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|------------|--------------|---|
| DTC | P0751 | Shift Solenoid "A" Performance (Shift Solenoid Valve S1) |
|------------|--------------|---|

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 Conditions | Trouble Areas |
|---------|--|--|
| P0751 | S1 stuck ON malfunction*1: The ECM determines that there is a malfunction when the following conditions are met (2-trip detection logic): (a) When the ECM directs the gearshift to switch to 4th gear, the actual gear is shifted to 1st. (b) When the ECM directs the gearshift to switch to 1st gear, the actual gear is also shifted to 1st. | <ul style="list-style-type: none"> • Shift solenoid valve S1 remains open • Shift solenoid valve SLT remains open or closed • Valve body is blocked • Automatic transmission (clutch, brake or gear, etc.) |
| | S1 stuck OFF malfunction*2: The ECM determines that there is a malfunction when the following conditions are met (2-trip detection logic): (a) When the ECM directs the gearshift to switch to 1st gear, the actual gear is shifted to 4th. (b) When the ECM directs the gearshift to switch to 5th gear, the actual gear is also shifted to 5th. | <ul style="list-style-type: none"> • Shift solenoid valve S1 remains closed • Shift solenoid valve SLT remains open or closed • Valve body is blocked • Automatic transmission (clutch, brake or gear, etc.) |

HINT:

Gear positions in the event of a solenoid valve mechanical problem:

| Gearshift controlled by ECM | 1st | 2nd | 3rd | 4th | 5th |
|---|-----|-----|-----|-----|-----|
| *1: Actual gear position under S1 stuck ON malfunction | 1st | 2nd | 2nd | 1st | N* |
| *2: Actual gear position under S1 stuck OFF malfunction | 4th | 3rd | 3rd | 4th | 5th |

N*: Neutral

MONITOR DESCRIPTION

This DTC indicates "stuck ON malfunction" or "stuck OFF malfunction" of the shift solenoid valve S1. The ECM controls the gearshifts by turning the shift solenoid valves "ON/OFF". When the gear position directed by the ECM and the actual gear position do not match, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

| | |
|---------------------------------------|---|
| Related DTCs | P0751: Shift solenoid valve S1/OFF malfunction Shift solenoid valve S1/ON malfunction |
| Required sensors/Components (Main) | Shift solenoid valve S1 |
| Required sensors/Components (Related) | Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (SP2) |
| Frequency of operation | Continuous |
| Duration | OFF malfunctions (A) and (B): 0.4 seconds OFF malfunction (C): Immediate ON malfunctions (A), (B) and (C): 0.4 seconds ON malfunction (D): 3 seconds ON malfunction (E): 0.5 seconds |
| MIL operation | 2 driving cycles |

| | |
|-----------------------|------|
| Sequence of operation | None |
|-----------------------|------|

TYPICAL ENABLING CONDITIONS

The following conditions are common to all OFF malfunctions (A), (B) and (C) and ON malfunctions (A), (B), (C), (D) and (E).

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present. | P0115 - P0118: ECT sensor P0125: Insufficient ECT for Closed Loop P0500: VSS P0748 - P0799: Trans solenoid (range) |
| Turbine speed sensor (NT) circuit | No circuit malfunction |
| Output speed sensor (SP2) circuit | No circuit malfunction |
| Shift solenoid "A" (S1) circuit | No circuit malfunction |
| Shift solenoid "B" (S2) circuit | No circuit malfunction |
| Shift solenoid "E" (SR) circuit | No circuit malfunction |
| Pressure control solenoid "A" (SL1) circuit | No circuit malfunction |
| Pressure control solenoid "B" (SL2) circuit | No circuit malfunction |
| ECT (Engine Coolant Temperature) sensor circuit | No circuit malfunction |
| Knock sensor circuit | No circuit malfunction |
| ETCS (Electronic Throttle Control System) | System not down |
| Transmission shift position | "D" |
| ECT | 40°C (104°F) or more |
| Spark advance from max. retard timing by knock sensor control | 0° CA or more |
| Engine | Starting |
| Transfer range | "High" *1 |

*1: Following conditions are met

| | |
|--|------------------------|
| Vehicle speed sensor "A" circuit | No circuit malfunction |
| Output speed sensor circuit | No circuit malfunction |
| Transfer output speed | 143 rpm or more |
| Transfer input speed/Transfer output speed | 0.9 to 1.1 |

OFF malfunction (A)

| | |
|------------------------------|---|
| ECM selected gear | 1st |
| Vehicle speed | 1.2 to 24.9 mph (2 to 40 km/h) |
| Throttle valve opening angle | 8 % or more and 6.5 % or more at engine speed of 2,000 rpm (Conditions vary with engine speed) |

OFF malfunction (B)

| | |
|---|-------------------|
| Current ECM selected gear | 5th |
| Last ECM selected gear | 4th |
| Continuous time of ECM selecting 4th gear | 2 seconds or more |
| Actual gear when ECM selected 4th gear | 4th |

OFF malfunction (C)

| | |
|---------------------------|-----|
| Current ECM selected gear | 5th |
| Last ECM selected gear | 4th |

ON malfunction (A)

| | |
|------------------------------|---|
| ECM selected gear | 1st |
| Vehicle speed | 1.2 to 24.9 mph (2 to 40 km/h) |
| Throttle valve opening angle | 6.5 % or more at engine speed of 2,000 rpm (Conditions vary with engine speed) |

ON malfunction (B)

| | |
|------------------------------|---|
| ECM selected gear | 4th |
| Vehicle speed | 1.2 mph (2 km/h) or more |
| Throttle valve opening angle | 6.5 % or more at engine speed of 2,000 rpm (Conditions vary with engine speed) |

ON malfunction (C)

| | |
|------------------------------|---|
| ECM selected gear | 3rd |
| Vehicle speed | 1.2 mph (2 km/h) or more |
| Throttle valve opening angle | 6.5 % or more at engine speed of 2,000 rpm (Conditions vary with engine speed) |

ON malfunction (D)

| | |
|---|-------------------------------|
| Current ECM selected gear | 5th |
| Last ECM selected gear | 4th |
| Vehicle speed (During transition from 4th to 5th gear) | Less than 62.2 mph (100 km/h) |

ON malfunction (E)

| | |
|---|-------------------------------|
| ECM selected gear | 5th |
| Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear) | 150 rpm or less |
| Vehicle speed (After transition from 4th to 5th gear) | Less than 62.2 mph (100 km/h) |

TYPICAL MALFUNCTION THRESHOLDS

[OFF malfunction]

All of the following conditions are met: OFF malfunctions (A), (B) and (C)

2 detections are necessary in 1 driving cycle.

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A)

| | |
|----------------------------|--------------------------------------|
| Turbine speed/Output speed | 0.93 to 1.07 (Actual gear is 4th) |
|----------------------------|--------------------------------------|

OFF malfunction (B)

| | |
|----------------------------|--------------------------------------|
| Turbine speed/Output speed | 0.65 to 0.79 (Actual gear is 5th) |
|----------------------------|--------------------------------------|

OFF malfunction (C)

| | |
|---|----------|
| Output record from ECM for 4th → 5th upshifting | Recorded |
|---|----------|

[ON malfunction]

Either of the following conditions is met:

- ON malfunctions (A) and (B)
- ON malfunction (B) or (C) and ON malfunction (D) or (E)

ON malfunction (A)

| | |
|----------------------------|--------------------------------------|
| Turbine speed/Output speed | 3.30 to 7.50 (Actual gear is 1st) |
|----------------------------|--------------------------------------|

ON malfunction (B)

| | |
|----------------------------|--------------------------------------|
| Turbine speed/Output speed | 3.30 to 7.50 (Actual gear is 1st) |
|----------------------------|--------------------------------------|

ON malfunction (C)

| | |
|----------------------------|--------------------------------------|
| Turbine speed/Output speed | 1.91 to 2.35 (Actual gear is 2nd) |
|----------------------------|--------------------------------------|

ON malfunction (D)

| | |
|---|-------------------|
| Turbine speed - Output speed x 4th gear ratio | 1,000 rpm or more |
|---|-------------------|

ON malfunction (E)

| | |
|---|-------------------|
| Turbine speed - Output speed x 5th gear ratio | 1,000 rpm or more |
|---|-------------------|

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components, such as the relay, VSV, and actuator, to be operated without removing any parts. Performing the ACTIVE TEST as a first step of troubleshooting is one method of shortening labor time.

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

1. Warm up the engine.
2. Turn the ignition switch off.
3. Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
4. Turn the ignition switch to the ON position.
5. Push the "ON" button of the tester.
6. Clear the DTC.
7. Select the items "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / SHIFT".
8. According to the display on the tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be changed with the intelligent tester.

Comparing the shift position directed by the ACTIVE TEST with the actual shift position enables the problem to be confirmed (See page AT-35).

| Item | Test Details | Diagnostic Note |
|-------|---|---|
| SHIFT | [Test Details] Operate the shift solenoid valve and set each shift position manually. [Vehicle Condition] Vehicle Speed: Less than 30 mph (50 km/h) [Others] <ul style="list-style-type: none"> • Press → button: Shift up • Press ← button: Shift down | Possible to check the operation of the shift solenoid valves. HINT: Shifting to the 5th gear is possible only when the vehicle is stationary with the engine idling. |

HINT:

- This test can be conducted when the vehicle speed is 30 mph (50 km/h) or less.
- The 4th to 5th up-shifting must be performed with the accelerator pedal released.
- The 5th to 4th down-shifting 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 directed by the ECM is shown in the DATA LIST / SHIFT display on the intelligent tester.
- The shift solenoid valve S1 is turned on/off normally when the shift lever is in the D position:

| | | | | | |
|-----------------------------|-----|-----|-----|-----|-----|
| Gearshift controlled by ECM | 1st | 2nd | 3rd | 4th | 5th |
| Shift solenoid valve S1 | ON | ON | OFF | OFF | OFF |

AT

| | |
|----------|---|
| 1 | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0751) |
|----------|---|

- (a) Connect the the intelligent tester to the DLC3.
- (b) Turn the ignition switch to the ON position and push the intelligent tester main switch ON.
- (c) Select the items "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".

(d) Read the DTCs using the intelligent tester.

Result:

| Display (DTC Output) | Proceed to |
|------------------------|------------|
| Only "P0751" is output | A |
| "P0751" and other DTCs | B |

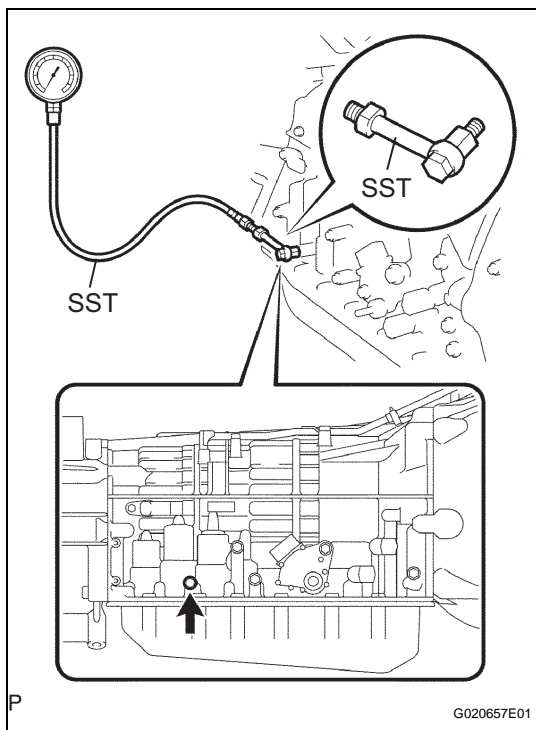
HINT:

If any codes besides "P0751" are output, perform troubleshooting for those DTCs first.

B **GO TO DTC CHART**

A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (SOLENOID (SLT))



NOTICE:

- Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).
- Be careful to prevent SST's hose from interfering with the exhaust pipe.
- Perform the test with the A/C OFF.

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time.

The DATA LIST can be displayed during the ACTIVE TEST.

(a) Remove the test plug on the transmission case center right side and connect SST.

SST 09992-00095 (09992-00231, 09992-00271)

- (b) Connect the intelligent tester to the DLC3.
- (c) Start the engine and warm it up.
- (d) Measure the line pressure with SST.
- (e) Turn the intelligent tester ON.
- (f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
- (g) Follow the instructions on the tester and perform the ACTIVE TEST.
- (h) Measure the line pressure with SST.

AT

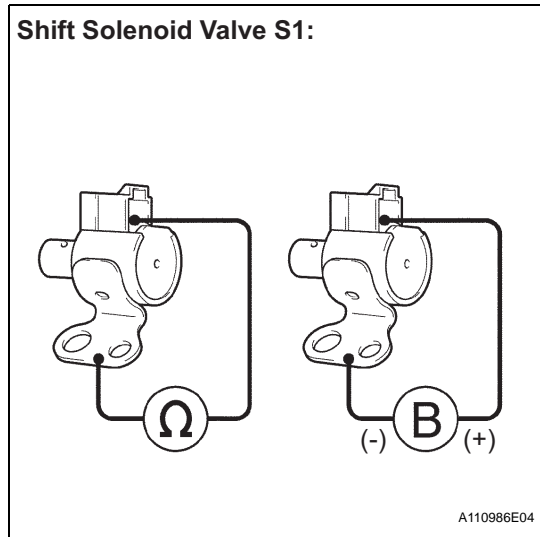
| Item | Test Details | Diagnostic Note |
|-----------------|--|-----------------|
| SOLENOID (SLT)* | <p>[Test Details] Operate shift solenoid SLT and raise line pressure.</p> <p>[Vehicle Condition]</p> <ul style="list-style-type: none"> • Vehicle stopped • IDL: ON <p>HINT: OFF: Line pressure up (when Active Test of "SOLENOID (SLT)" is performed, ECM commands SLT solenoid to turn off) ON: No action (normal operation)</p> | - |

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting SST to the automatic transmission, which is used in the HYDRAULIC TEST (See page AT-18) as well. Please note that the pressure values in the ACTIVE TEST and HYDRAULIC TEST are different.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

OK

3 INSPECT SHIFT SOLENOID VALVE S1



- (a) Remove the shift solenoid valve S1.
- (b) Measure the resistance.

Standard resistance

| Tester Connection | Specified Condition |
|--|---------------------------|
| Solenoid Connector (S1) - Solenoid Body (S1) | 11 to 15 Ω at 20°C (68°F) |

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

OK:

The solenoid makes operating sounds.

NG → **REPLACE SHIFT SOLENOID VALVE S1**

OK

4 INSPECT TRANSMISSION VALVE BODY ASSEMBLY (See chapter 2 in the problem symptoms table)

AT

OK:

There are no foreign objects on any valves and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY