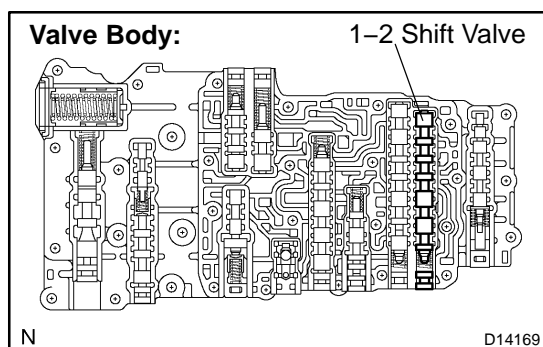


DTC	P0781	1-2 Shift (1-2 Shift Valve)
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SYSTEM DESCRIPTION

The 1-2 shift valve performs shifting to 1st gear and other gears.

DTC No.	DTC Detection Condition	Trouble Area
P0781	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	<ul style="list-style-type: none"> Valve body is blocked up or stuck (1-2 shift valve) Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates that the 1-2 shift valve in the valve body is locked in the direction the spring compresses. The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF" and switching oil pressure to the valves in the valve body.

The ECM calculates the "actual" transmission gear by comparing the signals from the input speed sensor (NCO) and the output speed sensor (SP2). The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC .

MONITOR STRATEGY

Related DTCs	P0781	Valve body/Rationality check
Required sensors/Components	Main	Valve body
	Sub	Automatic transmission assembly, Speed sensor (NT), Speed sensor (NO), Vehicle speed sensor, Throttle speed sensor
Frequency of operation	Continuous	
Duration	Conditions (A) and (B)	0.4 sec.
	Condition (C)	3 sec.
	Condition (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
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	
Condition (A)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1.2 mph) or more	–
Output speed	2nd → 1st down shift point or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
Condition (B)		
ECM selected gear	4th	
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)	–
Condition (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)
Condition (D)		
ECM selected gear	5th	

Engine speed – Turbine speed (NE – NT) (After transition from 4th to 5th gear)	–	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: Condition (A), and Condition (B), (C) or (D)	
Condition (A)	
Turbine speed/Output speed	3.30 to 7.50
Condition (B)	
Turbine speed/Output speed	1.28 to 1.53
Condition (C)	
Turbine speed – Output speed x 4th gear ratio (NT – NO x 4th gear ratio)	1,000 rpm or more
Condition (D)	
Turbine speed – Output speed x 5th gear ratio (NT – NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	Check other DTCs output (in addition to DTC P0781).
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PREPARATION:

- Turn the ignition switch off.
- Connect the OBD II scan tool or 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 / 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 "P0781" is output	A
"P0781" and other DTCs	B

HINT:

If any other codes besides "P0781" are output, perform troubleshooting for those DTCs first.

B

Go to DTC chart (See page [DI-1156](#)).

A

2**Perform active test****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.

- (a) Warm up the engine.
- (b) Turn the ignition switch off.
- (c) Connect the hand-held tester to the DLC3.
- (d) Turn the ignition switch to the ON position.
- (e) Turn on the tester.
- (f) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST".
- (g) 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](#)).

Standard:

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

OK:

Gear position changes in accordance with the tester command.

NG

Repair or replace valve body (See page [AT-12](#)).

OK

3 Clear the DTC and running test.**CHECK:**

Clear the DTC, and check DTC again after conducting the "MONITOR DRIVE PATTERN FOR ECT TEST"
(See page [DI-1134](#)).

OK:

No DTC code

NG

Repair or replace valve body (See page
[AT-12](#)).

OK**END**