

<b>DTC</b>	<b>P0741</b>	<b>TORQUE CONVERTER CLUTCH SOLENOID PERFORMANCE (SHIFT SOLENOID VALVE DSL)</b>
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## 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 mechanical problems of the shift solenoid valve DSL, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P0741	Lock-up does not occur when driving in lock-up range Lock-up remains ON in lock-up OFF range (2-trip detection logic)	<ul style="list-style-type: none"> <li>• Shift solenoid valve DSL remains open or closed</li> <li>• Valve body is blocked</li> <li>• Shift solenoid valve DSL</li> <li>• Torque converter clutch</li> <li>• Automatic transaxle (clutch, brake or gear etc.)</li> <li>• Line pressure is too low</li> <li>• ECM</li> </ul>

## MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests "lock-up" by applying control voltage to the shift solenoid DSL. When the DSL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve DSL or lock-up system performance. The ECM will turn on the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up.  
(Engine speed is at least 75 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up off.  
(The difference between engine speed and input turbine speed is less than 35 rpm.)

**MONITOR STRATEGY**

Related DTCs	P0741: Shift solenoid valve DSL/OFF malfunction Shift solenoid valve DSL/ON malfunction
Required sensors/Components	Shift solenoid valve DSL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

**TYPICAL ENABLING CONDITIONS****ALL:**

ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	–20°C (–4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

**OFF malfunction:**

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Vehicle speed	25 km/h (15.5 mph) or more

**ON malfunction:**

ECM lock-up command	OFF
ECM selected gear	3rd, 4th or 5th
Throttle valve opening angle	8.5% or more
Vehicle speed	25 to 60 km/h (15.5 to 37.3 mph)

**TYPICAL MALFUNCTION THRESHOLDS**

**Either of the following conditions is met: OFF malfunction or ON malfunction**

**OFF malfunction:**

Engine speed – Input (turbine) speed	100 rpm or more
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**ON malfunction:**

Difference between engine speed and input (turbine) speed	Less than 35 rpm
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## INSPECTION PROCEDURE

### HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

- Warm up the engine.
- Turn the ignition switch off.
- Connect the hand-held tester to the DLC3.
- Turn the ignition switch to the ON position.
- Push the "ON" button of the hand-held tester.
- When you use hand-held tester:  
Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
- According to the display on the tester, perform the "ACTIVE TEST".

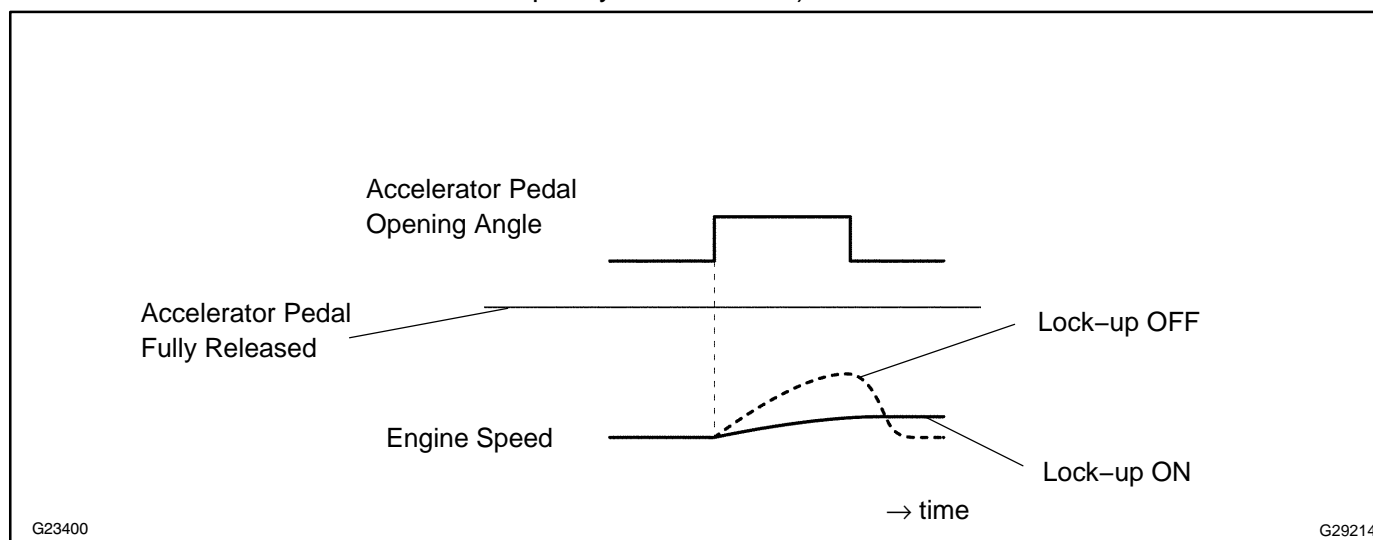
Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the DSL operation.

### HINT:

- This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.
  - This test can be conducted in the 5th gear.
- (h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

### HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



**1 CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0741)**

- (a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
- (b) Turn the ignition switch to the ON position and turn the OBD II scan tool or the hand-held tester main switch ON.
- (c) When you use hand-held tester:  
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
- (d) Read the DTCS using the OBD II scan tool or the hand-held tester.

**Result:**

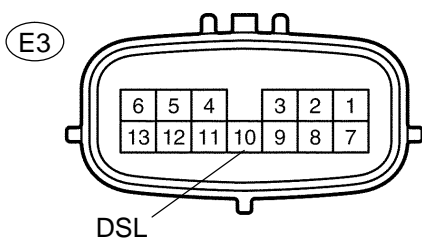
Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCS	B

**HINT:**

If any other codes besides "P0741" are output, perform the troubleshooting for those DTCS first.

**B**

**GO TO RELEVANT DTC CHART  
(SEE PAGE 05-1152)**

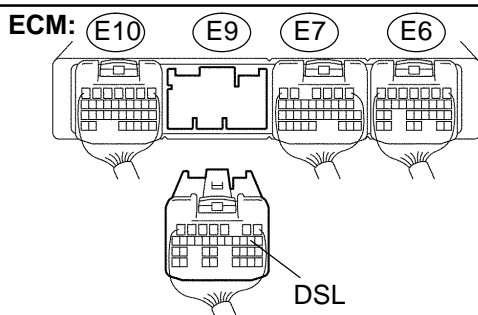
**A****2 INSPECT TRANSMISSION WIRE(DSL)****Transmission Wire Side:  
(Connector Front View):**

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- (a) Disconnect the transmission wire connector from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

**Standard:**

Tester Connection	Specified Condition 20°C (68°F)
10 – Body ground	11 to 13 Ω

**NG****Go to step 4****OK****3 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE – ECM)**

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- (a) Connect the transmission wire connector.
- (b) Disconnect the ECM connector.
- (c) Measure the resistance according to the value(s) in the table below.

**Standard:**

Tester Connection	Specified Condition 20°C (68°F)
E9 – 9 (DSL) – Body ground	11 to 13 Ω

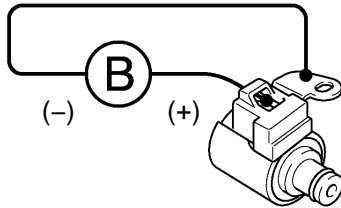
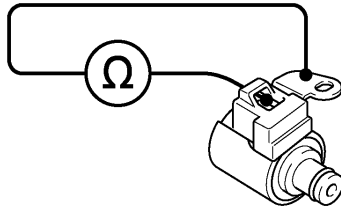
**NG**

**REPAIR OR REPLACE HARNESS OR  
CONNECTOR (SEE PAGE 01-32)**

**OK**

#### 4 INSPECT SHIFT SOLENOID VALVE(DSL)

##### Shift Solenoid Valve DSL:



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- (a) Remove the shift solenoid valve DSL.
- (b) Measure the resistance according to the value(s) in the table below.

##### Standard:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (DSL) – Solenoid Body (DSL)	11 to 13 Ω

- (c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

##### Standard:

The solenoid valve makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE(DSL)

OK

#### 5 CHECK TRANSMISSION WIRE (SEE PAGE 01–32)

NG

REPAIR OR REPLACE TRANSMISSION WIRE  
(SEE PAGE 40–34)

OK

#### 6 INSPECT TRANSMISSION VALVE BODY ASSY (See chapter 2 in the problem symptoms table) (SEE PAGE 05–1134)

NG

REPAIR OR REPLACE TRANSMISSION VALVE  
BODY ASSY (SEE PAGE 40–42)

OK

#### 7 INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40–27)

NG

REPLACE TORQUE CONVERTER CLUTCH  
ASSY

OK

REPAIR AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40–17)