

DTC	P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)
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SYSTEM DESCRIPTION

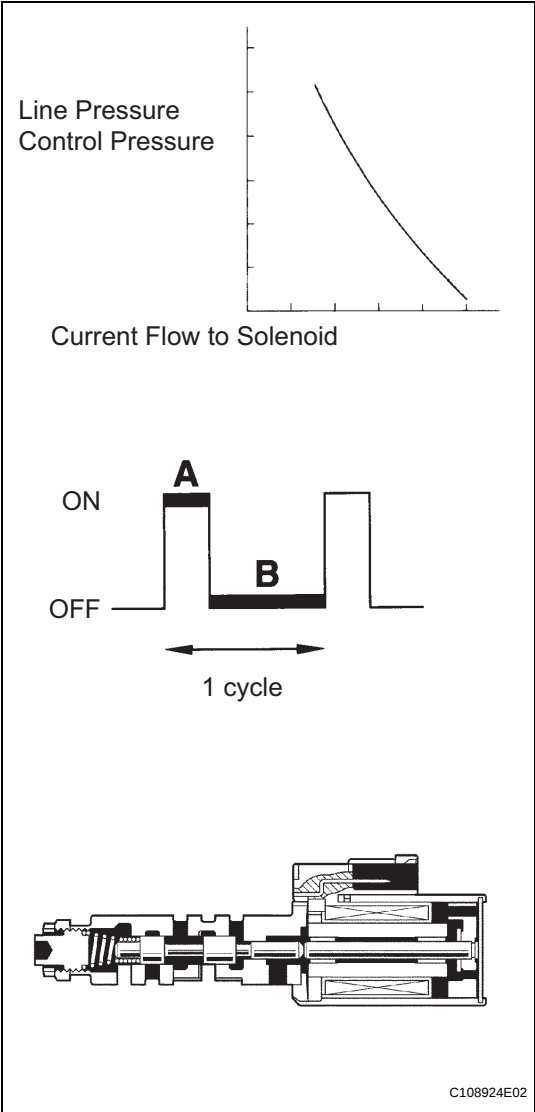
AT

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty ratio (*) of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio = $A/(A+B) \times 100$ (%)



DTC No.	DTC Detection Condition	Trouble Area
P2714	ECM detects a malfunction on SLT (ON side) according to the revolution difference of the turbine and the output shaft, and also by the oil pressure. (2-trip detection logic)	- Shift solenoid valve SLT remains open or closed - Shift solenoid valve S1, S2, SR, SL1 or SL2 remains open or closed - Gear 6 incorrect ratio (reverse sequence valve) or 1-2 shift valve is stuck - Valve body is blocked - Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM turns on the MIL and outputs this DTC when the amount of heat absorption exceeds the specified value.

When the shift solenoid valve SLT remains on, oil pressure goes down and clutch engagement force decreases.

NOTICE:

If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT, Valve body, ATF temperature sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous
Duration	Immediate
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor (NT) circuit	Not circuit malfunction
Output speed sensor (NO) circuit	Not circuit malfunction
TFT temperature 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
Shift solenoid valve SLT 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°crankshaft angle or more
Engine	Starting
Transfer range	"High" *1
TFT temperature	10°C (50°F) or more

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

TYPICAL MALFUNCTION THRESHOLDS

ON malfunction

Summation of C1 clutch heat generations	Specified value
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INSPECTION PROCEDURE

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2714)

AT

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

Result

Display (DTC output)	Proceed to
Only "P2714" is output	A
"P2714" and other DTCs	B

HINT:

If any other codes besides "P2714" are output, perform troubleshooting for those DTCs first.

B

GO TO DTC CHART

A

2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

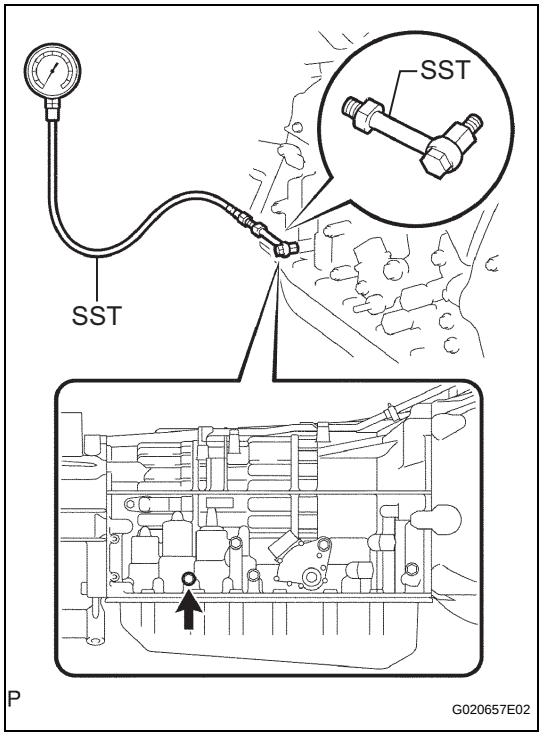
NOTICE:

- 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 hose from interfering with the exhaust pipe.
- This check must be conducted after checking and adjusting engine.
- Perform under condition that A/C is OFF.

HINT:

Performing the ACTIVE TEST using the intelligent 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) Turn the ignition switch off.
- (b) Lift the vehicle up.



- (c) Remove the test plug on the transmission case center right side and connect SST.
SST 09992-00095 (09992-00231, 09992-00271)
- (d) Lower the vehicle.
- (e) Fully apply the parking brake and chock the 4 wheels.
- (f) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
- (g) Start the engine.
- (h) Warm up the ATF (Automatic Transmission Fluid).
- (i) Measure the line pressure when the engine is idling.
- (j) Turn on the tester.
- (k) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SOLENOID (SLT)".
- (l) Follow the instructions on the tester and perform the ACTIVE TEST.
- (m) Measure the line pressure with SST.

Item	Test Details
LINE PRESS UP*	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] - Vehicle Stopped. - IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)

*: "LINE PRESS UP" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transmission, which is used in the HYDRAULIC TEST (See page [AT-170](#)) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

OK:

The line pressure changes as specified when performing the ACTIVE TEST.

NG

Go to step 9

OK

3

PERFORM RUNNING TEST

NOTICE:

This test should always be performed with at least 2 people.

HINT:

Performing the ACTIVE TEST using the intelligent 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.

The DATA LIST can be displayed during the ACTIVE TEST.

- (a) Warm up the engine.
- (b) Turn the ignition switch off.
- (c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
- (d) Turn the ignition switch to the ON position.
- (e) Turn on the tester.
- (f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
- (g) Follow the instructions on the tester and read the ACTIVE TEST.

HINT:

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

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] • IDL: ON • 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 intelligent tester.
- (h) Compare the ECM gear shift command and the actual gear position.

Result

ECM gear shift command			1st	2nd	3rd	4th	5th	Proceed to
Actual gear position under malfunction	Shift solenoid S1	Stuck ON	1st	2nd	2nd	1st	N ^{*1}	A
		Stuck OFF	4th	3rd	3rd	4th	5th	
	Shift solenoid S2	Stuck ON ^{*2}	2nd	2nd	3rd	3rd	N ^{*1}	B
		Stuck OFF ^{*3}	1st	1st	4th	4th	5th	
	Shift solenoid SL2	Stuck ON	1st	2nd	3rd	4th	N ^{*1}	C
		Stuck OFF	1st	2nd	3rd	4th	5th	
	Shift solenoid SR	Stuck ON ^{*4}	1st	2nd	3rd	4th	5th	D
		Stuck OFF ^{*5}	1st	2nd	3rd	4th	4th	

HINT:

- ^{*1}: Neutral
- ^{*2}: When shift solenoid S2 is stuck ON, the vehicle cannot drive in reverse.
- ^{*3}: When shift solenoid S2 is stuck OFF, the 4th to 5th up-shift will have a large shift shock. Also the 5th to 4th down-shift will have time lag.
- ^{*4}: Stuck ON condition can be determined by checking if shift shock has increased excessively.
- ^{*5}: When shift solenoid SR is stuck OFF, moving the shift lever from N to D will cause a large shift shock.
- Gear shift can be determined by paying attention to changes in rpm.

OK	Go to step 9
B	Go to step 5
C	Go to step 6
D	Go to step 7

A

AT

4

INSPECT SHIFT SOLENOID VALVE S1

Shift Solenoid Valve S1:

A110986E04

- (a) Remove the shift solenoid valve S1.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) 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.

OK

Go to step 10

NG

REPLACE SHIFT SOLENOID VALVE S1

5

INSPECT SHIFT SOLENOID VALVE S2

Shift Solenoid Valve S2:

A110987E04

- (a) Remove the shift solenoid valve S2.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S2) - Solenoid Body (S2)	11 to 15 Ω

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

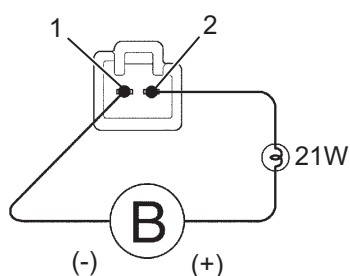
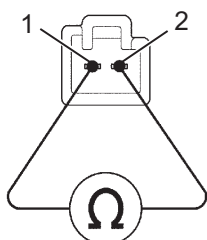
OK:
The solenoid makes an operating sound.

OK

Go to step 10

NG

REPLACE SHIFT SOLENOID VALVE S2

6 INSPECT SHIFT SOLENOID VALVE SL2**Shift Solenoid Valve SL2:**

D025466E22

- (a) Remove the shift solenoid valve SL2.
 (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) 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.

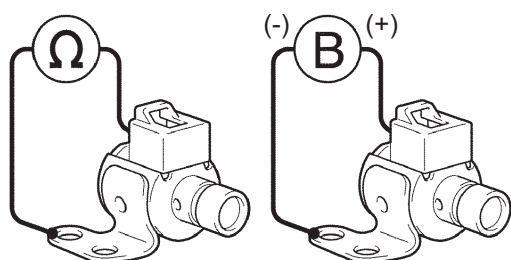
OK:

The solenoid makes an operating sound.

OK

Go to step 10

NG

REPLACE SHIFT SOLENOID VALVE SL2**7 INSPECT SHIFT SOLENOID VALVE SR****Shift Solenoid Valve SR:**

A110988E05

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

Standard resistance

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

- (c) 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.

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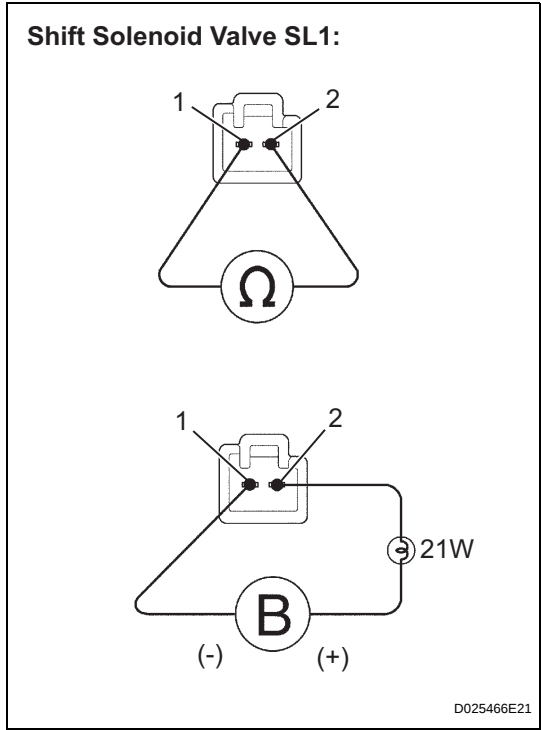
REPLACE SHIFT SOLENOID VALVE SR

OK

AT

8

INSPECT SHIFT SOLENOID VALVE SL1



- (a) Remove the shift solenoid valve SL1.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) 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.

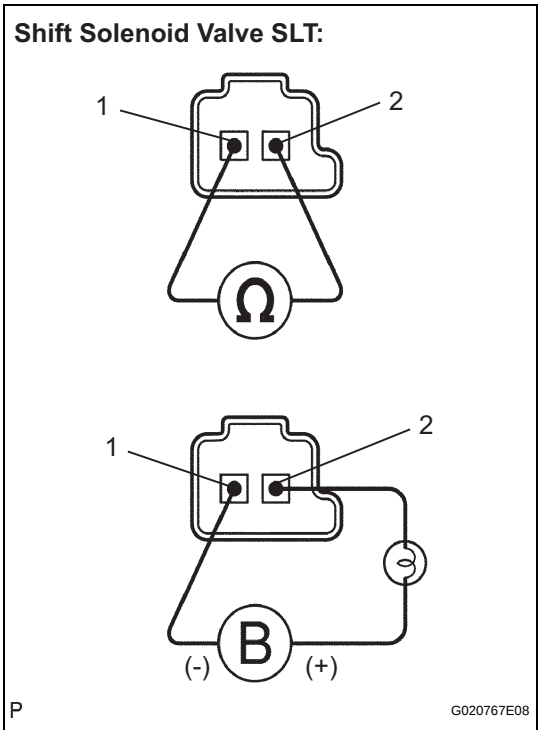
OK

Go to step 10

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REPLACE SHIFT SOLENOID VALVE SL1

9 INSPECT SHIFT SOLENOID VALVE SLT



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

Standard resistance

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

- (c) 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.

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REPLACE SHIFT SOLENOID VALVE SLT

OK

10 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

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REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

11 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Check the torque converter clutch assembly (See page [AT-354](#)).

OK:

The torque converter clutch operates normally.

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REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY