

<b>DTC</b>	<b>P0771</b>	<b>Shift Solenoid "E" Performance (Shift Solenoid Valve SR)</b>
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## SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).

Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	<ul style="list-style-type: none"> <li>Shift solenoid valve SR remains open or closed</li> <li>Shift solenoid valve SL1 remains open or closed</li> <li>Valve body is blocked</li> <li>Automatic transmission (clutch, brake or gear, etc.)</li> </ul>

## MONITOR DESCRIPTION

This DTC indicates "stuck ON malfunction" or "stuck OFF malfunction" of the shift solenoid valve SR or SL1. The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

## MONITOR STRATEGY

Related DTCs	P0771	Shift solenoid valve SR/Rationality check
Required sensors/Components	Main	Shift solenoid valve SR
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	0.4 sec.
	OFF malfunction (B) and (C)	Immediate
	ON malfunction	0.15 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

## TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
<b>All:</b>		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	

ETCS (Electric throttle control system)	Not system down	
Transmission range	"D"	
ECT	40°C (104°F) or more	—
Spark advance from Max. retard timing by KCS control	0° CA or more	—
Engine	Starting	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	—
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
OFF malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1.2 mph) or more	—
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	—
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	—
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction		
Current ECM selected gear	2th	
Last ECM selected gear	1st	
Throttle valve opening angle (During transition from 1st to 2nd gear)	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	—

## TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
<b>[OFF malfunction]</b>	
<b>All of the following conditions are met: OFF malfunctions (A), (B) and (C)</b>	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
<b>OFF malfunction (A)</b>	
Turbine speed/Output speed	0.93 to 1.07
<b>OFF malfunction (B)</b>	
Turbine speed/Output speed	Not change as follow 0.93 to 1.07 ↓ 0.65 to 0.79

<b>OFF malfunction (C)</b>	
Output record from ECM for 4th → 5th upshifting	Recorded
<b>[ON malfunction]</b>	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
Turbine speed – Output speed x 1st gear ratio (NT – NO x 1st gear ratio)	150 rpm or more

## 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.
- Turn on the tester.
- Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST".
- According to the display on the tester, perform the "ACTIVE TEST".

### HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page [DI-1150](#)).

Item	Test Details	Diagnostic Note
SHIFT	<p>[Test Details] Operate the shift solenoid valve and set each shift position by yourself.</p> <p>[Vehicle Condition] Less than 50 km/h (31 mph)</p> <p>[Others] • Press "→" button: Shift up • Press "←" button: Shift down</p>	Possible to check the operation of the shift solenoid valves.

### HINT:

- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The 4th to 5th up-shiftings must be performed with the accelerator pedal released.
- The 5th to 4th down-shiftings must be performed with the accelerator pedal released.
- Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand-held tester.
- The shift solenoid valve SR and SL1 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SR	OFF	OFF	OFF	OFF	ON
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON

**1 Check other DTCs output (in addition to DTC P0771).****PREPARATION:**

- (a) Turn the ignition switch off.
- (b) Connect the OBD II scan tool or hand-held tester to the DLC3.
- (c) Turn the ignition switch to the ON position.
- (d) Turn on the tester.
- (e) Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".

**CHECK:**

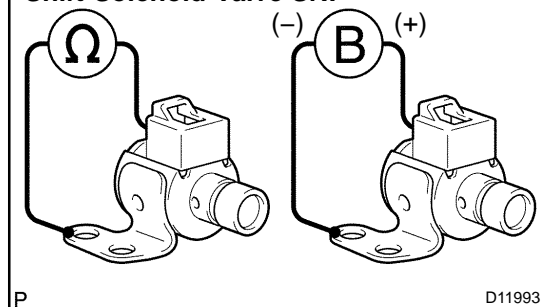
Read the DTCs using the OBD II scan tool or the hand-held tester.

**RESULT:**

Display (DTC output)	Proceed to
Only "P0771" is output	A
"P0771" and other DTCs	B

**HINT:**

If any other codes besides "P0771" are output, perform troubleshooting for those DTCs first.

**B****Go to DTC chart (See page [DI-1156](#)).****A****2 Inspect shift solenoid valve SR operation.****Shift Solenoid Valve SR:****PREPARATION:**

Remove the shift solenoid valve SR (See page [AT-12](#)).

**CHECK:**

Measure the resistance according to the value(s) in the table below.

**OK:**

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SR) – Solenoid Body (SR)	11 to 15 Ω

**CHECK:**

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

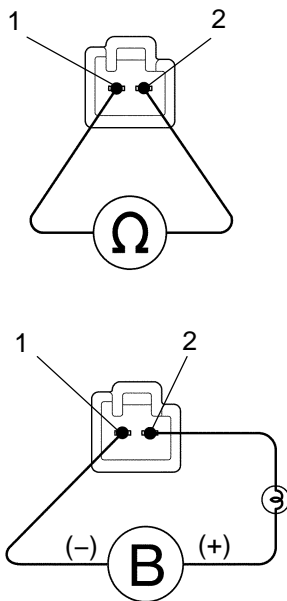
**OK:**

**The solenoid makes an operating sound.**

**NG****Replace shift solenoid valve SR  
(See page [AT-12](#)).****OK**

### 3 Inspect shift solenoid valve SL1.

Shift Solenoid Valve SL1:



D12795

#### PREPARATION:

Remove the shift solenoid valve SL1 (See page [AT-12](#)).

#### CHECK:

Measure the resistance according to the value(s) in the table below.

#### OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

#### CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

#### OK:

The solenoid makes an operating sound.

NG

Replace the shift solenoid valve SL1 (See page [AT-12](#)).

OK

### 4 Inspect valve body (See page [AT-12](#)).

#### OK:

There are no foreign objects on each valve.

NG

Repair or replace valve body.

OK

Repair or replace transmission (See page [AT-34](#)).