61</td>
<td>A/C switch 2</td>
<td>Refer to GROUP 55 - Troubleshooting (Check at A/C-ECU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>or Engine-ECU Terminal).</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Injector open circuit check</td>
<td>Engine: Increases from idling up to 4,000 r/min</td>
<td>The voltage decreases slightly (approx. 0.7 V) from 4.5 - 5.0 V.</td>
</tr>
<tr>
<td></td>
<td>signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 - 3.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake air temperature is 0°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake air temperature is 20°C</td>
<td>2.3 - 2.9 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake air temperature is 40°C</td>
<td>1.5 - 2.1 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake air temperature is 80°C</td>
<td>0.4 - 1.0 V</td>
</tr>
<tr>
<td>65</td>
<td>Air flow sensor</td>
<td>Engine: Idling</td>
<td>2.2 - 3.2 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine speed: 2,500 r/min</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Backup power supply</td>
<td>Ignition switch: OFF</td>
<td>System voltage</td>
</tr>
<tr>
<td>71</td>
<td>Oxygen sensor</td>
<td>Engine: Running at 2,500 r/min after warming-up</td>
<td>Voltages of 0 V and 0.8 V alternate</td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check item</td>
<td>Check condition (Engine condition)</td>
<td>Normal condition</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>78</td>
<td>Throttle position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal. 4.0 V or higher</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully. 0.4 - 0.6 V</td>
</tr>
<tr>
<td>79</td>
<td>Accelerator pedal position switch</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal. 0 - 1 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal slightly. 4 V or more</td>
</tr>
<tr>
<td>80</td>
<td>Vehicle speed sensor</td>
<td></td>
<td>Ignition switch: ON 0-1V Depress the accelerator pedal slightly. 4 V or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ignition switch: ON Move the vehicle slowly forward Votages of 0 and 8 - 12 V alternate (changes repeatedly)</td>
</tr>
<tr>
<td>83</td>
<td>A/C switch 1</td>
<td>Engine: Idling</td>
<td>A/C switch: OFF 0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A/C switch: ON (Compressor is operating) System voltage</td>
</tr>
<tr>
<td>86</td>
<td>Small lamp switch</td>
<td>Lighting switch: OFF</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lighting switch: Tail light position System voltage</td>
</tr>
<tr>
<td>87</td>
<td>Sensor applied voltage</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td>93</td>
<td>Fuel pressure sensor</td>
<td>Engine: Idling</td>
<td>0.3 - 4.7 V</td>
</tr>
<tr>
<td>95</td>
<td>Accelerator pedal position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>Release the accelerator pedal. 0.985 - 1.085 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully. 4.0 V or higher</td>
</tr>
<tr>
<td>98</td>
<td>Ignition switch-IG</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>123</td>
<td>Stop lamp switch</td>
<td>Depress the brake pedal.</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Release the brake pedal. 0 - 3 V</td>
</tr>
</tbody>
</table>
CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to OFF.
2. Disconnect the engine-A/T-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-A/T-ECU 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 earth, damage may be caused to the vehicle wiring, sensors, engine-A/T-ECU 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 then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.
## Engine-A/T-ECU Harness Side Connector Terminal Arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Standard value, normal condition (check conditions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-41</td>
<td>Oxygen sensor heater</td>
<td>4.5 - 8.0 Ω (at 20°C)</td>
</tr>
<tr>
<td>34-41</td>
<td>Purge control solenoid valve</td>
<td>28 - 36 Ω (at 20°C)</td>
</tr>
<tr>
<td>42-body earth</td>
<td>Earth</td>
<td>Continuity (0 Ω)</td>
</tr>
<tr>
<td>48-body earth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-41</td>
<td>EGR valve (A)</td>
<td>15 - 20 Ω (at 20°C)</td>
</tr>
<tr>
<td>53-41</td>
<td>EGR valve (C)</td>
<td></td>
</tr>
<tr>
<td>60-41</td>
<td>EGR valve (B)</td>
<td></td>
</tr>
<tr>
<td>62-41</td>
<td>EGR valve (D)</td>
<td></td>
</tr>
<tr>
<td>44-81</td>
<td>Engine coolant temperature sensor</td>
<td>5.1 - 6.5 kΩ (When coolant temperature is 0°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.1 - 2.7 kΩ (When coolant temperature is 20°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.9 - 1.3 kΩ (When coolant temperature is 40°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.26 - 0.36 kΩ (When coolant temperature is 80°C)</td>
</tr>
<tr>
<td>64-81</td>
<td>Intake air temperature sensor</td>
<td>5.3 - 6.7 kΩ (When intake air temperature is 0°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.3 - 3.0 kΩ (When intake air temperature is 20°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0 - 1.5 kΩ (When intake air temperature is 40°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.30 - 0.42 kΩ (When intake air temperature is 80°C)</td>
</tr>
<tr>
<td>79-81</td>
<td>Accelerator pedal position switch</td>
<td>Continuity (when the accelerator pedal is released)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No continuity (when the accelerator pedal is depressed slightly)</td>
</tr>
</tbody>
</table>
## Terminal Voltage Check Chart

### Throttle Valve Controller Terminal Arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Check condition (Engine condition)</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throttle control servo (U)</td>
<td>• Ignition switch: ON</td>
<td>Changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Accelerator pedal: From released position to fully depressed position</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Throttle control servo (V)</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>15</td>
<td>Throttle control servo (W)</td>
<td>Accelerator pedal: From released position to fully depressed position</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Throttle control servo power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>5</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>6</td>
<td>Sensor applied voltage</td>
<td>Ignition switch: ON</td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td>7</td>
<td>Throttle position sensor (1st channel)</td>
<td>Ignition switch: ON</td>
<td>0.4 - 0.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Release the accelerator pedal.</td>
<td>4.2 - 4.8 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Backup power supply</td>
<td>Ignition switch: OFF</td>
<td>System voltage</td>
</tr>
<tr>
<td>20</td>
<td>Accelerator pedal position sensor (2nd channel)</td>
<td>Ignition switch: ON</td>
<td>0.985 - 1.085 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Release the accelerator pedal.</td>
<td>4.0 V or higher</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depress the accelerator pedal fully.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Ignition switch-IG</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE USING AN ANALYZER
AIR FLOW SENSOR (AFS)

Measurement Method
1. Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to air flow sensor connector terminal 3.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 65.

Standard Wave Pattern

Table:

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>

Standard wave pattern

The time (cycle time) T is reduced when the amount of intake air increases.
Times T1 and T2 are equal.

Observation conditions (from conditions above engine speed is increased by racing.)

Wave Pattern Observation Points
Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.
Examples of Abnormal Wave Patterns

- **Example 1**
  **Cause of problem**
  Sensor interface malfunction
  **Wave pattern characteristics**
  Rectangular wave pattern is output even when the engine is not started.

- **Example 2**
  **Cause of problem**
  Damaged rectifier or vortex generation column
  **Wave pattern characteristics**
  Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.

**CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR**

**Measurement Method**

1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to camshaft position sensor terminal 2.
3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
4. Connect the analyzer special patterns pickup to crank angle sensor terminal 2.

**Alternate Method (Test harness not available)**

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 56. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 45. (When checking the crank angle sensor signal wave pattern.)

**Standard Wave Pattern**

**Observation conditions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>
Standard wave pattern

Wave Pattern Observation Points
Check that cycle time T becomes shorter when the engine speed increases.

Examples of Abnormal Wave Patterns

- Example 1
  **Cause of problem**
  Sensor interface malfunction
  **Wave pattern characteristics**
  Rectangular wave pattern is output even when the engine is not started.

- Example 2
  **Cause of problem**
  Loose timing belt
  Abnormality in sensor disk
  **Wave pattern characteristics**
  Wave pattern is displaced to the left or right.
INJECTORS AND INJECTOR OPEN CIRCUIT CHECK SIGNAL

Measurement Method

1. Connect the analyzer special patterns pickup to terminal 1 (No.1 injector) of the engine-A/T-ECU connector.
2. Connect the analyzer special patterns pickup to terminal 63 (injector open circuit check signal) of the engine-ECU connector.
3. After checking terminal 1, check terminal 9 (No.2 injector), terminal 24 (No.3 injector), terminal 2 (No.4 injector), terminal 10 (No.5 injector) and terminal 25 (No.6 injector).

Standard Wave Pattern

Observation conditions

<table>
<thead>
<tr>
<th>Function</th>
<th>Special pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Idle speed</td>
</tr>
</tbody>
</table>

Standard wave pattern

Wave Pattern Observation Points

- Check that the injector drive time is identical to the time displayed on the MUT-II.
- Check that the injector signals become greatly extended but soon return to their normal wave length when the engine is suddenly raced.
- Check that the injector open circuit check signal is synchronized with each rising portion of the injector drive signal.
IGNITION COIL AND POWER TRANSISTOR

Power transistor control signal

Measurement Method
1. Disconnect the ignition coil connector, and connect the special tool (test harness: MB991658) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to terminal 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 11 (No. 1 ignition coil), terminal 31 (No. 2 ignition coil), terminal 13 (No. 3 ignition coil), terminal 30 (No. 4 ignition coil), terminal 12 (No. 5 ignition coil) and terminal 32 (No. 6 ignition coil) respectively.

Standard Wave Pattern

Observation condition

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>Low</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine r/min</td>
<td>Approx. 1,200 r/min</td>
</tr>
</tbody>
</table>

Standard wave pattern

- **Crank angle sensor output wave pattern**
  - T: Revolution time corresponding to a crank angle of 120
  - Compression top dead centre

- **Power transistor control signal wave pattern**
  - θ: Spark advance angle
  - OFF
  - ON
  - Dowel division
  - Point wave built-up section

T: Revoltion time corresponding to a crank angle of 120
θ: Spark advance angle
Compression top dead centre
Point wave built-up section
Dowel division
Wave Pattern Observation Points
Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

<table>
<thead>
<tr>
<th>Condition of wave pattern build-up section and maximum voltage</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rises from approx. 2V to approx. 4.5V at the top-right</td>
<td>Normal</td>
</tr>
<tr>
<td>2V rectangular wave</td>
<td>Open-circuit in ignition primary circuit</td>
</tr>
<tr>
<td>Rectangular wave at power voltage</td>
<td>Power transistor malfunction</td>
</tr>
</tbody>
</table>

Examples of Abnormal Wave Patterns

- **Example 1**
  
  Wave pattern during engine cranking

  **Cause of problem**
  
  Open-circuit in ignition primary circuit

  **Wave pattern characteristics**
  
  Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.

- **Example 2**
  
  Wave pattern during engine cranking

  **Cause of problem**
  
  Malfunction in power transistor

  **Wave pattern characteristics**
  
  Power voltage results when the power transistor is ON.
EGR VALVE (STEPPER MOTOR)

Measurement Method
1. Disconnect the EGR valve connector, and connect the special tool (test harness: MB991658) in between.
2. Connect the analyzer special patterns pickup to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test harness not available)
1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 51, connection terminal 60, connection terminal 53, and connection terminal 62 respectively.

Standard Wave Pattern

Observation conditions

<table>
<thead>
<tr>
<th>Function</th>
<th>Special patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern height</td>
<td>High</td>
</tr>
<tr>
<td>Pattern selector</td>
<td>Display</td>
</tr>
<tr>
<td>Engine condition</td>
<td>When the engine coolant temperature is 20°C or below, turn the ignition switch from OFF to ON (without starting the engine).</td>
</tr>
<tr>
<td></td>
<td>While the engine is idling, turn the A/C switch to ON.</td>
</tr>
<tr>
<td></td>
<td>Immediately after starting the warm engine</td>
</tr>
</tbody>
</table>

Standard wave pattern

The wave pattern appears for an instant, but soon disappears. Point B: Coil reverse electromotive force (Approx. 3 x 10V). Point A: Induced electromotive force from the motor turning.
Wave Pattern Observation Points

Check that the standard wave pattern appears when the EGR control servo is operating.

Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

<table>
<thead>
<tr>
<th>Contrast with standard wave pattern</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induced electromotive force does not appear or is extremely small.</td>
<td>Motor is malfunctioning</td>
</tr>
</tbody>
</table>

Point B: Height of coil reverse electromotive force

<table>
<thead>
<tr>
<th>Contrast with standard wave pattern</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil reverse electromotive force does not appear or is extremely small.</td>
<td>Short in the coil</td>
</tr>
</tbody>
</table>

Examples of Abnormal Wave Pattern

- **Example 1**
  - **Cause of problem**
    Motor is malfunctioning. (Motor is not operating.)
  - **Wave pattern characteristics**
    Induced electromotive force from the motor turning does not appear.

- **Example 2**
  - **Cause of problem**
    Open circuit in the line between the EGR valve and the engine-A/T-ECU
  - **Wave pattern characteristics**
    Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 V.) Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.
ON-VEHICLE SERVICE

Caution
(1) Never attempt to tamper the fixed SAS. The fixed SAS is precisely adjusted at factory.
(2) Should it be tampered, the full closed position of the throttle valve will be changed. This causes the engine-ECU to learn a wrong position of the throttle valve.

FUEL PUMP CONNECTOR DISCONNECTION
(HOW TO REDUCE FUEL PRESSURE)

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release fuel pressure in the line and prevent fuel from running out.

1. Remove the fuel filler cap to release pressure in the fuel tank.
2. Remove the fuel pump relay.
3. Connect the MUT-II to the diagnosis connector.

Caution
Turn off the ignition switch before disconnecting or connecting the MUT-II.

4. Turn off the ignition switch.
5. Select “Item No.74” from the MUT-II Data list.
6. Crank the engine for at least two seconds.
7. If the engine is not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
8. If the engine is started, release fuel pressure by the following procedure:
   (1) Turn off the ignition switch, and then stop the engine.
   (2) Disconnect one of the ignition coil connectors.
   (3) Crank the engine for at least two seconds.
   (4) If the engine is not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
   (5) If the engine is started, stop it by racing and use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
   (6) Reconnect the ignition coil connector.

Caution
Clean the spark plug which corresponds to the disconnected ignition coil connector.

9. Remove the MUT-II.
10. Install the fuel pump relay.
FUEL PUMP OPERATION (LOW PRESSURE) CHECK
1. Check the operation of the fuel pump by using the MUT-II to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
   (1) Turn the ignition switch to the LOCK (OFF) position.
   (2) Remove the fuel pump relay. Connect the terminal No.2 of the harness-side connector to the battery. Check if the fuel pump operation sound can be heard at this time.

NOTE
As the fuel pump is an in-tank type, the fuel pump sound is hard to hear, so remove the fuel filler cap and check from the tank inlet.

(3) Check the fuel pressure by pinching the fuel hose with the fingertips.

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING
1. Start the engine, and warm it up until engine coolant temperature reaches 80°C. Then stop the engine.
2. Remove the air intake hose at the throttle body side.
3. Apply cleaning agent to the throttle valve through the intake port of the throttle valve, and then leave it for approx. five minutes.
4. Start the engine, race it several times, and then let it run at idle for approx. one minute.
5. If carbon deposits are not removed from the throttle vale area, repeat steps (3) and (4).
6. Install the air intake hose.
7. Use the MUT-II or disconnect the negative battery cable from the battery terminal in order to erase a diagnosis code. Wait for at least ten seconds, and then let the engine run at idle again for approx. ten minutes.

THROTTLE POSITION SENSOR (TPS) ADJUSTMENT
1. Connect the MUT-II to the diagnosis connector.
2. Check the output voltage of throttle position sensor (1st channel) while closing the throttle valve fully with your finger.

**Standard value: 0.4 - 0.6 V**

3. If outside the standard value, loosen the throttle position sensor mounting bolts, and adjust the throttle position sensor by rotating it.

4. Check the output voltage of throttle position sensor (2nd channel) while closing the throttle valve fully with your finger.

**Standard value: 4.2 - 4.8 V**

5. If outside the standard value, replace the throttle position sensor.

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

7. Connect the throttle control servo connector.

8. Remove the MUT-II.

9. If a diagnosis code is set, erase it by using the MUT-II or by disconnecting the negative battery cable for ten seconds or more, reconnecting it.

10. Turn the ignition switch to the ON position, and then return it to the LOCK (OFF) position. Then maintain that condition for ten seconds or more.)

If the negative battery cable is disconnected at step 11, let the engine run at idle for ten minutes.

---

**ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT**

**Caution**

1. The Accelerator pedal position sensor should not be moved unnecessarily; it has been precisely adjusted by the manufacturer.

2. If the adjustment is disturbed for any reason, readjust as follows.

1. Remove the accelerator pedal complete.

2. Connect the MUT-II to the diagnosis connector.
3. Check that the accelerator pedal arm touches the full-closed stopper.
4. Adjust the pedal arm by the adjusting screw so that clearance “A” (see the illustration) is 0.5 - 0.93 mm.
5. Hold the adjusting screw with the lock nut.
6. Turn the ignition switch to the ON position. (but do not start the engine.)
7. Turn the accelerator pedal position sensor until the output from accelerator pedal position sensor (1st channel) satisfies the standard value.

**Standard value: 0.985 - 1.085 V**
8. Tighten the accelerator pedal position sensor mounting bolts securely.
9. Install the accelerator pedal complete.

---

**FUEL PRESSURE TEST**

**MEASUREMENT OF FUEL LOW PRESSURE BETWEEN FUEL PUMP (LOW PRESSURE) AND FUEL PUMP (HIGH PRESSURE)**

1. Release residual pressure from the fuel pipe line to prevent fuel gush out. (Refer to P.13A-225.)
2. Disconnect the high-pressure fuel hose at the fuel pump (high pressure) side.

**Caution**

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

3. Remove the union joint and bolt from the special tool (adapter hose) and instead attach the special tool (hose adapter) to the adapter hose.
4. Install the special tool (for measuring the fuel pressure) that was set up in step 3.

<When using the fuel pressure gauge set (special tool)>
(1) Install the special tool (for measuring the fuel pressure) between the high-pressure fuel hose and the fuel pump (high pressure).
(2) Install the fuel pressure gauge set (special tool) on the special tool (for measuring the fuel pressure) putting the gasket between them.

(3) Connect the lead wire of the fuel pressure gauge set (special tool) to the power supply (cigarette lighter socket) and to the MUT-II.

<When using the fuel pressure gauge>
(1) Install the fuel pressure gauge on the special tool (for measuring the fuel pressure) putting a suitable O-ring or gasket between them.

(2) Install the special tool which was set up in step (1) between the high-pressure fuel hose and the fuel pump (high pressure).

5. Connect the MUT-II to the diagnosis connector.

**Caution**

Turn off the ignition switch before disconnecting or connecting the MUT-II.

6. Turn the ignition switch to ON. (But do not start the engine.)

7. Select “Item No.07” from the MUT-II Actuator test to drive the fuel pump (low pressure) at the fuel tank side. Check that there are no fuel leaks from any parts.

8. Finish the actuator test or turn the ignition switch to OFF.

9. Start the engine and run at idle.

10. Measure fuel pressure while the engine is running at idle.

**Standard value: approximately 329 kPa**

11. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.

12. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fuel pressure too low</td>
<td>Clogged fuel filter</td>
<td>Replace fuel filter</td>
</tr>
<tr>
<td>• Fuel pressure drops after racing</td>
<td>Fuel leaking to return side due to poor fuel pressure regulator (low pressure) valve seating or settled spring</td>
<td>Replace fuel pressure regulator (low pressure)</td>
</tr>
<tr>
<td></td>
<td>Low fuel pump (low pressure) delivery pressure</td>
<td>Replace the fuel pump (low pressure)</td>
</tr>
<tr>
<td>Fuel pressure too high</td>
<td>Binding valve in fuel pressure regulator (low pressure)</td>
<td>Replace fuel pressure regulator (low pressure)</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel return hose or pipe</td>
<td>Clean or replace hose or pipe</td>
</tr>
</tbody>
</table>
13. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel pressure drops gradually after engine is stopped</td>
<td>Leaky fuel pressure regulator (low pressure) valve seat</td>
<td>Replace fuel pressure regulator (low pressure)</td>
</tr>
<tr>
<td>Fuel pressure drops sharply immediately after engine is stopped</td>
<td>Check valve in fuel pump (low pressure) is held open</td>
<td>Replace the fuel pump (low pressure)</td>
</tr>
</tbody>
</table>

14. Release residual pressure from the fuel pipe line. (Refer to P.13A-225.)
15. Remove the fuel pressure gauge and special tools from the fuel pump (high pressure).

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

16. Replace the O-ring at the end of the high-pressure fuel hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
17. Fit the high-pressure fuel hose to the fuel pump (high pressure) and tighten the mounting bolt to specified torque.
18. Check for any fuel leaks by following the procedure in step 7.
19. Disconnect the MUT-II.

MEASUREMENT OF FUEL HIGH PRESSURE BETWEEN FUEL PUMP (HIGH PRESSURE) AND INJECTORS

NOTE
Measurement of the fuel pressure between the fuel pump (high pressure) and the injectors should be carried out after checking that the fuel pressure between the fuel pump (low pressure) and the fuel pump (high pressure) is normal.

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select “Item No.74” from the MUT-II Data list.
5. Crank the engine continuously for 2 seconds or more, and visually check that there are no fuel leaks from any parts.

Caution
If any fuel leaks appear, stop cranking immediately and repair the source of the leak.
6. Check if the fuel pressure is more than 1 MPa immediately after 20 seconds have passed since cranking was finished.
7. If the fuel pressure is lower than 1 MPa, it means that there is likely to be a leak in the high-pressure fuel system, so this system should be checked.
8. Turn the ignition switch to OFF.
9. Connect the injector intermediate harness connector.
10. Start the engine and run at idle.
11. Measure fuel pressure while the engine is running at idle.

**Standard value: 4 - 6.9 MPa**

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fuel pressure too low</td>
<td>Fuel leaking to return side due to poor fuel pressure regulator (high pressure) valve seating or settled spring</td>
<td>Replace fuel pressure regulator (high pressure)</td>
</tr>
<tr>
<td>• Fuel pressure drops after racing</td>
<td>Low fuel pump (high pressure) delivery pressure</td>
<td>Replace the fuel pump (high pressure)</td>
</tr>
<tr>
<td>Fuel pressure too high</td>
<td>Binding valve in fuel pressure regulator (high pressure)</td>
<td>Replace fuel pressure regulator (high pressure)</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel return hose or pipe</td>
<td>Clean or replace hose or pipe</td>
</tr>
</tbody>
</table>

14. Stop the engine and turn the ignition switch to OFF.
15. Disconnect the MUT-II.

**FUEL LEAK CHECK**

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select “Item No.74” from the MUT-II Data list.
5. Crank the engine continuously for two seconds or more, and visually check that there are no fuel leaks from any parts.

**Caution**
If any fuel leaks appear, stop cranking immediately and repair the source of the leak.

6. Crank the engine, and then measure fuel pressure immediately after 20 seconds.

**Limit: Minimum 1 MPa**

**Caution**
If the fuel pressure is less than 1 MPa, there may be a partial fuel leak in the high-pressure fuel system.

7. Turn off the ignition switch.
8. Reconnect the injector intermediate connector.
9. Remove the MUT-II.
# COMPONENT LOCATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/C relay</td>
<td>G</td>
<td>Fuel pump relay</td>
<td>H</td>
</tr>
<tr>
<td>A/C switch</td>
<td>R</td>
<td>Ignition coil</td>
<td>F</td>
</tr>
<tr>
<td>Accelerator pedal position sensor (1st and 2nd channels)</td>
<td>T</td>
<td>Ignition failure sensor</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhibitor switch &lt;A/T&gt;</td>
<td>X</td>
</tr>
<tr>
<td>Air flow sensor (with intake air temperature sensor and barometric pressure sensor)</td>
<td>A</td>
<td>Injectors</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Injector driver (L.H.D)</td>
<td>B</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>E</td>
<td>Injector driver (R.H.D)</td>
<td>G</td>
</tr>
<tr>
<td>Clutch switch &lt;M/T&gt;</td>
<td>S</td>
<td>Injection driver relay</td>
<td>H</td>
</tr>
<tr>
<td>Crank angle sensor</td>
<td>K</td>
<td>Oxygen sensor (front)</td>
<td>V</td>
</tr>
<tr>
<td>Detonation sensor</td>
<td>L</td>
<td>Oxygen sensor (rear) &lt;M/T&gt;</td>
<td>W</td>
</tr>
<tr>
<td>Diagnosis connector</td>
<td>Q</td>
<td>Power steering fluid pressure switch</td>
<td>N</td>
</tr>
<tr>
<td>EGR valve</td>
<td>I</td>
<td>Purge control solenoid valve</td>
<td>M</td>
</tr>
<tr>
<td>Engine control relay</td>
<td>H</td>
<td>Throttle position sensor</td>
<td>C</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>J</td>
<td>Throttle valve controller</td>
<td>U</td>
</tr>
<tr>
<td>Engine-A/T-ECU &lt;A/T&gt;</td>
<td>U</td>
<td>Throttle valve control servo</td>
<td>C</td>
</tr>
<tr>
<td>Engine-ECU &lt;M/T&gt;</td>
<td>U</td>
<td>Throttle valve control servo relay</td>
<td>H</td>
</tr>
<tr>
<td>Engine warning lamp (CHECK ENGINE lamp)</td>
<td>P</td>
<td>Vehicle speed sensor</td>
<td>Y</td>
</tr>
<tr>
<td>Fuel pressure sensor</td>
<td>E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Component Diagram](image_url)
ENGINE CONTROL RELAY, FUEL PUMP RELAY, INJECTOR DRIVER CONTROL RELAY AND THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Not supplied</td>
<td></td>
</tr>
<tr>
<td>Supplied</td>
<td></td>
</tr>
</tbody>
</table>

INTAKE AIR TEMPERATURE SENSOR CHECK
1. Disconnect the air flow sensor connector.
   **Standard value:**
   - 2.3 - 3.0 kΩ (at 20°C)
   - 0.30 - 0.42 kΩ (at 80°C)
3. Measure resistance while heating the sensor using a hair dryer.
   **Normal condition:**
<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>Smaller</td>
</tr>
</tbody>
</table>
4. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR CHECK
**Caution**
Be careful not to touch the connector (resin section) with the tool when removing and installing.
1. Remove the engine coolant temperature sensor.
2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

**Standard value:**
- 2.1 - 2.7 kΩ (at 20°C)
- 0.26 - 0.36 kΩ (at 80°C)

3. If the resistance deviates from the standard value greatly, replace the sensor.

4. Apply sealant to threaded portion.

**Specified sealant:**
- 3M NUT Locking Part No.4171 or equivalent

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

**Tightening torque:** 29 N·m

---

**THROTTLE POSITION SENSOR CHECK**

1. Disconnect the throttle position sensor connector.

2. Measure the resistance between throttle position sensor side connector terminal 1 and terminal 3.

**Standard value:** 0.9 - 2.5 kΩ

3. Measure resistance between terminal Nos. 1 and 2 as well as 1 and 4 of the throttle position sensor connector, respectively.

**Normal condition:**

| Throttle valve slowly open until fully open from the idle position | Changes smoothly in proportion to the opening angle of the throttle valve |

4. If the resistance is outside the standard value, or if it doesn’t change smoothly, replace the throttle position sensor.

**NOTE**

For the throttle position sensor adjustment procedure, refer to P.13A-220.
ACCELERATOR PEDAL POSITION SENSOR CHECK

1. Disconnect the accelerator pedal position sensor connector.

2. Measure the resistance between accelerator pedal position sensor connector terminal (1) [accelerator pedal position sensor (1st channel) earth] and terminal (2) [accelerator pedal position sensor (1st channel) power supply], and between terminal (7) [accelerator pedal position sensor (2nd channel) earth] and terminal (8) [accelerator pedal position sensor (2nd channel) power supply].

   **Standard value: 3.5 - 6.5 kΩ**

3. Measure the resistance between accelerator pedal position sensor connector terminal (2) [accelerator pedal position sensor (1st channel) power supply] and terminal (3) [accelerator pedal position sensor (1st channel) output]; and between terminal (8) [accelerator pedal position sensor (2nd channel) power supply] and terminal (6) [accelerator pedal position sensor (2nd channel) output].

   **Normal condition:**

   | When accelerator pedal is gently depressed | Changes comparatively smoothly in proportion to the accelerator pedal depression amount |

4. If the measured values are outside the standard value range, or if the resistance does not change smoothly, replace the accelerator pedal position sensor.

**NOTE**

After replacement, adjust the accelerator pedal position sensor. (Refer to P.13A-221.)
ACCELERATOR PEDAL POSITION SWITCH CHECK

1. Disconnect the accelerator pedal position sensor (1st channel) connector.
2. Check continuity between terminal Nos. 4 (accelerator pedal position switch) and 5 (sensor earth) of the connector.

<table>
<thead>
<tr>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator pedal</td>
</tr>
<tr>
<td>Depressed</td>
</tr>
<tr>
<td>Released</td>
</tr>
</tbody>
</table>

3. If defective, replace the accelerator pedal position sensor assembly.

NOTE
After replacement, adjust the accelerator pedal position sensor and switch. (Refer to P.13A-221.)

OXYGEN SENSOR CHECK

<Oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (4.5 - 8.0 Ω at 20°C) between terminal 2 (red clip of special tool) and terminal 4 (blue clip of special tool) on the oxygen sensor connector.

3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.

5. Use a jumper wire to connect terminal 1 (red clip) of the oxygen sensor connector to the battery (+) terminal and terminal 3 (blue clip) to the battery (-) terminal.

Caution
Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

**Standard value:**

<table>
<thead>
<tr>
<th>Engine</th>
<th>Oxygen sensor output voltage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>When racing the engine</td>
<td>0.6 - 1.0 V</td>
<td>If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 - 1.0 V.</td>
</tr>
</tbody>
</table>

8. If the sensor is defective, replace the oxygen sensor.

**NOTE**
For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

---

**<Oxygen sensor (rear) M/T only>**

1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.

2. Make sure that there is continuity (4.5 - 8.0 Ω at 20°C) between terminal 2 and terminal 4 on the oxygen sensor connector.

3. If there is no continuity, replace the oxygen sensor.

**NOTE**
(1) If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).

(2) For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.
**INJECTOR CHECK**

1. Disconnect the injector intermediate harness connector.
2. Measure the resistance between each of the terminals.

   **Standard value: 0.9 - 1.1 Ω (at 20°C)**

<table>
<thead>
<tr>
<th>Injector</th>
<th>Measurement terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.1 cylinder</td>
<td>11 - 12</td>
</tr>
<tr>
<td>No.2 cylinder</td>
<td>5 - 6</td>
</tr>
<tr>
<td>No.3 cylinder</td>
<td>9 - 10</td>
</tr>
<tr>
<td>No.4 cylinder</td>
<td>3 - 4</td>
</tr>
<tr>
<td>No.5 cylinder</td>
<td>7 - 8</td>
</tr>
<tr>
<td>No.6 cylinder</td>
<td>1 - 2</td>
</tr>
</tbody>
</table>

3. Connect the injector intermediate harness connector.

**THROTTLE VALVE CONTROL SERVO CHECK**

**Operation Check**

1. Disconnect the air intake hose from the throttle body.
2. Turn on the ignition switch.
3. Check that the throttle valve opens or closes in response to the accelerator pedal depression.

**Check of Coil Resistance**

1. Disconnect the throttle valve control servo connector.
2. Measure resistance between the throttle valve control servo connector terminals.

   **Standard value:**

<table>
<thead>
<tr>
<th>Terminals to be measured</th>
<th>Resistance value (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>0.6 - 1.0 (at 20°C)</td>
</tr>
<tr>
<td>1 - 3</td>
<td></td>
</tr>
<tr>
<td>2 - 3</td>
<td></td>
</tr>
</tbody>
</table>

3. Check that there is no continuity between the terminals and body.
CLUTCH SWITCH CHECK
1. Disconnect the connector.
2. Check for continuity between the terminals of the switch.

<table>
<thead>
<tr>
<th>Measurement conditions</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>When clutch pedal is depressed.</td>
<td>1</td>
</tr>
<tr>
<td>When clutch pedal is not depressed.</td>
<td>2</td>
</tr>
</tbody>
</table>

PURGE CONTROL SOLENOID VALVE CHECK
Refer to GROUP 17 - Emission Control System.

EGR VALVE CHECK
Refer to GROUP 17 - Emission Control System.
INJECTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Fuel Line Pressure Reduction <before removal only> (Refer to P.13A-219.)
- Engine Cover Removal and Installation
- Air Intake Hose Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Intake Manifold Removal and Installation (Refer to GROUP 15 - Intake Manifold.)
- Fuel Leak Check <after installation only> (Refer to P.13A-225.)

Removal steps

- Air bleeding from high-pressure fuel line
  1. Fuel pressure sensor connector
  2. Injector harness
  3. Fuel feed pipe
  4. Back-up ring A
  5. O-ring
  6. Back-up ring B
  7. Flange
  8. Fuel pressure sensor
  9. O-ring
  10. Back-up ring

- B 11. Injector washer
- B 12. Injector holder
- B 13. Delivery pipe assembly and Fuel injector assembly
- B 14. Insulator
- B 15. Injector gasket
- B 16. Fuel injector assembly
- A 17. Corrugated washer
- A 18. Back-up ring A
- A 19. O-ring
- A 20. Back-up ring B
- A 21. Delivery pipe
REMOVAL SERVICE POINTS

◆A◆ INJECTOR HARNESS DISCONNECTION

Caution
Disconnect the negative battery cable from its terminal before carrying out this operation.

◆B◆ FLANGE REMOVAL

If the fuel pressure sensor is reused, make mating marks on the sensor and the flange.

NOTE
The flange secures sealing performance of fuel pressure sensor and installation rigidity by bending to deform the shape at installation. Therefore, make mating marks to install the flange with the right phase and side. In addition, if the fuel pressure sensor is replaced with a new one, replace it together with the flange as a set.

◆C◆ DELIVERY PIPE ASSEMBLY/FUEL INJECTOR ASSEMBLY REMOVAL

Remove the delivery pipe assembly with the fuel injector assembly still attached.

Caution
Be careful not to drop the fuel injector assembly when removing the delivery pipe assembly.

INSTALLATION SERVICE POINTS

◆A◆ BACK-UP RING B/O-RING/BACK-UP RING A/CORRUGATED WASHER INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution
(1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.

(2) Do not confuse back-up ring A with that for the fuel pressure sensor. (External diameter of back-up ring A: 14.8 mm)

2. Apply petroleum jelly to the corrugated washer to prevent it from dropping, and then install it to the direction shown.

Caution
The corrugated washer should always be replaced with a new part.
**B** INJECTOR GASKET/INSULATOR/DELIVERY PIPE ASSEMBLY AND FUEL INJECTOR ASSEMBLY/INJECTOR HOLDER/INJECTOR WASHER INSTALLATION

1. Apply a small amount of fresh engine oil to the O-ring.
   **Caution**
   Take care not to let any of the engine oil get inside the delivery pipe assembly.

2. While being careful not to damage the O-ring, turn the fuel injector assembly to the left and right and connect it to the delivery pipe assembly. After connecting, check that the fuel injector turns smoothly.

3. If the fuel injector does not turn smoothly, the cause may be that the O-ring is getting caught. Remove the fuel injector, check the O-ring for damage and re-connect the fuel injector to the delivery pipe assembly and then re-check.

4. Align the injector mating mark with the delivery pipe mating mark.

5. Install the injector gasket and the insulator to the cylinder head.

6. Install the delivery pipe and fuel injectors assembly to the cylinder head, and then tighten them provisionally.

7. Install the injector holders and washers, and then tighten them to the specified torque.
   **Caution**
   Observe the tightening torque.

8. Working from the centre mounting bolt, tighten the delivery pipe and injector assembly mounting bolts to the specified torque.

**C** BACK-UP RING B/O-RING INSTALLATION

Install the back-up rings and the O-ring as shown in the illustration.

**Caution**
Be careful not to confuse this back-up ring with the back-up ring for the injector or back-up ring A for the fuel pipe. (External diameter of the back-up ring: 15.1 mm)
D FUEL PRESSURE SENSOR/FLANGE
INSTALLATION
1. Apply a small amount of fresh engine oil to the O-ring.
   Caution
   Take care not to let any of the engine oil get inside the delivery pipe.
2. Align the mating marks, and then install the sensor to the delivery pipe.
   Caution
   If the fuel pressure sensor is replaced, replace it together with the flange as a set.

E BACK-UP RING B/O-RING/back-up ring A/FUEL PIPE INSTALLATION
1. Install the back-up rings and the O-ring as shown in the illustration.
   Caution
   (1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.
   (2) Do not confuse back-up ring A with that for the fuel pressure sensor. (External diameter of back-up ring A: 14.8 mm)
2. Apply a small amount of fresh engine oil to the O-ring.
   Caution
   Take care not to let any of the engine oil get inside the fuel pump (high pressure) and delivery pipe.
3. Insert the fuel pipe into the fuel pump (high-pressure) and the delivery pipe ports squarely. Insert the pipe securely, being careful not to twisting it, and then tighten the mounting bolts to the specified torque.

F AIR BLEEDING FROM THE HIGH-PRESSURE FUEL LINE
1. Run the engine at 2,000 r/min for 15 seconds or more in order to bleed the air.
NOTE
When removing the fuel pump (high pressure), air may get into the fuel pump (high pressure). If air gets into the fuel pump (high pressure), diagnosis code No.56 for abnormal fuel pressure will be output.

2. Use the MUT-II to check the diagnosis code. If the diagnosis code No.56 for fuel pressure sensor system defect is output, erase it.
FUEL PUMP (HIGH PRESSURE)

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Fuel Line Pressure Reduction <before removal only> (Refer to P.13A-219.)
- Engine Cover Removal and Installation
- Air Intake Hose Removal and Installation (Refer to GROUP 15 - Air Cleaner.)
- Intake Manifold Removal and Installation (Refer to GROUP 15 - Intake Manifold.)
- Fuel Leak Check <after installation only> (Refer to P.13A-225.)
- Air Bleeding from High Pressure Fuel Line (Refer to P.13A-237.)

Removal steps
1. Fuel return hose connection
2. Fuel pressure hose connection
3. O-ring
4. Fuel feed pipe
5. Back-up ring A

Installation Service Points

FUEL PUMP (HIGH PRESSURE) INSTALLATION
1. Apply a small amount of fresh engine oil to the fuel pump (high pressure) roller and O-ring.
2. Install temporarily the fuel pump (high pressure) to the cylinder head.
3. Insert the fuel pump (high-pressure) to the cylinder head ports squarely, and then tighten the mounting bolts temporarily (a little more tightly than finger-tightening). Tightening them to the specified torque should be carried out in later step ▶B◀.

▶B◀ BACK-UP RING B/O-RING/BACK-UP RING A/FUEL PIPE INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution
(1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.
(2) Confirm the outer diameter of the back-up ring A. Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)

2. Apply a small amount of fresh engine oil to the O-ring.

Caution
Take care not to let any of the engine oil get inside the fuel pump (high pressure) or the delivery pipe assembly.

3. Insert the fuel pipe into the fuel pump (high-pressure) and the delivery pipe ports squarely. Insert the pipe securely, being careful not to twisting it, and then tighten the mounting bolts to the specified torque.

**Tightening torque: 19 ± 3 N·m**

4. Tighten the temporarily tightened mounting bolts of the fuel pump (high-pressure) in the shown order to 5.0 N·m.
5. Tighten the bolts to 17 N·m in the order shown in the illustration. The overall difference in tightening torque between the four bolts should be within 2 N·m.
C O-RING/FUEL PRESSURE HOSE INSTALLATION

1. Apply a small amount of fresh engine oil to the O-ring.
   
   Caution
   Take care not to let any of the engine oil get inside the fuel pump (high pressure) or the delivery pipe assembly.

2. While being careful not to damage the O-ring, turn the fuel pressure hose to the left and right and connect it to the delivery pipe assembly. After connecting, check that the fuel injector turns smoothly.

3. If the fuel pressure hose does not turn smoothly, the cause may be that the O-ring is getting caught. Remove the fuel pressure hose, check the O-ring for damage and re-connect the fuel pressure hose to the delivery pipe assembly and then re-check.
THROTTLE BODY
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying
  (Refer to GROUP 14 - On-vehicle Service.)
- Engine Cover Removal and Installation
- Air Cleaner Removal and Installation
  (Refer to GROUP 15.)

Removal steps
1. Throttle body stay
2. Throttle control servo connector connection
3. Throttle position sensor connector connection
4. Water hose connection
5. Throttle body assembly
6. Throttle body gasket

INSTALLATION SERVICE POINTS
-A- THROTTLE BODY GASKET INSTALLATION
The projection on the gasket should face upward.
THROTTLE BODY INSTALLATION

If the throttle body is replaced, initialize the electronic-controlled throttle valve system.

Initialization

Turn on the ignition switch, and turn it to the LOCK (OFF) position within one second. Then leave it for at least ten seconds with the ignition switch in the LOCK (OFF) position.
**DISASSEMBLY AND REASSEMBLY**

**Disassembly steps**

1. Throttle position sensor
2. Throttle body

**REASSEMBLY SERVICE POINTS**

**THROTTLE POSITION SENSOR**

1. Position the throttle position sensor on the throttle body along the dotted line as shown in the illustration.
2. Rotate the throttle position sensor anticlockwise as shown in the illustration, and then tighten the screws.
3. Measure resistance value between terminal Nos. 1 (sensor power supply) and 2 (throttle position sensor 1st-channel output) as well as 1 (sensor power supply) and 4 (throttle position sensor 2nd channel output).

Normal condition

| Open the throttle valve slowly from the idle position to full-open position. | Resistance value changes smoothly in response to throttle valve opening angle. |

4. If the resistance value does not change smoothly, replace the throttle position sensor.
INJECTOR DRIVER
REMOVAL AND INSTALLATION

Removal steps
1. Injector driver
2. Bracket

REMOVAL SERVICE POINT

INJECTOR DRIVER REMOVAL
Press the injector driver connector in the place shown in the illustration to disconnect the injector driver connector.

Caution
1. Disconnect the negative cable from its terminal before carrying out this operation.
2. High-tension current is flowing in the harness between the injector driver and the injector while engine is running, and the injector driver will become hot after the vehicle has been driven, so take care when handling it.
ENGINE-ECU <M/T>, ENGINE-A/T-ECU <A/T>, THROTTLE VALVE CONTROLLER

REMOVAL AND INSTALLATION

Removal steps
1. Cowl side trim
2. Instrument panel harness and front door harness connection
3. Instrument panel harness and front floor harness connection
4. A/T control relay connector <A/T>
5. A/T control relay <A/T>
7. Engine-ECU <M/T>, Engine-A/T-ECU <A/T>
8. Throttle valve controller connector
9. Throttle valve controller
   Instrument panel (Refer to GROUP 52A.)
10. Bracket

INSTALLATION SERVICE POINT

THROTTLE VALVE CONTROLLER INSTALLATION

If the throttle valve controller is replaced, initialize the electronic-controlled throttle valve system.

Initialization
Turn on the ignition switch, and turn it to the LOCK (OFF) position within one second. Then leave it for at least ten seconds with the ignition switch in the LOCK (OFF) position.
Service Bulletins

Click on the applicable bookmark to select the Service Bulletin.
<table>
<thead>
<tr>
<th>SERVICE BULLETIN</th>
<th>No.: MSB-00E13-001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>2001-06-03</td>
</tr>
<tr>
<td>Subject:</td>
<td>AVAILABILITY OF DRIVE CYCLE PATTERNS FOR 2001 MODEL CARS</td>
</tr>
<tr>
<td>Group:</td>
<td>FUEL</td>
</tr>
<tr>
<td>Draft No.:</td>
<td>00AL602317</td>
</tr>
<tr>
<td>&lt;Model&gt;</td>
<td>(EC)GALANT(EA0)</td>
</tr>
<tr>
<td></td>
<td>(EC)SPACE STAR</td>
</tr>
<tr>
<td></td>
<td>(EC) SPACE RUNNER/SPACE WAGON(N80, N90)</td>
</tr>
<tr>
<td></td>
<td>(EC)PAJERO SPORT</td>
</tr>
<tr>
<td></td>
<td>(K80W,K90W)</td>
</tr>
<tr>
<td></td>
<td>(EC)PAJERO/MONTERO</td>
</tr>
<tr>
<td></td>
<td>(V60, V70)</td>
</tr>
<tr>
<td></td>
<td>(EC)CARISMA</td>
</tr>
<tr>
<td></td>
<td>(EC)PAJERO PININ</td>
</tr>
<tr>
<td></td>
<td>(H60,H70)</td>
</tr>
</tbody>
</table>

1. Description:

On the 2001 model cars equipped with the on-board diagnostics system, the drive cycle patterns have been made available.
Performing the running test of the car using these drive cycle patterns makes it possible to monitor all the diagnosis codes that are required for operation of the car in order to determine if the applicable system is operating properly or not.
## 2. Applicable Manuals:

<table>
<thead>
<tr>
<th>Manual</th>
<th>Pub. No.</th>
<th>Language</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2001 GALANT</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Workshop Manual</td>
<td>PWDE9611-B</td>
<td>(English)</td>
<td>4G64-GDI:13I-8</td>
</tr>
<tr>
<td>Supplement</td>
<td>PWDS9612-B</td>
<td>(Spanish)</td>
<td>4G63-MPI:13A-7</td>
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<td></td>
<td>PWDF9613-B</td>
<td>(French)</td>
<td>6A13-MPI:13A-97</td>
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<td></td>
<td>PWDG9614-B</td>
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<td></td>
<td>PWDD9615-B</td>
<td>(Dutch)</td>
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<td></td>
<td>PWDW9616-B</td>
<td>(Swedish)</td>
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<tr>
<td><strong>2001 SPACE RUNNER/ SPACE WAGON</strong></td>
<td>PWDE9803-C</td>
<td>(English)</td>
<td>4G64-GDI:13A-9</td>
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<tr>
<td>Workshop Manual</td>
<td>PWDS9804-C</td>
<td>(Spanish)</td>
<td>4G63-MPI:13D-12</td>
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<td>PWDG9806-C</td>
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<td>PWDD9807-C</td>
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<td>PWDW9808-C</td>
<td>(Swedish)</td>
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<td><strong>2001 CARISMA</strong></td>
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<tr>
<td>Workshop Manual</td>
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<td>4G93-GDI:13J-8</td>
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<tr>
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<td>4G92-MPI:13A-7</td>
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<td>PWDF9504-E</td>
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<td>PWDG9505-E</td>
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<td>PWDD9506-E</td>
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<td></td>
<td>PWDW9507-E</td>
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<td><strong>2001 SPACE STAR</strong></td>
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<td>Workshop Manual</td>
<td>CMXE99E1-A</td>
<td>(English)</td>
<td>4G93-GDI:13A-9</td>
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<tr>
<td>Supplement</td>
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<td>4G93-GDI:13B-7</td>
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<td><strong>2001 COLT</strong></td>
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<tr>
<td>Workshop Manual</td>
<td>PWME9511-C</td>
<td>(Spanish)</td>
<td>4G13-MPI:13A-7</td>
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<tr>
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<td>4G93-MPI:13A-88</td>
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<td>PWMG9514-C</td>
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<td>PWMD9515-C</td>
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<td></td>
<td>PWMW9516-C</td>
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<tr>
<td><strong>2001 PAJERO</strong></td>
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<tr>
<td>Workshop Manual VOL1</td>
<td>PWJE0001(1/2)</td>
<td>(English)</td>
<td>6G74-GDI:13A-12</td>
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<tr>
<td><strong>2001 MONTERO</strong></td>
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<tr>
<td>Workshop Manual VOL1</td>
<td>PWJS0002(1/2)</td>
<td>(Spanish)</td>
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<tr>
<td><strong>2001 PAJERO/MONTERO</strong></td>
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<tr>
<td>Workshop Manual CD-ROM</td>
<td>PWJT0008R</td>
<td>(English)</td>
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<td>(Spanish)</td>
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<td>(German)</td>
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<tr>
<td><strong>2001 PAJERO SPORT</strong></td>
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<tr>
<td>Workshop Manual</td>
<td>PWJE9812-B</td>
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<td>6G72-MPI:13A-8</td>
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<td>Supplement</td>
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<td>PWJF9814-B</td>
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<tr>
<td></td>
<td>PWJG9815-B</td>
<td>(German)</td>
<td></td>
</tr>
<tr>
<td><strong>2001 PAJERO PININ</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshop Manual</td>
<td>CKRE99E1-A</td>
<td>(English)</td>
<td>4G93-GDI: 13A-9</td>
</tr>
</tbody>
</table>
DRIVE CYCLE
Performing the running test of the car using the following five drive cycle patterns makes it possible to
monitor all the diagnosis codes that are required for operation of the car in order to determine if the
applicable system is operating properly or not.
In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the
Engine Warning Lamp (Check Engine Lamp) and to verify the repair procedure has eliminated the trouble
[the Engine Warning Lamp (Check Engine Lamp) is no longer illuminated].

Caution
Two technicians should always be in the vehicle when carrying out a test drive.

NOTE
Check that the diagnosis code is not output before traveling in the Drive cycle pattern. Erase the diagnosis
code if it has been output.

DRIVE CYCLE PATTERN LIST

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>MONITOR ITEM</th>
<th>DIAGNOSIS CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Catalytic converter monitor</td>
<td>P0420</td>
</tr>
<tr>
<td></td>
<td>Heated oxygen sensor &lt;front&gt; monitor</td>
<td>P0130</td>
</tr>
<tr>
<td>2</td>
<td>Fuel trim monitor</td>
<td>P0170</td>
</tr>
<tr>
<td>3</td>
<td>Feed back monitor</td>
<td>P0125</td>
</tr>
<tr>
<td>4</td>
<td>Other monitor</td>
<td>P0136, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0325</td>
</tr>
</tbody>
</table>

NOTE
The vehicle speed sensor (P0500) and the power steering fluid pressure switch (P0551) are used to
determine if the system is operating properly or not through use of the Data List function of the MUT-II.
## PROCEDURE 1

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>CATALYTIC CONVERTER MONITOR (P0420)</th>
<th>OXYGEN SENSOR &lt;FRONT&gt; MONITOR (P0130)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive cycle pattern</td>
<td>One trip monitor [from start to ignition switch to “LOCK” (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 10 minutes or more.</td>
<td></td>
</tr>
</tbody>
</table>

### Drive cycle pattern

<table>
<thead>
<tr>
<th>Time</th>
<th>Vehicle speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Engine start</td>
</tr>
<tr>
<td>(2)</td>
<td>5 minutes or more</td>
</tr>
<tr>
<td>(3)</td>
<td>100 km/h or more</td>
</tr>
<tr>
<td>(4)</td>
<td>5 minutes or more</td>
</tr>
<tr>
<td>(5)</td>
<td>60 – 80 km/h</td>
</tr>
<tr>
<td>(6)</td>
<td>Ignition switch “LOCK” (OFF) position</td>
</tr>
</tbody>
</table>

### Inspection conditions

- Atmospheric temperature : -10 °C or more
- Condition of A/T : Selector lever D range, overdrive switch “ON” position

### Test procedure

1. Engine : start
2. Accelerate until the vehicle speed is 100 km/h or more.
3. Travel for 5 minutes or more while keeping the vehicle speed is 100 km/h or more.
4. Decelerate until the vehicle speed is 60 - 80 km/h or less.
5. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 60 - 80 km/h and travel for 5 minutes or more.
   - Stopping and braking during this operation are permitted.
6. Return the vehicle to the shop, then turn the ignition switch “LOCK” (OFF) position.
## PROCEDURE 2

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>FUEL TRIM MONITOR (P0170)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive cycle pattern</td>
<td>One trip monitor [from start to ignition switch to “LOCK” (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 15 minutes or more.</td>
</tr>
</tbody>
</table>

### Inspection conditions
- Engine coolant temperature: 85°C or more
- Atmospheric temperature: -10°C or more
- Condition of A/T : Selector lever D range, overdrive switch “ON” position

### Test procedure
1. Engine : start
2. Accelerate until the vehicle speed is 80 – 110 km/h.
3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 80 – 110 km/h and travel for 15 minutes or more.
4. Return the vehicle to the shop, then turn the ignition switch “LOCK” (OFF) position.
## PROCEDURE 3

### FEED BACKK MONITOR (P0125)

<table>
<thead>
<tr>
<th>Drive cycle pattern</th>
<th>One trip monitor [from start to ignition switch to “LOCK” (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 5 minutes or more.</th>
</tr>
</thead>
</table>

| Inspection conditions | • Engine coolant temperature : 85 °C or more  
                         • Atmospheric temperature : -10 °C or more  
                         • Condition of A/T :Selector lever D range, overdrive switch “ON” position |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Test procedure | 1. Engine : start  
                          2. Accelerate until the vehicle speed is 100 – 120 km/h.  
                          3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 100 – 120 km/h and travel for 5 minutes or more.  
                          4. Return the vehicle to the shop, then turn the ignition switch “LOCK” (OFF) position. |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

![Drive cycle diagram](image-url)
## PROCEDURE 4

### OTHER MONITOR

<table>
<thead>
<tr>
<th>Diagnosis code No.</th>
<th>OTHER MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0136, P0201, P0202, P0203, P0204, P0205, P0206, P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0325</td>
<td></td>
</tr>
</tbody>
</table>

### Drive cycle pattern

One trip monitor [from start to ignition switch to “LOCK” (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 6 minutes or more.

![Drive cycle pattern diagram]

### Inspection conditions

- Engine coolant temperature : 85 °C or more
- Atmospheric temperature : -10 °C or more
- Condition of A/T : Selector lever D range, overdrive switch “ON” position

### Test procedure

1. Engine : start
2. Accelerate until the vehicle speed is 60 km/h.
3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 60 km/h or more and travel for 5 minutes or more.
4. Return the vehicle to the shop
5. After stopping the vehicle, continue idling for 30 seconds, and then turn the ignition switch to “LOCK” (OFF) position.
   - A/C switch : OFF
   - Light and all accessories: OFF
   - Transmission : Neutral
GASOLINE DIRECT INJECTION (GDI)
GENERAL

OUTLINE OF CHANGE
The engine-ECU <M/T> and engine-A/T-ECU <A/T>, which feature communication port with stability control system, have been introduced. The service procedures for these ECUs are the same as before.

GENERAL INFORMATION

GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine-ECU &lt;M/T&gt;</td>
<td>Identification No.</td>
</tr>
<tr>
<td></td>
<td>E2T79275 &lt;LHD&gt;</td>
</tr>
<tr>
<td></td>
<td>E2T79276 &lt;RHD&gt;</td>
</tr>
<tr>
<td>Engine-A/T-ECU &lt;A/T&gt;</td>
<td>Identification No.</td>
</tr>
<tr>
<td></td>
<td>E2T76290 &lt;LHD&gt;</td>
</tr>
<tr>
<td></td>
<td>E2T76291 &lt;RHD&gt;</td>
</tr>
</tbody>
</table>
GASOLINE DIRECT INJECTION (GDI)

CONTENTS

GENERAL ........................................ 3
Outline of Changes ................................ 3
GENERAL INFORMATION ......................... 3
TROUBLESHOOTING .............................. 3
ON-VEHICLE SERVICE ............................ 7
Oxygen Sensor Check ............................ 7
GENERAL

OUTLINE OF CHANGES
Due to the changes as shown below, the service procedures regarding the different description from the previous version have been established.

- On M/T, the engine-ECU has been changed as diagnosis code P1603 has been added.
- On A/T, the engine-A/T-ECU has been changed as an on-board diagnosis system has been adopted. The engine warning lamp control, the diagnosis function, the service data output and the actuator test are basically the same as for M/T.
- On A/T, an dual oxygen sensor has been adopted. This sensor is the same as for the previous M/T.

GENERAL INFORMATION

GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine-ECU &lt;M/T&gt;</td>
<td>Identification No.</td>
</tr>
<tr>
<td></td>
<td>E2T79277 &lt;LHD&gt;</td>
</tr>
<tr>
<td></td>
<td>E2T79278 &lt;RHD&gt;</td>
</tr>
<tr>
<td>Engine-A/T-ECU &lt;A/T&gt;</td>
<td>Identification No.</td>
</tr>
<tr>
<td></td>
<td>E2T76292 &lt;LHD&gt;</td>
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<tr>
<td></td>
<td>E2T76293 &lt;RHD&gt;</td>
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</table>

TROUBLESHOOTING

DIAGNOSIS FUNCTION
ENGINE WARNING LAMP (CHECK ENGINE LAMP)
The following item has been added as diagnosis code P1603 has been added. The other items are the same as before.

Engine warning lamp inspection items

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Diagnosis item</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1603</td>
<td>Battery backup line malfunction</td>
</tr>
</tbody>
</table>

INSPECTION CHART FOR DIAGNOSIS CODES
Diagnosis code P1603 has been added. The other codes are the same as for the previous M/T.

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Diagnosis item</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1603</td>
<td>Battery backup line malfunction</td>
<td>13A-4</td>
</tr>
</tbody>
</table>
## Code No. P1603 Battery backup line malfunction

<table>
<thead>
<tr>
<th>Range of Check</th>
<th>Probable cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Starting sequence was completed.</td>
<td>• Open or short circuit in the battery back-up line or loose connector contact</td>
</tr>
<tr>
<td>• The battery voltage is 10 V or more.</td>
<td>• Malfunction of engine-ECU &lt;M/T&gt;</td>
</tr>
<tr>
<td>Set Condition</td>
<td>• Malfunction of engine-A/T-ECU &lt;A/T&gt;</td>
</tr>
<tr>
<td>• Battery backup line voltage is less than 2 V.</td>
<td>NOTE: If the engine is started while the ignition-off current draw connector has been pulled off, the engine-ECU &lt;M/T&gt; or the engine-A/T-ECU &lt;A/T&gt; judges that the battery backup line is open, and illuminates the engine warning lamp and stores this diagnosis code.</td>
</tr>
</tbody>
</table>

### MUT-II Self-Diag Code

**Is code No. P1603 set?**

<table>
<thead>
<tr>
<th>YES</th>
<th>Intermittent malfunction (Refer to GROUP 00 - Points to Notes for Intermittent Malfunction).</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td><strong>Check the following connectors:</strong> E-13, D-27, D-31 &lt;L.H. drive vehicles&gt;, D-223 &lt;L.H. drive vehicles&gt;</td>
</tr>
<tr>
<td></td>
<td>OK                                           NG</td>
</tr>
<tr>
<td></td>
<td><strong>Repair</strong></td>
</tr>
</tbody>
</table>

- **Check the following connector:** D-117 <M/T>, D-120 <A/T>  
- **Check the harness wire between the battery and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.**

<table>
<thead>
<tr>
<th>OK</th>
<th>NG</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
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<td></td>
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<tr>
<td>OK</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check the trouble symptoms.**

**Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.**
## DATA LIST REFERENCE TABLE

The data list has been changed as the engine-ECU and the engine-A/T-ECU have been changed. The other items are the same as for M/T.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Inspection item</th>
<th>Inspection contents</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Crank angle sensor</td>
<td>● Engine: Cranking ● Tachometer: Connected</td>
<td>Compare the engine speed readings on the tachometer and the MUT-II.</td>
<td>Accord</td>
<td>13A-56*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Engine: Idling ● Idle position switch: ON</td>
<td>When engine coolant temperature is -20°C</td>
<td>1,300 - 1,500 r/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 0°C</td>
<td>1,300 - 1,500 r/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 20°C</td>
<td>1,250 - 1,450 r/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 40°C</td>
<td>1,100 - 1,300 r/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When engine coolant temperature is 60°C (more than four minutes later after engine has started)</td>
<td>600 - 800 r/min</td>
<td></td>
</tr>
<tr>
<td>A1★</td>
<td>Oxygen sensor</td>
<td>Engine: After having warmed up. (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)</td>
<td>When at 4,000 r/min, engine is decelerated</td>
<td>200 mV or less</td>
<td>13A-28*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine is idling (more than 4 minutes later after engine has started)</td>
<td>Voltage should alternate between 400 mV or less and 600 - 1,200 mV (more than 4 minutes after the engine has started).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24★</td>
<td>Vehicle speed sensor</td>
<td>Drive at 40 km/h</td>
<td>Approximately 40 km/h</td>
<td></td>
<td>13A-63*</td>
</tr>
<tr>
<td>Item No.</td>
<td>Inspection item</td>
<td>Inspection contents</td>
<td>Normal condition</td>
<td>Inspection procedure No.</td>
<td>Reference page</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>81★</td>
<td>Learned value</td>
<td>Engine: Warm, 2,500 r/min without any load (during closed loop lambda control)</td>
<td>-10 - 10 %</td>
<td>Code No. P0170</td>
<td>13A-34*</td>
</tr>
<tr>
<td>82★</td>
<td>Closed loop control</td>
<td>Engine: Warm, 2,500 r/min without any load (during closed loop lambda control)</td>
<td>-25 - 25 %</td>
<td>Code No. P0170</td>
<td>13A-34*</td>
</tr>
<tr>
<td>87★</td>
<td>Engine load</td>
<td>Engine: After having warmed up</td>
<td>20 - 40 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Idling (more than 4 minutes later after the engine has started)</td>
<td>2,500 r/min 10 - 30 %</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
| 8A★     | Throttle position sensor (1st channel) (throttle valve angle) | ● Engine: After having warmed up  
● Ignition switch: ON (Engine: stopped) | Release the accelerator pedal. 0 - 20 % | Code No. P0120 | 13A-25*        |
|         |                 |                     | Depress the accelerator pedal. Increase in proportion to the pedal stroke | 80 - 100 %    |                 |

**NOTE**
★: will not displayed if service data is selected on the check mode.
*: Refer to the 2001 PAJERO Workshop Manual (Pub.No. PWJE0001)
CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART <A/T>

Engine-A/T-ECU Connector Terminal Arrangement
The terminals below have been changed as the engine-A/T-ECU has been changed. The other terminals are the same as before.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Check requirements (Engine condition)</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Oxygen sensor heater (front)</td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,500 r/min</td>
<td>System voltage</td>
</tr>
<tr>
<td>26</td>
<td>Oxygen sensor heater (rear)</td>
<td>Engine: Idling</td>
<td>0 - 3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,500 r/min</td>
<td>System voltage</td>
</tr>
<tr>
<td>71</td>
<td>Oxygen sensor (front)</td>
<td>Engine: Warmed up, and then hold the engine speed at 2,500 r/min (Use a digital voltmeter)</td>
<td>0 and 0.8 V alternate.</td>
</tr>
<tr>
<td>73</td>
<td>Oxygen sensor (rear)</td>
<td>• Transmission: 2nd gear</td>
<td>0.6 - 1.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine speed: 3,500 r/min or more</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Driving with the throttle valve widely open</td>
<td></td>
</tr>
</tbody>
</table>

Engine-A/T-ECU Harness-side Connector Terminal Arrangement
The terminals below have been changed as the engine-A/T-ECU has been changed. The other terminals are the same as before.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check item</th>
<th>Standard value, normal condition (check conditions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 41</td>
<td>Oxygen sensor heater (front)</td>
<td>11 - 18 Ω (at 20°C)</td>
</tr>
<tr>
<td>26 - 41</td>
<td>Oxygen sensor heater (rear)</td>
<td>11 - 18 Ω (at 20°C)</td>
</tr>
</tbody>
</table>

ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK
On A/T, a dual oxygen sensor has been adopted. Its service procedure is the same as for the previous M/T.
GROUP 13A
GASOLINE DIRECT INJECTION (GDI)

GENERAL

OUTLINE OF CHANGES
Due to the changes as shown below, the service procedures regarding the different description from the previous version have been established.
• The engine-ECU and the engine-A/T-ECU have been changed.
• The values in the data list have been changed.

GENERAL INFORMATION

GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine-ECU &lt;M/T&gt;</td>
<td>Identification No. E2T79279 &lt;LHD&gt;</td>
</tr>
<tr>
<td>Engine-A/T-ECU &lt;A/T&gt;</td>
<td>Identification No. E2T76298 &lt;LHD&gt; E2T76299 &lt;RHD&gt;</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

DATA LIST REFERENCE TABLE

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check item</th>
<th>Requirements</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
</table>
| 22       | Crank angle sensor | • Engine: Cranking  
• Tachometer: Connected  
• Engine: Idling  
• Idle position switch: ON  
Compare the engine speed readings on the tachometer and the MUT-II.  
When engine coolant temperature is -20°C  
1,300 - 1,500 r/min  
When engine coolant temperature is 0°C  
1,300 - 1,500 r/min  
When engine coolant temperature is 20°C  
1,250 - 1,450 r/min  
When engine coolant temperature is 40°C  
1,100 - 1,300 r/min  
When engine coolant temperature is 80°C (within four minutes after engine has started)  
500 - 700 r/min | Accord  
Code No. P0335 | 13A-56★ |
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check item</th>
<th>Requirements</th>
<th>Normal condition</th>
<th>Inspection procedure No.</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Volumetric efficiency</td>
<td>• Engine coolant temperature: 80 - 95°C&lt;br&gt;• Lamps, electric cooling fan and all accessories: OFF&lt;br&gt;• Transmission: Neutral (A/T: P range)</td>
<td>Engine: idling (Within four minutes after engine has started) 2,500 r/min</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 - 30 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine is suddenly raced</td>
<td>Volumetric efficiency increases in response to racing</td>
<td>Code No. P0190</td>
<td>13A-36★</td>
</tr>
<tr>
<td>44</td>
<td>Ignition advance</td>
<td>• Engine: After warm-up&lt;br&gt;• Set a timing lamp</td>
<td>Idling (More than four minutes after engine has started) 2,500 r/min</td>
<td>Code No. P0300</td>
<td>13A-53★</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 - 20° BTDC&lt;br&gt;12 - 28° BTDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;M/T&gt; &lt;A/T&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Fuel pressure sensor</td>
<td>• Engine coolant temperature: 80 - 95°C&lt;br&gt;• Lamps, electric cooling fan and all accessories: OFF&lt;br&gt;• Transmission: Neutral (A/T: P range)</td>
<td>Engine: Cranking</td>
<td>2 kPa or more</td>
<td>Code No. P0190</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Engine: Idling</td>
<td>4 - 6.9 MPa</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
