### System Description

The ECM uses the signals from the throttle position sensor, Air–flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock–up clutch. Then the ECM compares the engagement condition of the lock–up clutch with the lock–up schedule in the ECM memory to detect a mechanical problems of the shift solenoid valve SL, valve body and torque converter clutch.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0741</td>
<td>• Lock–up does not occur when driving in lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in lock–up OFF range (2–trip detection logic) • When lock–up is ON, clutch or brake slips or gear is broken. (2–trip detection logic)</td>
<td>• Shift solenoid valve SL remains open or closed • Valve body is blocked • Shift solenoid valve SL • Lock–up clutch • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • ECM</td>
</tr>
</tbody>
</table>

### Monitor Description

Based on the signals from the throttle position sensor, the airflow meter and the crankshaft position sensor, the ECM sends a signal to the shift solenoid valve SL to regulate the hydraulic pressure and provide smoother gearshifts. The shift–solenoide valve SL responds to commands from the ECM. The valve controls the lock–up relay valve to perform torque–converter lock–up and flexible lock–up functions.

The ECM compares the engine rpm (NE) signal and the input turbine speed signal to detect torque converter lock–up. The ECM then compares the lock–up status against the lock–up schedule in the ECM memory. If the ECM does not detect lock–up at the appropriate time, it will conclude that there is a malfunction of shift solenoid SL. The ECM will illuminate the MIL.

### Monitor Strategy

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0741</th>
<th>Torque converter clutch solenoid (SL)/Rationality check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque converter clutch solenoid (SL)/OFF malfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque converter clutch solenoid (SL)/ON malfunction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required sensors/Components</th>
<th>Torque converter clutch solenoid (SL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>OFF malfunction 3.5 sec. ON malfunction 1.8 sec.</td>
</tr>
<tr>
<td>MIL operation</td>
<td>2 driving cycles</td>
</tr>
<tr>
<td>Sequence of operation</td>
<td>None</td>
</tr>
</tbody>
</table>
## TYPICAL ENABLING CONDITIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>The monitor will run whenever the following DTCs are not present.</td>
<td>See page 05–389</td>
</tr>
</tbody>
</table>

### OFF malfunction
- **ECT**
  - Minimum: 60 °C (140 °F) or more
  - Maximum: –
- **Vehicle speed range**
  - Minimum: 25 km/h (16 mph) or more
  - Maximum: –
- **Transmission shift position**
  - Minimum: “D”
  - Maximum: –
- **ECM selected gear**
  - Minimum: 3rd or 4th
  - Maximum: –
- **Shift solenoid “A” (S1) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Shift solenoid “B” (S2) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Torque converter clutch solenoid (SL) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **ECT sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Input (turbine) speed sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Internal counter shaft speed sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Throttle sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **ECM lock-up command**
  - Minimum: ON
  - Maximum: –

### ON malfunction
- **ECT**
  - Minimum: 60 °C (140 °F) or more
  - Maximum: –
- **Vehicle speed**
  - Minimum: 25 km/h (16 mph) or more
  - Maximum: –
- **Transmission shift position**
  - Minimum: “D”
  - Maximum: –
- **ECM selected gear**
  - Minimum: 3rd or 4th
  - Maximum: –
- **Shift solenoid “A” (S1) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Shift solenoid “B” (S2) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Torque converter clutch solenoid (SL) circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **ECT sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Input (turbine) speed sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Internal counter shaft speed sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **Throttle sensor circuit**
  - Minimum: Not circuit malfunction
  - Maximum: –
- **ECM lock-up command**
  - Minimum: OFF
  - Maximum: –
- **Throttle valve opening angle**
  - Minimum: 8 % or more
  - Maximum: –
- **Vehicle speed**
  - Minimum: –
  - Maximum: Less than 60 km/h (37 mph)

## TYPICAL MALFUNCTION THRESHOLDS

<table>
<thead>
<tr>
<th>Detection criteria</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF malfunction</strong></td>
<td></td>
</tr>
<tr>
<td>Engine speed – Input shaft speed (NE – NT)</td>
<td>100 rpm or more</td>
</tr>
<tr>
<td>NE: Engine speed</td>
<td></td>
</tr>
<tr>
<td>NT: Input (turbine) speed</td>
<td></td>
</tr>
<tr>
<td><strong>ON malfunction</strong></td>
<td></td>
</tr>
<tr>
<td>It is necessary 2 judgments/driving cycle</td>
<td></td>
</tr>
<tr>
<td>1st judgment: Temporary flag ON</td>
<td></td>
</tr>
<tr>
<td>2nd judgment: Pending fault code ON</td>
<td></td>
</tr>
<tr>
<td>Vehicle speed must be under 10 km/h (6 mph) once before</td>
<td></td>
</tr>
<tr>
<td>Engine speed – Input shaft speed</td>
<td>Less than 35 rpm</td>
</tr>
<tr>
<td>NE: Engine speed</td>
<td></td>
</tr>
<tr>
<td>NT: Input (turbine) speed</td>
<td></td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE

1  INSPECT SHIFT SOLENOID VALVE(SL)

(a) Remove the shift solenoid valve SL.
(b) Measure the resistance according to the value(s) in the table below.
   **Standard:**
   
<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 °C (68 °F)</td>
</tr>
<tr>
<td>Solenoid Connector (SL) – Solenoid Body (SL)</td>
<td>11 to 15 Ω</td>
</tr>
</tbody>
</table>

(c) Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.
   **Standard:**
   The solenoid valve makes an operating noise.

   NG REPLACE SHIFT SOLENOID VALVE(SL)

2  INSPECT TRANSMISSION VALVE BODY ASSY (See chapter 2 in the problem symptoms table) (See page 05–394)

   NG REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (See page 40–24)

3  INSPECT TORQUE CONVERTER CLUTCH ASSY (See page 40–21)

   NG REPLACE TORQUE CONVERTER CLUTCH ASSY

OK

REPAIR AUTOMATIC TRANSAXLE ASSY (See page 40–7)