

DTC	P0781	1-2 Shift
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SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch 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 Detecting Condition	Trouble Area
P0781	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Valve body is blocked up or stuck (1-2 shift) • Automatic transmission assembly • ECM

MONITOR DESCRIPTION

The ECM calculates the "actual" transmission gear by comparing the signals from the input speed sensor and the output speed sensor. 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	Condition (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
The Following items are common to all conditions below: Condition (A), (B), (C) and (D)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40° C (104° F) or more	–
Spark advance from Max. retard timing by KCS control	0° CA or more	–
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	–
NO/NOTf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
Condition (A)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	–
Output speed	2nd → 1st down shift point or more	–
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	–
Condition (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	–
Throttle valve opening angle	6.5% 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 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 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 (NT/NO)	3.30 or more and 7.50 or less
Condition (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
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:

- Warm up the engine.
- 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.
- Push the "ON" button of the OBD II scan tool or the hand-held 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" is output, perform the troubleshooting for those DTCs first.

B

Go to relevant DTC chart (See page [DI-390](#))

A

2	Clear the DTC and running test (See page DI-361).
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CHECK:
Clear the DTC again, and check DTC again after conducting the running test.
OK:

Normal code

OK	END
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Repair or replace valve body (See page [AT-8](#)).