WARNINGs REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING
1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) and GROUP 53 - Maintenance Services, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: SRS-ECU, SRS-warning light, airbag module, steering wheel, and other units using an OBD-II 16-pin connector. Only the diagnosis, test, and repair work on SRS-related components that may risk the SRS system's safety is covered in this manual. Work on SRS-related components that do not impact the SRS system's safety must be performed by an authorized MITSUBISHI dealer.
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<td>3</td>
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<tr>
<td>TROUBLESHOOTING ....................</td>
<td>3</td>
</tr>
</tbody>
</table>
ENGINE AND EMISSION CONTROL

ENGINE CONTROL SYSTEM

GENERAL INFORMATION
The accelerator system consists of a cable and pedal. The accelerator pedal side end of the cable has a plastic bushing and damper. It effectively suppresses the noise that would result from direct contact of the cable and the accelerator arm.

CONSTRUCTION DIAGRAM

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator cable play mm (in.) 1</td>
<td>1-2 (0.04 - 0.08)</td>
</tr>
<tr>
<td>Engine idle speed time 1.5L Engine</td>
<td>750 - 100</td>
</tr>
<tr>
<td>Engine idle speed time 1.8L Engine</td>
<td>800 - 100</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle valve will not fully open or close</td>
<td>Misadjusted accelerator cable</td>
<td>Adjust</td>
</tr>
<tr>
<td>Misadjusted auto-cruise control cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broken return spring</td>
<td></td>
<td>Replace</td>
</tr>
<tr>
<td>Throttle lever malfunction</td>
<td></td>
<td>Replace</td>
</tr>
<tr>
<td>Accelerator pedal operation not smooth</td>
<td>Accelerator pedal wrongly tightening</td>
<td>Repair</td>
</tr>
<tr>
<td>Lower acceleration</td>
<td></td>
<td>Accelerator cable requires lubrication</td>
</tr>
</tbody>
</table>
ON-VEHICLE SERVICE

ACCELERATOR CABLE CHECK AND ADJUSTMENT

1. Turn off the air conditioning and all lights. Inspect and adjust at no load.
2. Start the engine and allow to idle until it reaches normal operating temperature.
3. Confirm idle speed is at standard value.

   Standard value:
   - 1.5L Engine: 750 ± 100 r/min
   - 1.8L Engine: 800 ± 100 r/min

4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.
   Standard value: 1 - 2 mm (.04 - .08 in.)

7. If there is too much slack or no slack, adjust the cable as follows:
   1) Loosen the adjusting bolt to release the cable.
   2) Move the plate until the inner cable play is at the standard value and then tighten the adjusting bolt to the specified torque.

8. Adjust accelerator cable play and confirm throttle lever stopper touches the "end" of SAS.
ACCELERATOR CABLE AND PEDAL

REMOVAL AND INSTALLATION

Removal steps

1. Adjusting bolts
2. Inner cable connection (Throttle body side)
3. Inner cable connection (Accelerator pedal side)
4. Accelerator cable
5. Cotter pin
6. Accelerator pedal
7. Spring
8. Pedal pad
9. Stopper
10. Accelerator pedal stopper

Post-installation Operation
- Adjusting the Accelerator Cable (Refer to E.17.4)
AUTO-CRUISE CONTROL SYSTEM

GENERAL INFORMATION

By using the auto-cruise control, the driver can select and maintain a desired cruising speed at [approximately 40 km/h (25 mph) or more] without depressing the accelerator pedal.

CONSTRUCTION DIAGRAM

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator cable play</td>
<td>1.21.04</td>
</tr>
</tbody>
</table>

SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and name</th>
<th>Supersession</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991502</td>
<td>MB991496-0D</td>
<td>Diagnostic trouble code check</td>
</tr>
<tr>
<td>MB991496-0D</td>
<td>MB991502</td>
<td></td>
</tr>
<tr>
<td>Scan Tool (MUT-11)</td>
<td></td>
<td>Diagnostic trouble code check</td>
</tr>
<tr>
<td>MB991496-0D</td>
<td>MB991502</td>
<td></td>
</tr>
<tr>
<td>MB991502</td>
<td>MB991496-0D</td>
<td></td>
</tr>
<tr>
<td>Diagnostic trouble code check harness</td>
<td>MB991502</td>
<td></td>
</tr>
</tbody>
</table>
TRROUBLESHOOTING

DIAGNOSTIC TROUBLESHOOTING FLOW

Outline information from customer

- Verify complaint

Produce 

- Confirm location

Check diagnostic trouble code: Refer to P.71 IC.

No diagnostic trouble code or trouble code is P.71 IC.

Diagnose trouble code and display.

No diagnostic trouble code.

Recheck diagnostic trouble code.

Then erase them.

No diagnostic trouble symptom.

Check diagnostic trouble code. Refer to P.71 IC.

Diagnose trouble code.

Display.

No diagnostic trouble symptom.

NOTE

Before carrying out trouble diagnosis, check to be sure that all of the following items are normal.

1. Is the vacuum hose installed correctly and is the hose not damaged?
2. Is the accelerator cable play at the standard value?

DIAGNOSTIC FUNCTION

METHOD OF READING THE DIAGNOSTIC TROUBLE CODES

Using the scan tool.

Caution

To prevent damage to the scan tool, make sure the ignition switch is "OFF" before connecting or disconnecting the scan tool.

1. Turn the ignition switch "OFF."
2. Connect the scan tool to the data link connector.
3. Use the scan tool to check for auto-cruise control system diagnostic trouble codes.
4. Turn the ignition switch "OFF."
5. Disconnect the scan tool.
Using a auto-cruise control indicator light

1. Push the main switch to "ON."
2. With the "SET" switch at the "ON" position turn the ignition switch "ON," and within one second after this, turn the "RESUME" switch to "ON."
3. Take a reading of a diagnostic trouble code based on the flashing of the auto-cruise control indicator light in the combination meter.

Diagnostic Result Display Method When Using the Auto-Cruise Control Indicator Light

When the diagnostic trouble code No. 24 is output

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5</td>
<td>12</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

When no diagnostic trouble code is output

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
</tr>
</tbody>
</table>

NOTE

Other diagnosis items are also output as voltage waveforms corresponding to diagnosis code numbers.
METHOD OF ERASING DIAGNOSTIC TROUBLE CODES

Erase the diagnostic trouble codes with the following procedure.

NOTE
The diagnostic trouble codes will not be erased even if the battery (-) terminal is disconnected.

Using the scan tool

Caution
To prevent damage to the scan tool, make sure the ignition switch is "OFF" before connecting or disconnecting the scan tool.

1. Turn the ignition switch "OFF."
2. Connect scan tool to the data link connector.
3. Use scan tool to check for auto-cruise control system diagnostic trouble codes.
4. Turn the ignition switch "OFF."
5. Disconnect the scan tool.

Without using the scan tool

1. Turn the ignition switch "ON."
2. Push the auto-cruise control switch in the direction of arrow (A) in the illustration, and within one second after doing this, push the auto-cruise control switch back in the direction of arrow (A).
3. Push the auto-cruise control switch again in the direction of arrow (B) in the illustration. While holding the switch in this position, press the stop light switch to the "ON" position for five seconds or more.

INPUT SWITCH CODE CHECK METHOD

1. Connect the scan tool to the data link connector (16-pin) under the instrument panel under cover.
2. Turn the ignition switch to ON.
3. After pushing the auto-cruise control switch in the direction of arrow (B) in the illustration, press the cruise control main switch to the "ON" position, and within 1 second after doing this, push the cruise control switch back in the direction of arrow (A).
4. Operate each switch listed in the input check table and take a reading of the input switch codes with the scan tool.
## Input Inspection Table

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Input operation</th>
<th>Operation judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>SET switch ON</td>
<td>Auto-cruise control-ECU judges that SET switch is ON</td>
</tr>
<tr>
<td>22</td>
<td>RESUME switch ON</td>
<td>Auto-cruise control-ECU judges that RESUME switch is ON</td>
</tr>
<tr>
<td>25</td>
<td>Stop light switch (ON when brake pedal depressed)</td>
<td>Auto-cruise control-ECU judges that stop light switch is ON</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed signal</td>
<td>Auto-cruise control-ECU judges that vehicle speed is 40 km/h (25 mph) or higher</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auto-cruise control-ECU judges that vehicle speed is lower than 40 km/h (25 mph)</td>
</tr>
<tr>
<td>26</td>
<td>Clutch pedal position switch (M/T: ON when clutch pedal depressed)</td>
<td>Auto-cruise control-ECU judges that clutch pedal position switch (M/T) or park/neutral position switch (AT) is ON</td>
</tr>
<tr>
<td></td>
<td>Park/neutral position switch (AT)</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>CANCEL switch ON</td>
<td>Auto-cruise control-ECU judges that CANCEL switch is ON</td>
</tr>
<tr>
<td>26</td>
<td>Throttle position sensor signal</td>
<td>Auto-cruise control-ECU judges that throttle position sensor voltage is 1.5 V or more</td>
</tr>
<tr>
<td>29</td>
<td>Closed throttle position switch</td>
<td>Auto-cruise control-ECU judges that closed throttle position switch is OFF</td>
</tr>
</tbody>
</table>

## INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES

<table>
<thead>
<tr>
<th>Code No.</th>
<th>On-board diagnostic item</th>
<th>Reference page</th>
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<tr>
<td>11</td>
<td>Auto-cruise vacuum pump drive system</td>
<td>17-11</td>
</tr>
<tr>
<td>12</td>
<td>Vehicle speed sensor system</td>
<td>17-11</td>
</tr>
<tr>
<td>14</td>
<td>Auto-cruise vacuum pump power supply system</td>
<td>17-12</td>
</tr>
<tr>
<td>15</td>
<td>Auto-cruise control switch</td>
<td>17-12</td>
</tr>
<tr>
<td>16</td>
<td>Auto-cruise control-ECU</td>
<td>17-12</td>
</tr>
<tr>
<td>17</td>
<td>Throttle position sensor system</td>
<td>17-13</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODES

Code No. 11 Auto-cruise vacuum pump drive system

- Probable cause
  - Malfunction of the auto-cruise vacuum pump
  - Malfunction of the connector
  - Malfunction of the harness
  - Malfunction of the auto-cruise control ECU

Check the harness between the auto-cruise vacuum pump and auto-cruise control-ECU.

- Result
  - NG: Replace
  - OK: Replace the auto-cruise control ECU

Check the following connectors 6-27 E-581

- Result
  - NG: Replace
  - OK: Replace the auto-cruise control ECU

Check the harness between the auto-cruise vacuum pump and auto-cruise control-ECU.

- Result
  - NG: Replace
  - OK: Replace the auto-cruise control ECU

Code No. 12 Vehicle speed signal system

- Probable cause
  - Malfunction of the vehicle speed sensor
  - Malfunction of the connector
  - Malfunction of the harness
  - Malfunction of the auto-cruise control ECU

Is the sensor connected properly?  

- Yes
  - OK
- No
  - Connect the vehicle speed sensor connection X

Maximum in auto-cruise control ECU (connector 6-27)

- Result
  - OK: 4.5 V or more
  - NG: Replace

Check the following connector 6-27 E-581

- Result
  - NG: Replace
  - OK: Replace the auto-cruise control ECU

Check the harness between the vehicle speed sensor and auto-cruise control ECU.

- Result
  - NG: Replace
  - OK: Replace the auto-cruise control ECU
**Code No. 14 Auto-cruise vacuum pump power supply system**

The diagnostic trouble code is output when none of the drive signals from the release valve, control valve and motor of the auto-cruise vacuum pump are input to the auto-cruise control ECU.

**Probable cause**

- Malfunction of the stop light switch
- Malfunction of the harness
- Malfunction of the auto-cruise control ECU
- Malfunction of the auto-cruise vacuum pump

**Check**

- Disconnect the connector and measure at the harness side.
- Voltage between terminal (1) and ground
  - OK: System voltage
  - NG

**Repair**

- Replace
- Check the following connectors: A-37, 8-53, B-06, 8-26

This diagnostic trouble code is output if there is an abnormality in the CANCEL hold circuit or the microprocessor monitor circuit in the auto-cruise control ECU.

**Probable cause**

- Malfunction of the auto-cruise control-ECU

**Check**

- Disconnect the connector and measure at the harness side.
- Voltage between terminal (7) and ground (for driving control valve)
- Voltage between terminal (8) and ground (for driving release valve)
- Voltage between terminal (16) and ground (for driving motor)
  - OK: System voltage
  - NG

**Repair**

- Replace

**Code No. 15 Auto-cruise control switch**

This diagnostic trouble code is output if the cruise control RESUME switch, SET switch or CANCEL switch remains ON.

**Probable cause**

- Malfunction of the auto-cruise control switch

**Check**

- Replace the auto-cruise control switch

**Code No. 16 Auto-cruise control ECU**

This diagnostic trouble code is output if there is an abnormality in the CANCEL hold circuit or the microprocessor monitor circuit in the auto-cruise control ECU.

**Probable cause**

- Malfunction of the auto-cruise control ECU

**Check**

- Replace the auto-cruise control ECU.
Code No. 17 Throttle position sensor system

This diagnostic trouble code is output if the voltage of 1.0 V or more when the throttle position sensor output for a continuous period of 6 seconds or more.

Probable cause
- Malfunction of the throttle position sensor
- Malfunction of the auto-cruise control-ECU
- Malfunction of the harness
- Malfunction of the auto-cruise control-ECU

Scan tool diagnostic trouble code
- No output from the engine control module?
  - No
    - Check the following connectors:
      1. 8-26, 8-48
  - OK
    - NG
      - Repair

Reference page 17-13

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 scan tool is not possible.</td>
<td>1</td>
<td>17-13</td>
</tr>
<tr>
<td>Communication with all systems is not possible.</td>
<td>1</td>
<td>17-13</td>
</tr>
<tr>
<td>Communication with auto cruise control ECU only is not possible.</td>
<td>2</td>
<td>17-14</td>
</tr>
<tr>
<td>Input switch inspection using the scan tool is not possible.</td>
<td>3</td>
<td>17-15</td>
</tr>
<tr>
<td>Auto-cruise control not cancelled.</td>
<td>4</td>
<td>17-16</td>
</tr>
<tr>
<td>Even if brake pedal is depressed.</td>
<td>4</td>
<td>17-16</td>
</tr>
<tr>
<td>Even if clutch pedal is depressed «M-T»</td>
<td>5</td>
<td>17-17</td>
</tr>
<tr>
<td>Even if select lever is set to N range «A-T»</td>
<td>6</td>
<td>17-17</td>
</tr>
<tr>
<td>Even if CANCEL switch is set to CN</td>
<td>7</td>
<td>17-19</td>
</tr>
<tr>
<td>Auto cruise control cannot be set.</td>
<td>9</td>
<td>17-19</td>
</tr>
<tr>
<td>Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.</td>
<td>10</td>
<td>17-13</td>
</tr>
<tr>
<td>Auto-cruise control indicator light in the combination meter does not illuminate.</td>
<td>11</td>
<td>17-21</td>
</tr>
</tbody>
</table>
# Inspection Procedure for Trouble Symptoms

## Inspection Procedure 1

**Communication with scan tool is not possible.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Possible causes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Malfunction of the harness</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the connector</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the power supply system including ground, or the diagnosis line</td>
</tr>
</tbody>
</table>

- The reason is probably a defect in the power supply system including ground, or the diagnosis line.
- Check the following connectors: B-60, B-66, B-24, B-20.
- Check trouble symptom.
- Check the harness wire between the data link connector and ground, and replace if necessary.
- Replace the scan tool.
Communication with scan tool is not possible (Communication with auto-cruise control-ECU only is not possible.)

Probable cause:
- Malfunction of the auto-cruise control switch
- Malfunction of the connector
- Malfunction of the harness
- Malfunction of the auto-cruise control-ECU

Check the following connectors:
- C-10
- B-67, 8-62

- Measure the voltage between the terminal (1) and ground.
  - OK: Battery positive voltage
  - NG: Repair

Check the following connector:
- B-23

Check the harness between the auto-cruise control-ECU and the data link connector.
- OK: Replace
- NG: Repair

1. Check trouble symptom.
INSPECTION PROCEDURE 3

Input switch inspection using the scan tool is not possible. (However, diagnosis inspection is possible.)

The cause is probably a malfunction of auto-cruise control switch system.

 probable cause

- Malfunction of the auto-cruise control switch circuit system
- Malfunction of the clock spring
- Malfunction of the connector
- Malfunction of the harness

Ground...NG

Auto-cruise control switch check (Refer NG * Replace P.17-26.)

1. Check voltage between terminal (2) and ground
   - OK: system voltage
   - NG:
     - Check the following connectors, C-10, C-11, and B-26
     - Check trouble symptom
     - NG: check the harness between the clock spring and power supply and repair if necessary

NG

NG

OK

Check trouble symptom

NG

OK

Check trouble symptom

NG

Check trouble symptom
The cause is probably a malfunction of the stop light circuit.

**INSPECTION PROCEDURE**

1. **Probable cause**
   - Malfunction of the connector
   - Malfunction of the harness
   - Malfunction of the auto-cruise control-ECU
   - Malfunction of the stop light switch

2. **Even if brake pedal is depressed, auto-cruise control is not cancelled.**

3. **Check the following connectors.**
   - B-06, 8-26

4. **Repair**
   - Yes
   - No

5. **Check the harness between the stop light switch and auto-cruise control-ECU, and repair if necessary.**

6. **Stop light switch check**
   - (Refer to P.17-25.)

7. **OK**
   - Replace

8. **Measure at stop light switch connector**
   - Disconnect the connector and measure at the harness side.
   - Voltage between terminal (2) and ground
     - **OK:** System voltage B-06.
     - **NG:**

9. **Repair**
   - Check the harness between the stop light switch and power supply, and repair if necessary.
INSPECTION PROCEDURE 5

Even if clutch pedal is depressed, auto-cruise control is not cancelled. <N/T>

The cause is probably a malfunction of clutch pedal position switch or clutch circuit.

Probable cause:
- Malfunction of the clutch pedal position switch
- Malfunction of the harness
- Malfunction of the auto-cruise control-ECU

Check the following connectors:
- NG = Replace
- OK = Check the following connectors
- NG = Check the following connectors
- OK = Check the following connectors
- NG = Replace the auto-cruise control-ECU

Even if select lever is set to N range, auto-cruise control is not cancelled. <A/T>

The cause is probably a malfunction of the park/neutral position switch.

Probable cause:
- Malfunction of the park/neutral position switch
- Malfunction of the harness
- Malfunction of the auto-cruise control-ECU

Check the following connectors:
- NG = Replace
- OK = Replace the auto-cruise control-ECU
### INSPECTION PROCEDURE 7

**Even if auto-cruise control CANCEL switch is set to ON, auto-cruise control is not cancelled.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Malfunction of the auto-cruise control system</td>
</tr>
</tbody>
</table>

The cause is probably an open-circuit in the circuit inside the CANCEL switch.

### INSPECTION PROCEDURE 9

**Auto-cruise control cannot be set.**

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Malfunction of the auto-cruise control switch</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the clock spring</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the harnesses or connectors</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the clutch pedal position switch (M/T)</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the park/neutral position switch (A/T)</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the auto-cruise control-ECU</td>
</tr>
</tbody>
</table>

**INSTRUCTION**
- Inspect the auto-cruise control system with the scan tool.

**INSTRUCTION**
- Check if the scan tool can be used to read and inspect diagnostic trouble codes.

**INSTRUCTION**
- Inspect the input switch codes for each system.

<table>
<thead>
<tr>
<th>Code</th>
<th>INSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Refer to P17-15</td>
</tr>
<tr>
<td>12</td>
<td>Refer to P17-16</td>
</tr>
<tr>
<td>14</td>
<td>Refer to P17-17</td>
</tr>
<tr>
<td>15</td>
<td>Refer to P17-18</td>
</tr>
<tr>
<td>16</td>
<td>Refer to P17-19</td>
</tr>
<tr>
<td>17</td>
<td>Refer to P17-20</td>
</tr>
<tr>
<td>23</td>
<td>Refer to P17-21</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE 10

Hunting (reported acceleration and deceleration) occurs at the set vehicle speed.

The cause is probably a malfunction of vehicle speed sensor or incorrect vacuum in the motor-driven vacuum pump or actuator.

Probable cause
- Malfunction of vehicle speed sensor
- Malfunction of the motor-driven vacuum pump
- Malfunction of the actuator
- Malfunction of the auto-cruise control ECU

Vehicle speed sensor check (Refer to GROUP 54 - Combination Meter.)

- NG
  - Replace

Auto-cruise control indicator lamp does not illuminate. (However, auto-cruise control is normal.)

Probable cause
- Malfunction of the valve
- Malfunction of the harness
- Malfunction of the connector
- Malfunction of the auto-cruise control ECU

Stop light switch input circuit system inspection (Code No. 20)

Check the following connectors. U.S. B16-L 26

- NG
  - Replace
INSPECTION PROCEDURE 13

Clutch pedal position switch <M/T> or park/neutral position switch <A/T> input circuit system inspection (Code No. 26)

<MTs>
- Clutch pedal position switch check plunger <M/T> plunger
- Check the following connectors
  - B-26
  - 8-22
  - 8-23

<ATs>
- Replace
- Check harness between auto-cruise control ECU and power supply

Clutch pedal position switch check plunger <A/T> plunger

Check the following connectors
- B-26
- 8-22
- 8-23
- Replace

Clutch pedal position

Check the following connectors
- B-26
- 8-22
- 8-23

Check the following connectors
- B-26
- 8-22
- 8-23

Check the following connectors
- B-26
- 8-22
- 8-23
## CHECK AT THE ECU TERMINALS

<table>
<thead>
<tr>
<th>Terminal No</th>
<th>Check item</th>
<th>Check conditions</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throttle position sensor input</td>
<td>When accelerator pedal is fully depressed, when accelerator pedal is released</td>
<td>4.5 - 5.5V, 0.3 - 1.0V</td>
</tr>
<tr>
<td>2</td>
<td>Closed throttle position switch output</td>
<td>When accelerator pedal is depressed, when accelerator pedal is not depressed</td>
<td>4.5 - 5.5V, 0V</td>
</tr>
<tr>
<td>3</td>
<td>AT terminal output</td>
<td>No OD-OFF request, OD-OFF request</td>
<td>System voltage, 0V</td>
</tr>
<tr>
<td>4</td>
<td>Stop light switch input</td>
<td>When brake pedal is depressed, when brake pedal is not depressed</td>
<td>System voltage, 3V</td>
</tr>
<tr>
<td>5</td>
<td>Pump power supply</td>
<td>Ignition switch: ON, Stop light switch: OFF</td>
<td>System voltage</td>
</tr>
<tr>
<td>6</td>
<td>ECU power supply</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td>7</td>
<td>Auto cruise vacuum pump release valve and control valve input</td>
<td>When decelerating with the SET switch while driving at constant speed, when cancelling constant speed driving with the CANCEL switch</td>
<td>Control valve open, Release valve open, System voltage</td>
</tr>
<tr>
<td>8</td>
<td>Auto cruise control switch input</td>
<td>When main switch ON, when input switch has not been operated</td>
<td>Approximately 9.0V, 4.5V</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>When input switch is pushed down, when SET switch is ON</td>
<td>Approximately 1.5V, 3.0V</td>
</tr>
<tr>
<td>10</td>
<td>Vehicle speed sensor input</td>
<td>When vehicle is moved forwards and backwards, sensor turns ON and OFF momentarily</td>
<td>When sensor is ON, When sensor is OFF</td>
</tr>
<tr>
<td>11</td>
<td>Diagnosis output</td>
<td>When ignition switch is ON</td>
<td>4V or more</td>
</tr>
</tbody>
</table>
## AUTO-CRUISE CONTROL SYSTEM OPERATION CHECK

### AUTO-CRUISE CONTROL SWITCH INDICATOR LIGHT

1. Turn the ignition switch to "ON".
2. Check that the indicator light within the combination meter illuminates when the main switch is turned to "ON".

<table>
<thead>
<tr>
<th>Terminal No</th>
<th>Check item</th>
<th>Check conditions</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>ACC power supply</td>
<td>When ignition switch is in ACC position Main switch &quot;ON&quot;</td>
<td>System voltage</td>
</tr>
<tr>
<td>13</td>
<td>Clutch pedal position switch input</td>
<td>When pedal is not depressed When clutch pedal position switch is OFF</td>
<td>4.5V or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When pedal is depressed</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When clutch pedal position switch is &quot;ON&quot;</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When select lever is in a position other than N range</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When select lever is in N range</td>
<td>0V</td>
</tr>
<tr>
<td>14</td>
<td>Ground</td>
<td>At any time</td>
<td>Continuously</td>
</tr>
<tr>
<td>15</td>
<td>Indicator input (inside combination meter)</td>
<td>When driving at constant speed When indicator is illuminated</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When constant-speed thing is cancelled</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Auto-cruise vacuum pump motor input</td>
<td>When driving at constant speed using the SET switch</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When accelerating with the RESUME switch while driving at constant speed</td>
<td>System voltage 0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When decelerating with the SET switch while driving at constant speed</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When cancelling constant speed driving with the CANCEL switch</td>
<td>System voltage</td>
</tr>
</tbody>
</table>

---

### ON-VEHICLE SERVICE

**AUTO-CRUISE CONTROL SYSTEM OPERATION CHECK**

**AUTO-CRUISE CONTROL SWITCH INDICATOR LIGHT**

1. Turn the ignition switch to "ON".
2. Check that the indicator light within the combination meter illuminates when the main switch is turned to "ON".
**AUTO-CRUISE CONTROL SETTING**

1. Switch ON the main switch.
2. Drive at the desired speed above approximately 40 km/h (25 mph).
3. Push the auto-cruise control switch in the direction of arrow (B).
4. Check to be sure that when the switch is released the speed is the desired constant speed.

**NOTE**

- If the vehicle's speed decreases to approximately 15 km/h (9 mph) below the set speed because of climbing a hill, for example, the auto-cruise control will be cancelled.

**SPEED-INCREASE SETTING**

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (A).
3. Check to be sure that acceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

**NOTE**

- Acceleration can be continued even if the vehicle speed has passed the high speed limit (approximately 200 km/h or 124 mph). But the speed when the auto-cruise control switch is released will be recorded as the high speed limit.

**SPEED-REDUCTION SETTING**

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (B).
3. Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

**NOTE**

- When the vehicle speed reaches the low limit (approximately 40 km/h or 25 mph) during deceleration, the auto-cruise control will be cancelled.

**RETURN TO THE SET SPEED BEFORE CANCELLATION AND AUTO-CRUISE CONTROL CANCELLATION**

1. Set the auto-cruise speed control.
2. When any of the following operations are performed while at constant speed during auto-cruise control check if normal driving is resumed and deceleration occurs,
   a. The auto-cruise control switch is pushed in the direction of arrow (C).
   b. The brake pedal is depressed.
   c. The clutch pedal is depressed. (M/T)
   d. The selector lever is moved to the "N" range (A/T)
AUTO-CRUISE CONTROL COMPONENT CHECK

STOP LIGHT SWITCH
Refer to GROUP 35A - On vehicle Service

CLUTCH PEDAL POSITION SWITCH <M/T>
Refer to GROUP 21 - On-vehicle Service

PARK/NEUTRAL POSITION SWITCH ("N" POSITION)
Refer to GROUP 23A - On-vehicle Service

THROTTLE POSITION SENSOR
Refer to GROUP 13A - On-vehicle Service.

AUTO-CRUISE VACUUM PUMP
1. Disconnect the vacuum hose from the auto-cruise vacuum pump and connect a vacuum gauge to the vacuum pump.
2. Disconnect the vacuum pump connector.
3. Check that the reading on the vacuum gauge matches the values in the table below when the battery is connected to each connector terminal.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Valve condition</th>
<th>Vacuum gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Release valve closed</td>
<td>53 (390, 15.7)</td>
</tr>
<tr>
<td></td>
<td>Control valve closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Release valve open</td>
<td>20 (150, 5.9)</td>
</tr>
<tr>
<td></td>
<td>Control valve open</td>
<td></td>
</tr>
</tbody>
</table>
**VACUUM ACTUATOR**

1. Disconnect the vacuum hose from the vacuum actuator, and connect a hand vacuum pump to the actuator.
2. Check that the throttle lever operates when applying vacuum, and the vacuum is kept.

**AUTO-CRUISE CONTROL CHECK**

Measure the resistance between the terminals when each of the "SET," "RESUME," "CANCEL" and "MAIN" switches is pressed. If the values measured at the time correspond to those in the table below, then there is no problem.

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Resistance between terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;OFF&quot;</td>
<td>No continuity</td>
</tr>
<tr>
<td>&quot;CANCEL&quot; switch &quot;ON&quot;</td>
<td>Terminals 1 and 3</td>
</tr>
<tr>
<td>&quot;RESUME&quot; switch &quot;ON&quot;</td>
<td>Terminals 2 and 3</td>
</tr>
<tr>
<td>&quot;SET&quot; switch &quot;ON&quot;</td>
<td>Terminals 1 and 3</td>
</tr>
<tr>
<td>&quot;MAIN&quot; switch &quot;ON&quot;</td>
<td>Terminals 2 and 3</td>
</tr>
</tbody>
</table>

**VEHICLE SPEED SENSOR CHECK**

Refer to GROUP 54 - Combination meters.
Auto-cruise vacuum pump removal steps:
1. Vacuum hose
2. Bracket
3. Auto-cruise vacuum pump and bracket assembly
4. Auto-cruise vacuum pump assembly
5. Pump bracket
CAUTION: SRS
Before removal of the air bag module, refer to the following groups:
GROUP 52B - SRS Service Precautions.
GROUP 52B - Air Bag Modules and Clock Spring.

Control unit removal
6. Auto-cruise control-ECU
   Control switch removal

Control switch removal
- Air bag module (Refer to GROUP 52B.)
7. Control switch

Sensor removal
8. Throttle position sensor
9. Park neutral position switch (A/T)
10. Stop light switch
11. Clutch pedal position switch (M/T)
EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The emission control system consists of the following subsystems:
- Positive crankcase ventilation system
- Evaporative emission control system
- Exhaust emission control system

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporative emission purge solenoid coil resistance [at 20°C (68°F)]</td>
<td>06-44</td>
</tr>
<tr>
<td>EGR solenoid coil resistance [at 20°C (68°F)]</td>
<td>06-44</td>
</tr>
</tbody>
</table>

SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool</th>
<th>Tool number and name</th>
<th>Supersession</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU992770</td>
<td>Oxygen sensor wrench</td>
<td></td>
<td>Removal/installation of heated oxygen sensor</td>
</tr>
<tr>
<td>MD995361</td>
<td></td>
<td></td>
<td>Inspection of surge control system</td>
</tr>
</tbody>
</table>
### TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not start or hard to start</td>
<td>Vacuum hose disconnected or damaged</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>The EGR valve is not closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of the evaporative emission purge solenoid</td>
<td></td>
</tr>
<tr>
<td>Rough idle or engine stalls</td>
<td>The EGR valve is not closed</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Vacuum hose disconnected or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of the positive crankcase ventilation valve</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the purge control system</td>
<td></td>
</tr>
<tr>
<td>Engine hesitates or poor acceleration</td>
<td>Malfunction of the exhaust gas recirculation system</td>
<td>Check the system; if there is a problem, check its component parts.</td>
</tr>
<tr>
<td>Excessive oil consumption</td>
<td>Positive crankcase ventilation line clogged</td>
<td>Check positive crankcase ventilation system</td>
</tr>
<tr>
<td>Poor fuel mileage</td>
<td>Malfunction of the exhaust gas recirculation system</td>
<td>Check the system; if there is a problem, check its component parts.</td>
</tr>
</tbody>
</table>
VACUUM CIRCUIT DIAGRAM

<1.6L Engine>

Legend:
- Light Blue: EGR valve
- Red: Fuel tank
- Black: Fuel pressure regulator
- Green: EVAP purge canister
- Yellow: EGR solenoid
- White: EGR valve

* With red paint mark
**VACUUM HOSE INSTALLATION**

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the VACUUM HOSE ROUTING as a guide.

**VACUUM HOSE CHECK**

1. Using the VACUUM HOSE ROUTING as a guide, check that the vacuum hoses are correctly connected.
2. Check the connection of the vacuum hoses (removed, loose, etc.) and check that there are no blends or damage.

---

**POSITIVE CRANKCASE VENTILATION SYSTEM**

**GENERAL INFORMATION**

The positive crankcase ventilation system is a system for preventing the escape of blow-by gases from inside the crankcase into the atmosphere. Fresh air is sent from the cleaner into the crankcase through the breather hose to be mixed with the blow-by gas inside the crankcase. The blow-by gas inside the crankcase is drawn into the intake manifold through the positive crankcase ventilation (PCV) valve.

The PCV valve is designed to lift the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

**SYSTEM DIAGRAM**

![Diagram showing components of the positive crankcase ventilation system including the PCV valve and breather hose connections.]
CRANKCASE VENTILATION SYSTEM CHECK

(1) Remove the positive crankcase ventilation (PCV) valve from the rocker cover, then reconnect the PCV valve to the vacuum supply hose.

(2) With the engine idling, put finger on the open end of the PCV valve, and check for negative pressure (vacuum) with finger.

**NOTE**
At this time, the plunger in the PCV valve should move back and forth as the open end is covered and uncovered.

(3) If negative pressure is not felt, clean or replace the PCV valve. Inspect the vacuum supply hose and its port for restriction or plugged condition.

POSITIVE CRANKCASE VENTILATION (PCV) VALVE CHECK

(1) Hold the PCV valve with the vacuum side down. Using light pressure, depress the PCV valve spring with the thin stick 5 - 10 mm (0.20 - 0.39 in). Release pressure on the stick to see if the PCV valve spring will lift the stick to its original position.

(2) If the stick returns quickly to its original position, the PCV valve is OK. If the stick does not return quickly, clean or replace the PCV valve.
EVAPORATIVE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The evaporative control system prevents fuel vapors generated in the fuel tank from escaping into the atmosphere. Fuel vapors from the fuel tank flow through the fuel tank pressure control valve and vapor pipe/hose to be stored temporarily in the EVAP canister. When the vehicle is in operation, fuel vapors stored in the EVAP canister flow through the EVAP purge solenoid and purge port and go into the intake manifold plenum to be sent to the combustion chamber. When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle for example), the engine control module brings the EVAP purge solenoid into the OFF state to shut off the fuel vapor flow to the intake manifold plenum. This does not only ensure the driveability when the engine is cold or running under low load but also stabilize the emission level. In addition, the EVAP ventilation solenoid is provided between the EVAP canister and atmospheric air to carry out OBD-II EVAP leak monitor. This solenoid valve is always off, but if OBD-II EVAP leak monitor is being carried out, the valve will be turned on to prevent atmospheric air from entering the EVAP canister. Moreover, the fuel vent valve is provided to the fuel filler tube to prevent excessive fuel from entering the fuel tank.

SYSTEM DIAGRAM

COMPONENT LOCATION

Evaporative emission purge solenoid
<1.5L Engines>

Evaporative emission purge solenoid
<1.8L Engines>
1. Disconnect the purge hose from the evaporative emission (EVAP) canister, and connect the special tool (purge flow indicator) between the EVAP canister and the purge hose.

2. The vehicle should be prepared as follows before the inspection and adjustment:
   - Engine coolant temperature: 80 - 95°C (176 - 203°F)
   - Lights, cooling fan, and accessories: OFF
   - Transaxle: Neutral (W for P range)

3. Let the engine run at idle for at least four minutes.

4. Race the engine suddenly several times and check the purge flow rate.

   **Standard value:**
   momentarily 20 cm³ (2.5 SCFH) or more

5. If the purge flow rate is below the standard value, disconnect the vacuum hose from the EVAP canister, and check the purge flow rate again.

   If the purge flow rate is below the standard value, check the vacuum port and hose for blockage, or the emission purge solenoid.

   In addition, replace the EVAP canister when the purge flow rate is at the standard value.
PURGE PORT VACUUM CHECK

<1.5L Engine>
1. Disconnect the vacuum hose (red strip) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.

<1.8L Engine>
Disconnect the vacuum hose (black) from the intake air plenum vacuum nipple and connect a hand vacuum pump to the nipple.

2. Start the engine and check to see that, after raising the engine speed by racing the engine, purge vacuum is kept constant regardless of the increased engine speed.

NOTE
If there is no vacuum created, it is possible that the intake air plenum port may be clogged and require cleaning.

EVAPORATIVE EMISSION PURGE SOLENOID CHECK

NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at its original position.

1. Disconnect the vacuum hose (black, red stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

<table>
<thead>
<tr>
<th>Factory voltage</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied</td>
<td>Vacuum leaks</td>
</tr>
<tr>
<td>Not applied</td>
<td>Vacuum maintained</td>
</tr>
</tbody>
</table>
5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 38 - 44 kΩ (at 20 °C (68 °F))

ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR CHECK <1.5L Engine>

To check these parts, refer to GROUP 13A - On-vehicle Service.

VOLUME AIR FLOW SENSOR, ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR CHECK <1.8L Engine>

To inspect these parts, refer to GROUP 13A - On-vehicle Service.

AIR CONDITIONING SWITCH CHECK

To inspect the conditioning switch, refer to GROUP 55 - Air Conditioning Switch.
EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION
The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NOx) is generated in the combustion chamber. Therefore, this system recirculates part of emission gas from the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in a reduction of NOx.

The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION
When the engine coolant temperature is low, when the engine is at idle or when a wide-open throttle operation is performed, the EGR valve is kept closed, achieving no EGR.

The engine control module monitors the EGR system and illuminates the check engine malfunction indicator lamp to indicate that there is a malfunction.

SYSTEM DIAGRAM
**COMPONENT LOCATION**

**EGR SYSTEM CHECK**

1. Disconnect the vacuum hose (green stripe) from the EGR valve, and then connect a hand vacuum pump via the three-way terminal.

2. Regarding the engine in cold and hot conditions, check the condition of vacuum when engine rpm is increased by opening the throttle valve quickly.

When engine is cold

*[Engine coolant temperature: 20°C (68°F) or less]*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle valve</td>
<td>Normal vacuum condition</td>
</tr>
<tr>
<td>Open quickly</td>
<td>No vacuum will generate (remained as barometric pressure)</td>
</tr>
</tbody>
</table>
When engine is hot
[Engine coolant temperature: 80 °C (176 °F) or less]

- Throttle valve  Normal vacuum condition
  - Open quickly  It will momentarily rise over
    13kPa (3.9 in. Hg)

3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump directly to the EGR valve.
5. Check whether the engine stalls or the idling is unstable
   when a vacuum of 23kPa (8.7 in. Hg) or higher is applied
   during idling.

VACUUM CONTROL VALVE CHECK
1. Disconnect the vacuum hose (white stripe) from the
   valve and run the hand vacuum pump to the vacuum control
   valve.
2. Plug the end of the removed vacuum hose.
3. Start the engine and run at idle.
4. Check the vacuum condition

<table>
<thead>
<tr>
<th>Engine condition</th>
<th>Normal vacuum condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idling</td>
<td>Approx. 23kPa (8.7 in. Hg)</td>
</tr>
</tbody>
</table>

EGR VALVE CHECK
1. Remove the EGR valve and inspect for sticking, carbon
   deposits, etc.; if found, clean with a suitable solvent
   so that the valve seats correctly.

2. Connect a hand vacuum pump to the EGR valve
3. Apply 13kPa (2.0 in. Hg) of vacuum, and check to be sure
   that the vacuum is maintained.
4. Apply a vacuum and check the passage of air by blowing
   through one side of the EGR passage.

<table>
<thead>
<tr>
<th>Vacuum</th>
<th>Passage of air</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3kPa (1.6 in. Hg) or more</td>
<td>Air is blown out</td>
</tr>
<tr>
<td>29kPa (8.7 in. Hg) or more</td>
<td>Air is blown out</td>
</tr>
</tbody>
</table>
5. Reinstall the EGR valve, using a new gasket, and tighten to the specified torque.

Tightening torque: 22 Nm (16 ft lbs.)

EGR PORT VACUUM CHECK

1. Disconnect the vacuum hose (green stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.

2. Start the engine and check to see that, after rapidly increasing engine rpm, vacuum remains fairly constant.

EGR SOLENOID CHECK

NOTE
When disconnecting the vacuum hose, always make sure that it can be reconnected at original position.

1. Disconnect the vacuum hose (yellow stripe, white stripe) from the solenoid valve.

2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple to which the white-striped vacuum hose was connected.

4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applied</td>
<td>Vacuum leaks</td>
</tr>
<tr>
<td>Applied</td>
<td>Vacuum maintained</td>
</tr>
</tbody>
</table>

5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 36 – 44 Ω [at 20°C (68°F)]
CATALYTIC CONVERTER

GENERAL INFORMATION
The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

REMOVAL AND INSTALLATION

<Vehicles for Federal>

1. Heated oxygen sensor
2. Front catalytic converter
3. Front exhaust pipe
4. Rear catalytic converter
5. Heated oxygen sensor

Removal steps:
1. Heated oxygen sensor
2. Front catalytic converter
3. Front exhaust pipe
4. Rear catalytic converter
5. Heated oxygen sensor

<Vehicles for California>

1. Heated oxygen sensor
2. Front catalytic converter
3. Rear catalytic converter
4. Heated oxygen sensor

Removal steps:
1. Heated oxygen sensor
2. Front catalytic converter
3. Rear catalytic converter
4. Heated oxygen sensor
REMVAL SERVICE POINT

HEATED OXYGEN SENSOR REMOVAL

INSTALLATION SERVICE POINT

HEATED OXYGEN SENSOR REMOVAL

INSPECTION

Inspect for damage, cracking or deterioration. Replace if faulty.

Caution

1. Stop the engine immediately if engine misfiring occurs, otherwise an abnormally hot exhaust system will damage the catalytic converter or other underbody parts.

2. Correct and repair the ignition or fuel system if there are malfunctions, otherwise engine misfiring may occur which will damage the catalytic converter.

3. Observe manufacturer's specifications when doing service work.
Removal steps
1. Leveling pipe connection
2. Purge hose connection
3. Vent pipe
4. Canister bracket
5. Canister upper cover
6. Vent hose A
7. Purge hose
8. Purge pipe assembly
9. Vapor hose
10. Evaporative emission canister assembly

11. Evaporative emission ventilation solenoid
12. Vent hose B
13. Vent valve
14. Vent hose C
15. Vent hose D
16. Air filter
17. Vent hose E
18. Canister lower cover
INSPECTION

EVAPORATIVE EMISSION VENTILATION SOLENOID CHECK

(1) Connect a hand vacuum pump to nipple (A) of the solenoid.

(2) Check airtightness by applying a vacuum with voltage applied directly from the battery to the evaporative emission ventilation solenoid and without applying voltage.

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applied vacuum maintained.</td>
</tr>
<tr>
<td></td>
<td>Not applied vacuum leaks.</td>
</tr>
</tbody>
</table>

(3) Measure the resistance between the terminals of the solenoid.

Standard value: 17 - 21 Ω (at 20°C (68°F))