

DTC	P0724	BRAKE SWITCH "B" CIRCUIT HIGH
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CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition, when brakes are suddenly applied.

When the brake pedal is depressed, this switch sends a signals to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch does not turn off even once the vehicle is driven (2-trip detection logic).	• Short in stop light switch signal circuit • Stop light switch • ECM

MONITOR DESCRIPTION

The circuit prevents the engine from stopping when the vehicle is stopped by sudden braking when the torque converter clutch is in the "lock-up" mode. The ECM receives the signal from the stop light switch at the time brake pedal is depressed. Then, the ECM sends the signal to the lock-up solenoid valve not to be in lock-up condition. When the stop light switch remains ON during "stop and go" driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on. The vehicle must stop and go (3 km/h (2 mph) to 30 km/h (19 mph)) ten times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check
		Stop light switch/Rationality
Required sensors/Components	Stop light switch	
Frequency of operation	Continuous	
Duration	Go and stop 10 times or more	
MIL operation	2 driving cycles	
Sequence of operation	None	

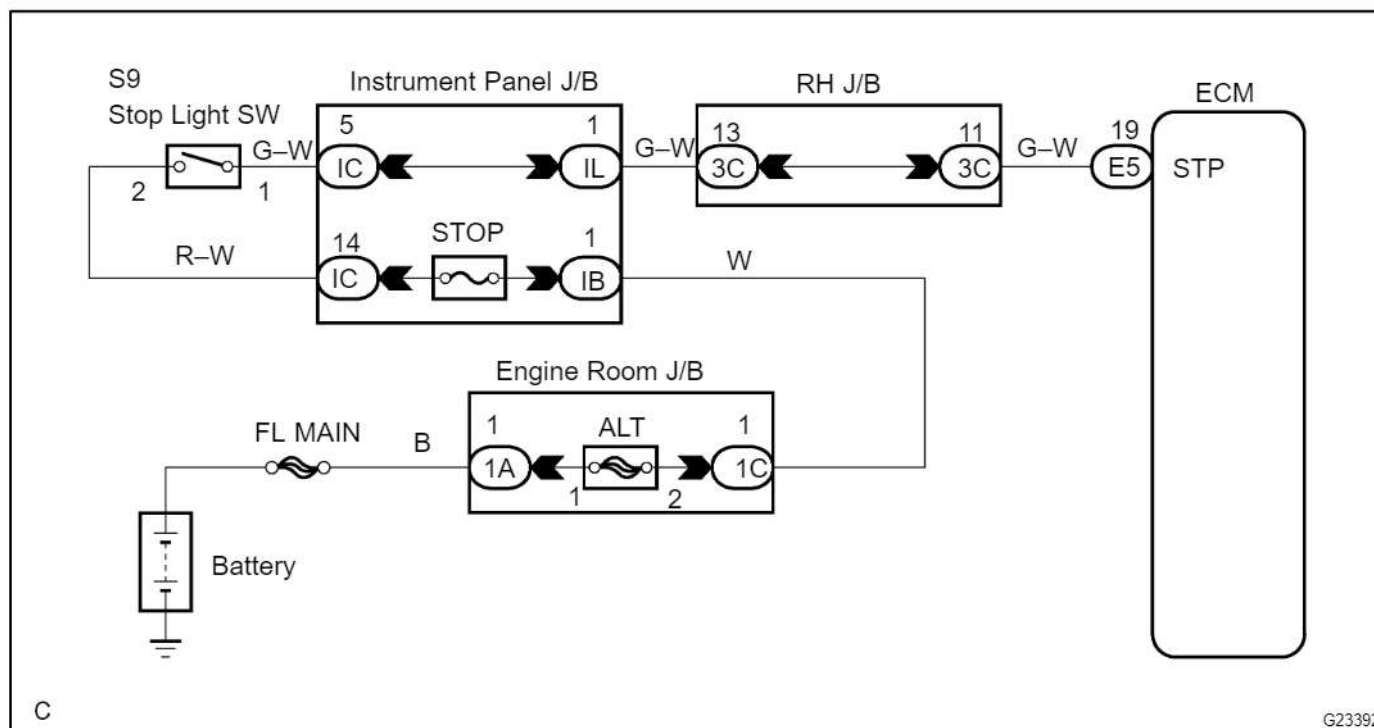
TYPICAL ENABLING CONDITION

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Number of "Go" and "Stop" defined as follows	10 times	
"Go"	30 km/h (19 mph) or more	–
"Stop"	–	Less than 3 km/h (2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Switch status	ON stuck

WIRING DIAGRAM



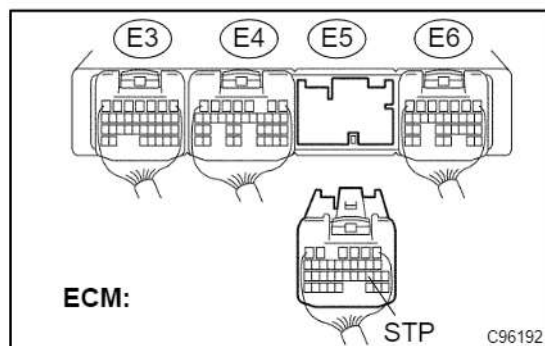
INSPECTION PROCEDURE

1 INSPECT STOP LAMP SWITCH ASSY (See page 65-7)

NG → REPLACE STOP LAMP SWITCH ASSY

OK

2 CHECK HARNESS AND CONNECTOR(STOP LAMP SWITCH ASSY – ECM)



- Install the stop lamp switch assy.
- Disconnect the ECM connector.
- Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard:

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	E5 – 19 (STP) – Body ground	10 to 14 V
Brake pedal is released		Below 1 V

NG → REPAIR OR REPLACE HARNESS OR
CONNECTOR (See page 01-30)

OK

REPLACE ECM (See page 10-11)

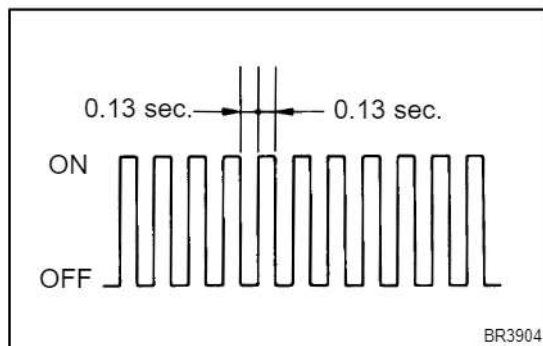
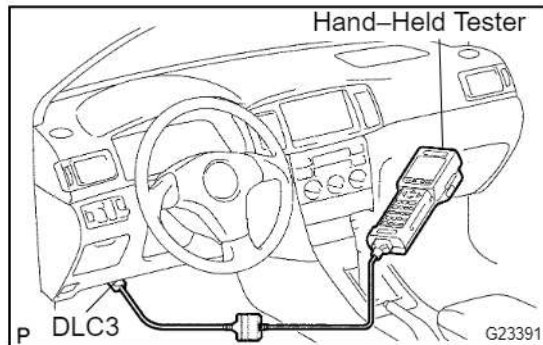
CHECK MODE PROCEDURE

1. DTC CHECK (CHECK MODE)

HINT:

Hand-held tester only:

Compared to the normal mode, the check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.



(a) Procedure for Check Mode using the hand-held tester.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in the P or N position
- A/C switch is off

(2) Turn the ignition switch off.

(3) Connect the hand-held tester to the DLC3.

(4) Turn the ignition switch to the ON position.

(5) Switch the hand-held tester from the normal mode to the check mode (Check that the MIL flashes).

NOTICE:

If the hand-held tester switches the ECM from the normal mode to the check mode or vice-versa, or if the ignition switch is turned from the ON position to the ACC or LOCK position during the check mode, the DTC and freeze frame data will be erased.

(6) Start the engine (MIL goes off after the engine starts).

(7) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch in the ON position until you have checked the DTCs, etc.

(8) After simulating malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Be sure not to turn the ignition switch off, as turning it off switches the diagnosis system from the check mode to the normal mode, which erases all the DTCs, etc.

(9) After checking the DTC, inspect the applicable circuit.

2. DTC CLEAR

- (a) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
 - (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
 - (2) Turn the ignition switch to the ON position.
 - (3) When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)
- (b) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
 - (1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more.

Transaxle Control System Check Sheet

Customer's Name		VIN	
		Production Date	/ /
		Licence No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /		
How Often Does Problem Occur?	☐ Continuous	☐ Intermittent (	times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ Particular position)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)
	☐ No down-shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick-down
Others	☐ Others
	()

Check Item	MIL	☐ Normal	☐ Remains ON
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DTC Check	1st Time	☐ Normal code	☐ Malfunction code (DTC)
	2nd Time	☐ Normal code	☐ Malfunction code (DTC)

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

- 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.
- According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	- Brake Pedal is depressed: ON - Brake Pedal is released: OFF	—
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th (O/D)	Shift Lever Position is; - L: 1st 2: 1st or 2nd - D(O/D OFF): 1st, 2nd or 3rd - D(O/D ON): 1st, 2nd, 3rd or 4th (O/D)	—
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	- Lock Up: ON - Except Lock Up: OFF	—
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	The shift lever position and these values are different, there are failures of the PNP switch or shift cable adjustment. HINT: When the failure still occurs even after adjusting these parts, See page 05-379 .
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
OVERDRV CUT SW1	O/D SW Status/ ON or OFF	- IG SW ON: ON ↓ - O/D SW Push: OFF ↓ - O/D SW Push: ON	—
OVERDRV CUT SW2 *	CCS O/D Cancel Signal/ ON or OFF	- O/D Cancel Signal input: ON - O/D Cancel Signal not input: OFF	—
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	IG SW ON: ON	—

*: w/ Cruise control

2. 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) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the 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.
LOCK UP	[Test Details] Control the shift solenoid SL to set the ATM to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the SL operation.
LINE PRESS UP *	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] • Vehicle Stopped. • IDL: ON [Others] OFF: Line pressure up. 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 transaxle, which is used in the HYDRAULIC TEST as well.

HINT:

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

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time when enabling condition is met during a single driving cycle.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2 nd driving cycle.

DIAGNOSIS SYSTEM



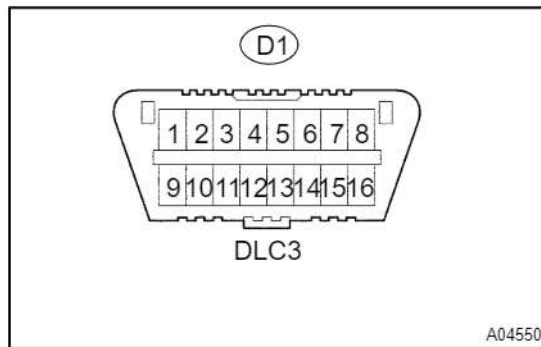
(a) Description

- (1) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect an OBD II scan tool complying with SAE J1987 or a hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.

- (2) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to the MIL illuminating when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page 05-372).

If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.

- (3) To check the DTCs, connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).
- (4) The DTCs include SAE controlled codes and Manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (See the DTC chart on page 05-372).
- (5) The diagnosis system operates in the normal mode during the normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to the check mode when troubleshooting, the technician can cause the MIL to illuminate for a malfunction that is only detected once or momentarily. (hand-held tester).
- (6) *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second test drive, this second detection causes the MIL to illuminate.



- (b) Inspect the DLC3.
The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester connection	Condition	Specified condition
7 (Bus ⊕ Line) – 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) – Body	Always	1 Ω or less
5 (Signal Ground) – Body	Always	1 Ω or less
16 (B+) – Body	Always	9 to 14 V

HINT:

If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or hand-held tester to the DLC3, turned the ignition switch to the ON position and operated the scan tool, there is a problem on the vehicle side or tool side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

- (c) Measure the battery voltage.

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

- (d) Check the MIL.

- (1) The MIL comes on when the ignition switch is turned to the ON position and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter.

- (2) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

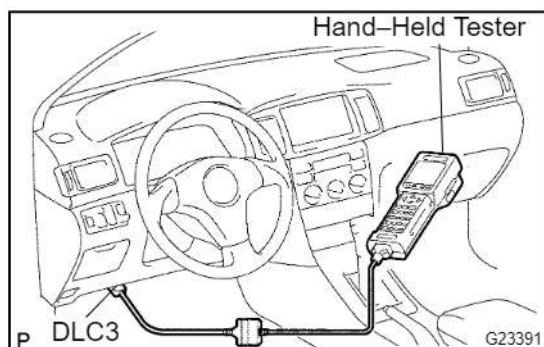
DTC CHECK/CLEAR

1. DTC CHECK (NORMAL MODE)

NOTICE:

Hand-held tester only:

When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



- (a) Checking DTCs using the OBD II scan tool or hand-held tester.
 - (1) Turn the ignition switch off.
 - (2) Connect the OBD II scan tool or hand-held tester to DLC3.
 - (3) Turn the ignition switch to the ON position.
 - (4) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).
 - (5) See page 05-372 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch off after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL is indicated on the instrument panel and DTCs are recorded in the ECM.

2. DTC CLEAR

- (a) When using the OBD II scan tool or hand-held tester: Clearing the DTCs.
 - (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
 - (2) Turn the ignition switch to the ON position.
 - (3) When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)
- (b) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.
 - (1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more.

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed in the table below and proceed to the page given.

* : ● ... MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0500 (05-247)	Vehicle Speed Sensor "A"	• Combination meter • Open or short in vehicle speed sensor circuit • Vehicle speed sensor • ECM	●	○
P0705 (05-379)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	• Open or short in park/neutral position switch circuit • Park/neutral position switch • ECM	●	○
P0724 (05-384)	Brake Switch "B" Circuit High	• Short in stop light switch circuit • Stop light switch • ECM	●	○
P0741 (05-386)	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	• Shift solenoid valve SL remains open or closed • Valve body is blocked • Shift solenoid valve SL • Lock-up clutch • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • ECM	●	○
P0751 (05-389)	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	• Shift solenoid valve S1 remains open or closed • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake or gear etc.) • ECM	●	○
P0756 (05-394)	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	• Shift solenoid valve S2 remains open or closed • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake or gear etc.) • ECM	●	○
P0850 (05-379)	Park/Neutral Switch Input Circuit	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM	●	○
P0973 (05-402)	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM	●	○
P0974 (05-402)	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM	●	○
P0976 (05-406)	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM	●	○
P0977 (05-406)	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM	●	○
P2716 (05-409)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM	●	○

P2769 (05-413)	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve SL)	• Short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM	●	○
P2770 (05-413)	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve SL)	• Open in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM	●	○

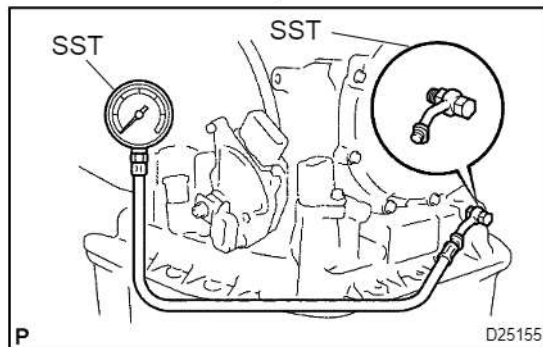
HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- Do the test at normal operation ATF temperature 50 to 80 °C (122 to 176 °F).
- The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stopper outside the vehicle while the other is doing the test.
- Be careful to prevent SST's hose from interfering with the exhaust pipe.



- (1) Warm up the ATF.
- (2) Remove the test plug on the transaxle case front left side and connect SST.
SST 09992-00095 (09992-00231, 09992-00271)
- (3) Fully apply the parking brake and chock the 4 wheels.
- (4) Connect an OBD II scan tool or hand-held tester to the DLC3.
- (5) Start the engine and check the idling speed.
- (6) Keep your left foot pressed firmly on the brake pedal and shift into the D position.
- (7) Measure the line pressure when the engine is idling.
- (8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when the engine speed reaches the stall speed.
- (9) Do the test in the R position in the same way.

Specified line pressure:

Condition	D position kPa (kgf/cm ² , psi)	R position kPa (kgf/cm ² , psi)
Idling	324 to 451 (3.3 to 4.6, 47 to 65)	577 to 817 (5.9 to 8.3, 84 to 118)
Stall	713 to 844 (7.27 to 8.61, 103 to 122)	1,520 to 1,755 (15.5 to 17.9, 220 to 254)

Evaluation:

Problem	Possible cause
If the measured values at all positions are higher	• Line pressure control solenoid (SLT) defective • Regulator valve defective
If the measured values at all positions are lower	• Line pressure control solenoid (SLT) defective • Regulator valve defective • Oil pump defective • O/D direct clutch defective
If pressure is low in the D position only	• D position circuit fluid leak • Forward clutch defective
If pressure is low in the R position only	• R position circuit fluid leak • Direct clutch defective • 1st and reverse brake defective

LIST OF DISABLE A MONITER

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

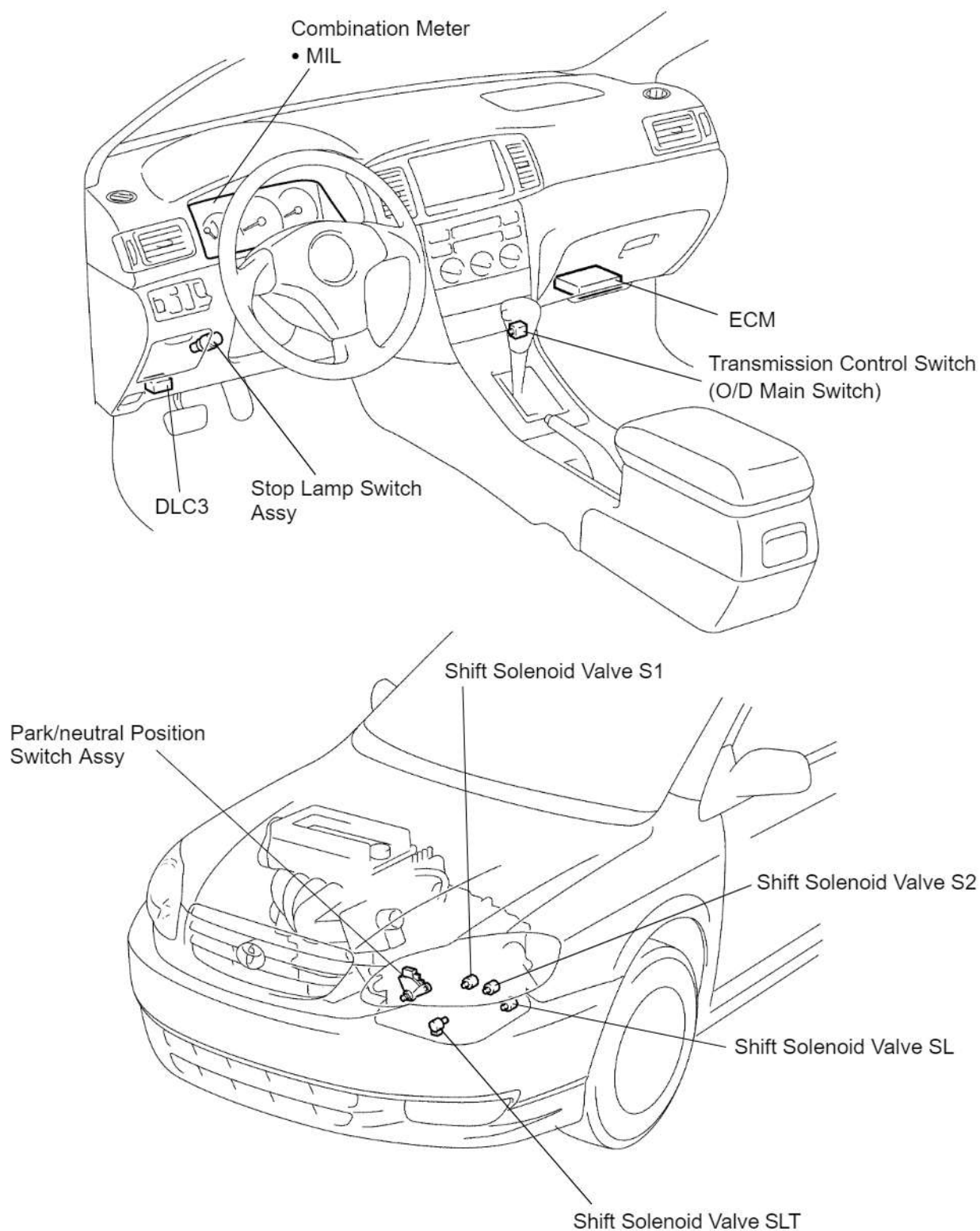
Fault code	Fault code	Component system	Monitor disablement (X - disabled)																							
			P0010	P0011	P0012	P0013	P0014	P0015	P0016	P0017	P0018	P0019	P0020	P0021	P0022	P0023	P0024	P0025	P0026	P0027	P0028	P0029	P0030	P0031	P0032	P0033
			CVT press sensor	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system	CVT system
P0010, P0020	P0010, P0020	VVT VSV1,2																								
P0011	P0011	VVT System1 - Advance																								
P0012	P0012	VVT System1 - Retard																								
P0013, P0018	P0013, P0018	VVT System - Misalignment																								
P0021	P0021	VVT System2 - Advance																								
P0022	P0022	VVT System2 - Retard																								
P0030, 50	P0031, 32, 51, 52	O2 Sensor Heater - Sensor1																								
P0033, P0155	P0031, 32, 51, 52	A/F Sensor Heater - Sensor1																								
P0036, 56	P0037, 38, 57, 58	O2 Sensor Heater - Sensor2																								
P0035, 44, 65, 66	P0035, 44, 65, 66	O2 Sensor Heater - Sensor5																								
P0100, P0101	P0100, P0101	MAF sensor																								
P0105, P0106	P0105, P0106	MAP sensor																								
P0110	P0110, P0111	IAT sensor																								
P0115, P0116	P0115, P0118	ECT sensor																								
P0120, P0121	P0120, P0123, P0125	TP sensor																								
P0125	P0125	Insufficient ECT for Closed Loop																								
P0128	P0128	Thermostat																								
P0130, P0133	P0130, P0133	O2 Sensor - Sensor1																								
P0134, P0154	P0134, P0154	O2 Sensor, A/F Sensor (No Activity) - Sensor1																								
P0136, P0156	P0136, P0156	O2 Sensor - Sensor2																								
P0142, P0162	P0142, P0162	O2 Sensor - Sensor5																								
P0171, P0172	P0171, P0172	Fuel system																								
P0300, P0308	P0300, P0308	Missfire																								
P0325, P0330	P0325, P0330	Knock sensor																								
P0335	P0335	CKP sensor																								
P0340, P0341	P0340, P0341	CMP sensor																								
P0340, P0346	P0340, P0346	VVT sensor1, 2																								
P0351, P0358	P0351, P0358	Igniter																								
P0405	P0405	CKP sensor2																								
P0401	P0401	ECR system(disconnect)																								
P0402	P0402	ECR system(open)																								
P0405, P0409	P0405, P0409	URI sensor																								
P0420, P0430	P0420, P0430	Catalyst																								
P0442, P0456	P0442, P0456	EVAP system																								
P0450, P0451	P0450, P0453	EVAP press sensor																								
P0500	P0500	VSS																								
P0511	P0511	IAC valve																								
P0510	P0510	Idle switch																								
P0600	P0600	System Voltage																								
P0617	P0617	Starter signal																								
P0705	P0705	Shift lever position switch																								
P0710	P0710, P0713	Trans fluid temp sensor																								
P0720, P0753	P0720, P0753	Output speed sensor																								
P0715, P0717	P0715, P0717	Input speed sensor																								
P0721	P0721	Stop lamp switch																								
P0711, P0756	P0711, P0756	Trans solenoid (function)																								
P0748, P0758	P0748, P0758	Trans solenoid (range)																								
P0850	P0850	PNP switch																								
P1010, P1020	P1010, P1020	VVTL																								
P1011, 12, 21, 22	P1011, 12, 21, 22	VVTL system(1,2)																								
P1120	P1120	Electronic magnet clutch																								
P1129	P1129	Electronic throttle system																								
P1430	P1430	HC adsorber ACT press sensor																								
P2004, 6	P2004, 6	Intake Manifold Runner Control																								
P2009, 10	P2009, 10	Intake Manifold Runner Control Circuit																								
P2014, 16, 17	P2014, 16, 17	Intake Manifold Runner Position Sensor																								
P2102, P2105	P2102, P2105	Throttle motor																								
P2120, P2158	P2120, P2158	Acid position sensor																								
P2196, P2198	P2196, P2198	A/F sensor(rationality)																								
P2296	P2296	BARO sensor																								
P2257, P2240	P2257, P2240	A/F sensor(open)																								
P2425, 24	P2425, 24	HC Absorption Catalyst																								
P2430, 2,3	P2430, 2,3	AIR Pressure Sensor(Low/High)																								
P2431	P2431	AIR Pressure Sensor(Rationality)																								
P2440	P2440	AIR control valve stuck open																								
P2441	P2441	AIR control valve stuck close																								
P2444	P2444	AIR stuck On																								
P2445	P2445	AIR stuck Off																								
P2714, P2759	P2714, P2759	Trans solenoid,SLU-SLU																								
P2800, P2803	P2800, P2803	A/F Sensor (Slow response)																								

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Fault code	Monitor disarmed (X - disArm)		Component system	Fault code		Component system		
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P0001								
P0002								
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P0306								

LOCATION



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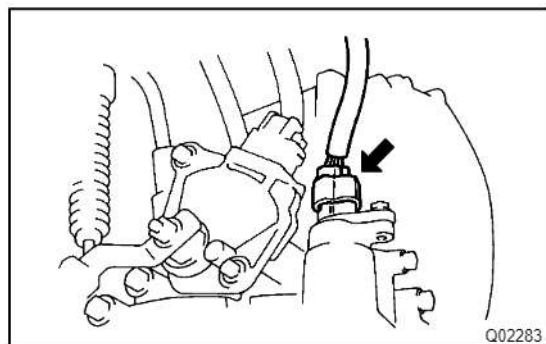
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MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transaxle.



- (a) Disconnect the transmission wire connector.
- (b) Inspect the manual driving operation.
Check that the shift and gear positions correspond to the table below.
While driving, shift through the L, 2 and D positions.
Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	O/D
2	O/D
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the gear positions of the L, 2 and D are difficult to distinguish, do the following road test.

If any abnormality is found in the above test, the problem is in the transaxle itself.

- (c) Connect the transmission wire connector.
- (d) Clear the DTC (See page 05-353).

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Do the test at normal operating ATF temperature 50 to 80 °C (122 to 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
 - (1) Chock the 4 wheels.
 - (2) Connect an OBD II scan tool or hand-held tester to the DLC3.
 - (3) Fully apply the parking brake.
 - (4) Keep your left foot pressed firmly on the brake pedal.
 - (5) Start the engine.
 - (6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot.
 - (7) Quickly read the stall speed at this time.

Stall speed: 2,550 ± 150 rpm

- (8) Do the same test in the R position.

Stall speed: 2,550 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R positions	• Engine output may be insufficient • Stator one-way clutch not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall speed high in D position	• Line pressure too low • Forward clutch slipping • No. 2 one-way clutch not operating properly • U/D one-way clutch not operating properly
(c) Stall speed high in R position	• Line pressure too low • Direct clutch slipping • 1st and reverse brake slipping • U/D brake slipping
(d) Stall speed high in D and R positions	• Line pressure too low • Improper fluid level • U/D one-way clutch not operating properly

- (b) Measure the time lag.
- (1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- Do the test at normal operating ATF temperature 50 to 80 °C (122 to 176 °F).
- Be sure to allow 1 minute interval between tests.
- Take 3 measurements and take the average value.

- (2) Connect an OBD II scan tool or hand-held tester to the DLC3.
- (3) Fully apply the parking brake.
- (4) Start the engine and check idle speed.

Idle speed: 650 ± 50 rpm (In N position and A/C OFF)

- (5) Shift the shift lever from the N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.
- (6) Measure the time lag of N → R in the same way.

Time lag:

N → D Less than 1.2 seconds

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than specified):

Problem	Possible cause
N → D time lag is longer	• Line pressure too low • Forward clutch worn • U/D one-way clutch not operating properly
N → R time lag is longer	• Line pressure too low • Direct clutch worn • 1st and reverse brake worn • U/D one-way clutch not operating properly

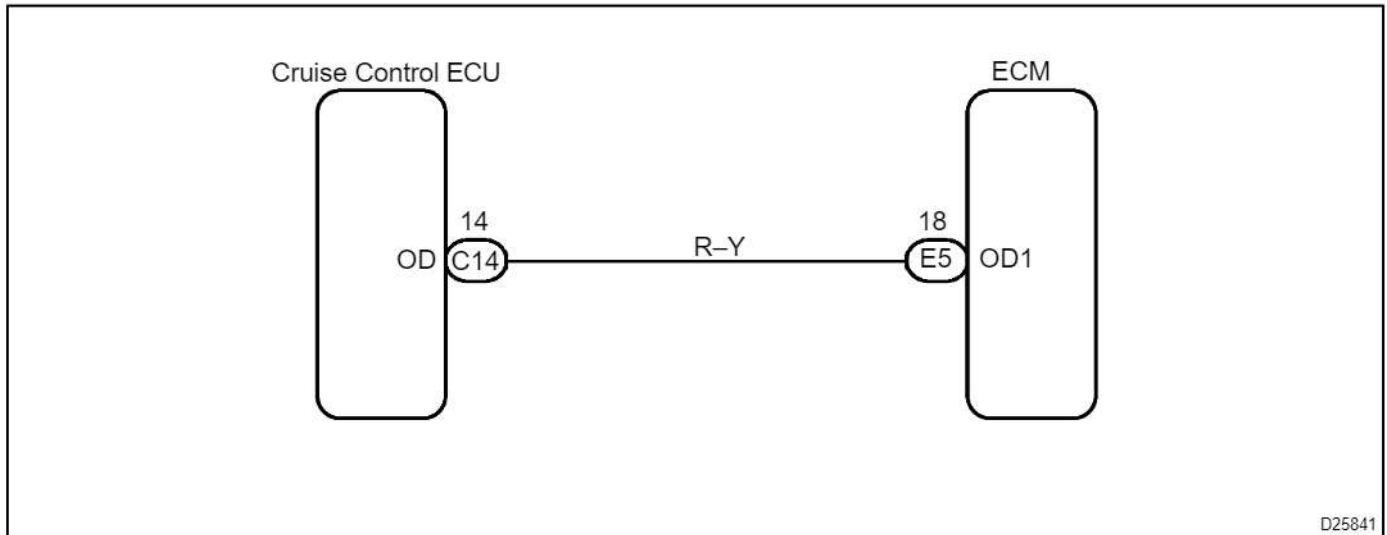
O/D CANCEL SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some conditions.

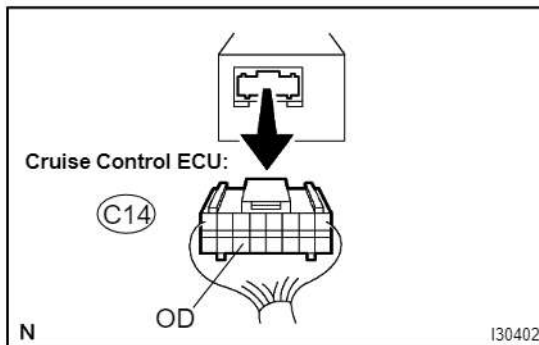
The cruise control ECU sends O/D cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TERMINAL VOLTAGE(OD – BODY GROUND)



- Disconnect the cruise control ECU connector.
- Turn the ignition switch to the ON position.
- Measure the voltage between terminal OD of cruise control ECU and body ground.

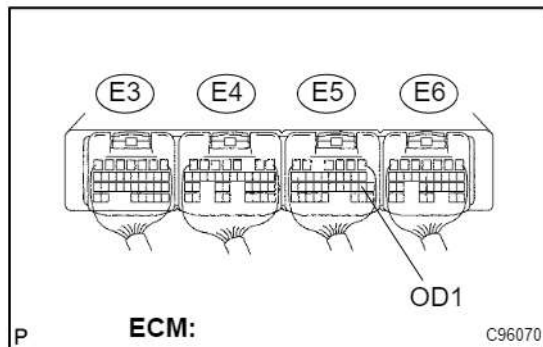
Standard:

Condition	Tester Connection	Specified Condition
IG switch ON	C14 – 14 (OD) – Body ground	10 to 14 V
IG switch OFF		Below 1 V

OK

CHECK AND REPLACE CRUISE CONTROL ECU ASSY (See page 05-752)

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2 INSPECT TERMINAL VOLTAGE(OD1 – BODY GROUND)

- (a) Measure the voltage between terminal OD1 of ECM and body ground.

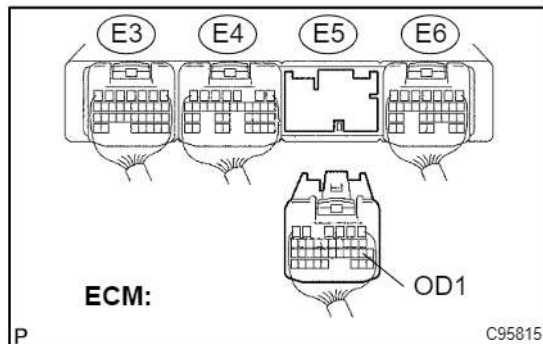
Standard:

Condition	Tester Connection	Specified Condition
IG switch ON	E5 – 18 (OD1) – Body ground	10 to 14 V
IG switch OFF		Below 1 V

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

NG

3 CHECK HARNESS AND CONNECTOR(OD1 – BODY GROUND)

- (a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E5 – 18 (OD1) – Body ground	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

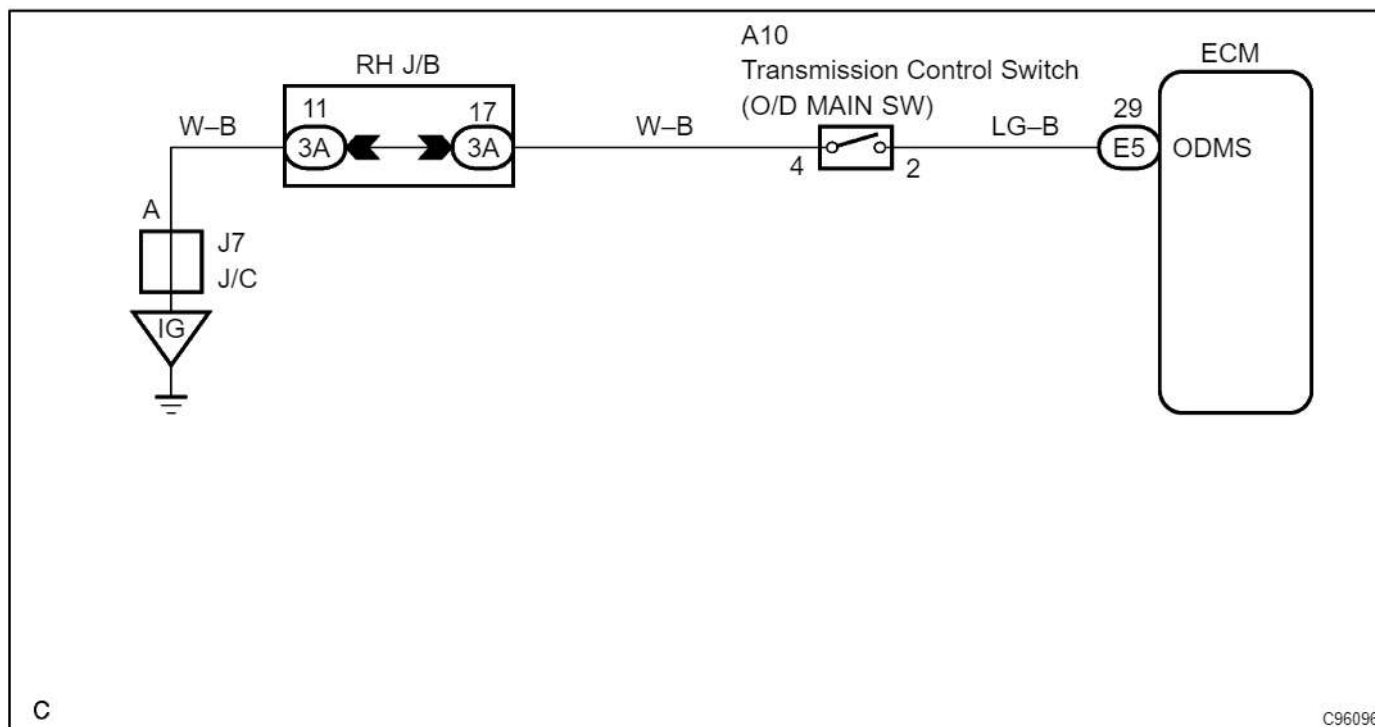
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-374)

O/D MAIN SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light lights up and the ECM prohibits shifting into O/D, and when pressing it once again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

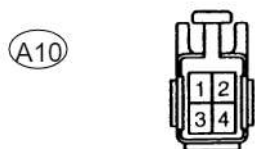
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH – BODY GROUND)

Wire Harness Side:
(Connector Front View):



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- Disconnect the transmission control switch connector of shift lever assy.
- Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
4 – Body ground	Below 1 Ω

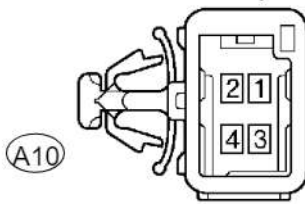
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REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

2 INSPECT TRANSMISSION CONTROL SWITCH

Switch Side:
(Connector Front View):



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

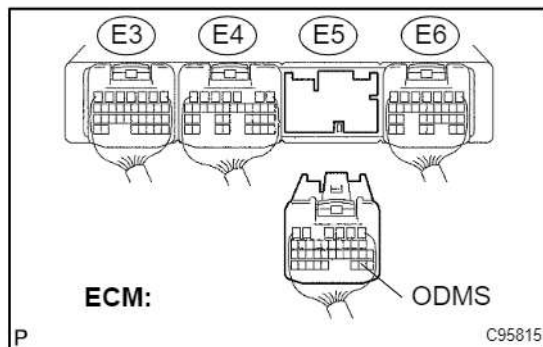
Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	2 – 4	Below 1 Ω
Release transmission control switch		10 k Ω or higher

NG

REPLACE TRANSMISSION CONTROL SWITCH

OK

3 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH – ECM)

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- (a) Connect the transmission control switch connector of shift lever assy.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	E5 – 29 (ODMS) – Body ground	Below 1 Ω
Release transmission control switch		10 k Ω or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(See page 05-374)

DTC	P0741	TORQUE CONVERTER CLUTCH SOLENOID PERFORMANCE (SHIFT SOLENOID VALVE SL)
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SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SL, valve body and torque converter clutch or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0741	- Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in the lock-up OFF range. (2-trip detection logic) - When lock-up is ON, clutch or brake slips or gear is broken. (2-trip detection logic)	- Shift solenoid valve SL remains open or closed - Valve body is blocked - Shift solenoid valve SL - Lock-up clutch - Torque converter clutch - Automatic transaxle (clutch, brake or gear etc.) - ECM

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, the airflow meter and the crankshaft position sensor, the ECM sends a signal to the shift solenoid valve SL to regulate the hydraulic pressure and provide smoother gearshifts. The shift-solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform torque-converter lock-up and flexible lock-up functions.

The ECM compares the engine rpm (NE) signal and the input speed calculated by output speed sensor (output speed) and gear ratio to detect torque converter lock-up. The ECM then compares the lock-up status against the lock-up schedule in the ECM memory. If the ECM does not detect lock-up at the appropriate time, it will conclude that there is a malfunction of shift solenoid SL. The ECM will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P0741	Torque converter clutch solenoid (SL)/Rationality check
		Torque converter clutch solenoid (SL)/OFF malfunction
		Torque converter clutch solenoid (SL)/ON malfunction
Required sensors/Components	Torque converter clutch solenoid (SL)	
Frequency of operation	Continuous	
Duration	Less than 10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

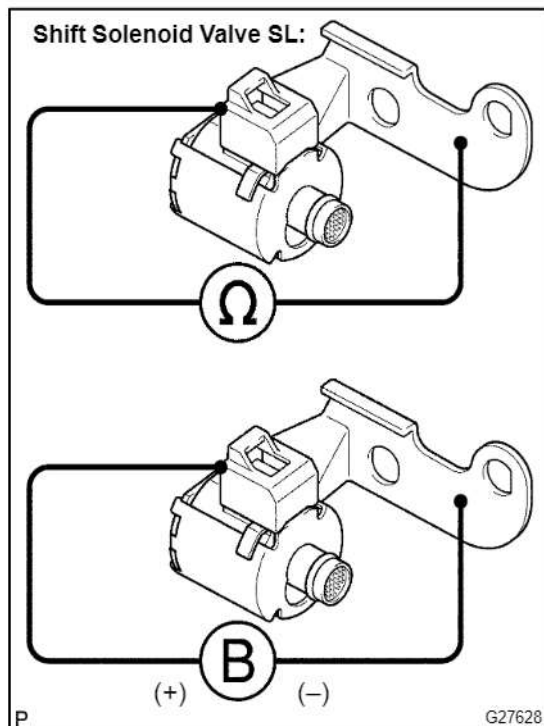
Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
OFF malfunction		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
ECM selected gear	4th with lock up	
ON malfunction		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
ECM selected gear	4th	
Throttle valve opening angle	7 % or more	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
OFF malfunction	
Engine speed	$\geq 4\text{th gear ratio} \times \text{NO} + 100 \text{ rpm}$ and $< 3\text{rd gear ratio} \times \text{NO} - 100 \text{ rpm}$ NO: Transmission output speed
ON malfunction	
Engine speed It is necessary 2 judgments/driving cycle 1st judgment: temporary flag ON 2nd judgment: pending fault code ON	$\geq 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ and $< 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ NO: Transmission output speed

INSPECTION PROCEDURE

1 INSPECT SHIFT SOLENOID VALVE(SL)



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

Standard:

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

- (c) Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid valve makes an operating noise.

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REPLACE SHIFT SOLENOID VALVE(SL)

OK

2 INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (See page 05-374)

NG

REPAIR OR REPLACE TRANSMISSION VALVE
BODY ASSY (See page 40-23)

OK

3 INSPECT TORQUE CONVERTER CLUTCH ASSY (See page 40-20)

NG

REPLACE TORQUE CONVERTER CLUTCH
ASSY

OK

REPAIR AUTOMATIC TRANSAXLE ASSY (See page 40-7)

DTC	P0751	SHIFT SOLENOID "A" PERFORMANCE (SHIFT SOLENOID VALVE S1)
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SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and crankshaft position sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

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

DTC No.	DTC Detecting Condition	Trouble Area
P0751	During normal driving, the gear required by the ECM does not match the actual gear (2-trip detection logic)	• Shift solenoid valve S1 remains open or closed • Valve body is blocked • Shift solenoid valve S1 • Automatic transaxle (clutch, brake or gear etc.) • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0751	Shift solenoid "A" (S1)/Rationality check Shift solenoid "A" (S1)/OFF malfunction Shift solenoid "A" (S1)/ON malfunction
Required sensors/Components	Shift solenoid valve S1	
Frequency of operation	Continuous	
Duration	Less than 10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
OFF malfunction (A)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	—
Spark retard by KCS control	0° CA or more	—
ECM selected gear	1st	
Throttle valve opening angle	30 % or more	—
OFF malfunction (B)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)

Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Current ECM selected gear	2nd	
Last ECM selected gear	1st	
Throttle valve opening angle	7 % or more	–
Closing change of throttle valve opening angle	–5 % or more	Less than 5 %
THlast – TH current THlast: Throttle valve opening angle at last ECM selected gear THcurrent: Throttle valve opening angle at current ECM selected gear	–5 % or more	Less than 5 %
OFF malfunction (C), (D) and (E)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	2nd	
Throttle valve opening angle	7 % or more	Less than 60 %
OFF malfunction (F) and (G)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	3rd	
Throttle valve opening angle	5 % or more	Less than 60 %
OFF malfunction (H) and (I)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–

Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	4th	
Throttle valve opening angle	5 % or more	Less than 60 %
OFF malfunction (J)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	ON	
Braking	ON	
Throttle valve opening angle	65 % or more (ECM selected gear 2nd)	Less than 5 % (ECM selected gear 2nd)
	65 % or more (ECM selected gear 3rd)	Less than 3 % (ECM selected gear 3rd)
	65 % or more (ECM selected gear 4th)	Less than 3 % (ECM selected gear 4th)
THcurrent – TH2ndstep THcurrent: Throttle valve opening angle at current ECM selected gear TH2ndstep: Throttle valve opening angle at 2nd judgment step	Less than –10 % or 10 % or more	
Closing change of throttle valve opening angle	Less than –10 % or 10 % or more	
ON malfunction		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
ECM selected gear	4th	
Throttle valve opening angle	12 % or more	Less than 35 %

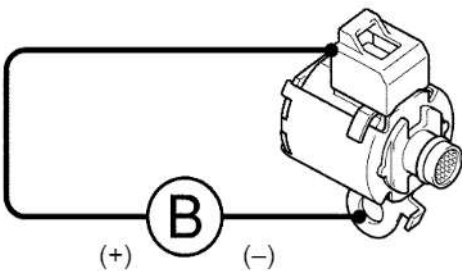
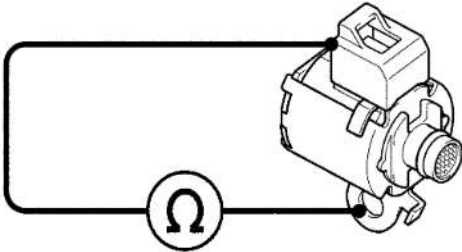
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
OFF malfunction:	
There are 2 judgment steps/driving cycle 1st judgment step: when following conditions met, temporary flag becomes ON. OFF malfunction (A) or (B) It is necessary 2 judgments/driving cycle 2nd judgment step: when following conditions met, pending fault code becomes ON. (OFF malfunction (E) and (G) and (H)) or (OFF malfunction (C) and (D) and (F) and (I))	
OFF malfunction (A)	
Engine speed (NE)	$< 2 \times \text{NO} + 1,100 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (B)	
NElast – NEcurrent NElast: Engine speed at last ECM selected gear NEcurrent: Engine speed at current ECM selected gear	$< 512.5 \text{ rpm}$ at throttle valve opening angle 40 % (condition vary with throttle valve opening angle)
OFF malfunction (C)	
Engine speed (NE)	$< 1\text{st gear ratio} \times \text{NO} + 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (D)	
Engine speed (NE)	$\geq 2\text{nd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 2\text{nd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (E) and (F)	
Engine speed (NE)	$< 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ and $\geq 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (G)	
Engine speed (NE)	$\geq 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (H)	
Engine speed (NE)	$\geq 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (I)	
Engine speed (NE)	$< 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ and $\geq 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (J)	
When one of following secondary parameter conditions met, 2nd judgment is stopped.	(See secondary parameters and condition)
ON malfunction:	
Engine speed (NE)	$\geq 2 \times \text{NO} + 1,100 \text{ rpm}$ NO: Transmission output speed

INSPECTION PROCEDURE

1 INSPECT SHIFT SOLENOID VALVE(S1)

Shift Solenoid Valve S1:



P

G27629

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

Standard:

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

- (c) Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE(S1)

OK

2 INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (See page 05-374)

NG

REPAIR OR REPLACE TRANSMISSION VALVE
BODY ASSY (See page 40-23)

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (See page 40-7)

DTC	P0756	SHIFT SOLENOID "B" PERFORMANCE (SHIFT SOLENOID VALVE S2)
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SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and crankshaft position sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

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

DTC No.	DTC Detecting Condition	Trouble Area
P0756	During normal driving, the gear required by the ECM does not match the actual gear (2-trip detection logic)	• Shift solenoid valve S2 remains open or closed • Valve body is blocked • Shift solenoid valve S2 • Automatic transaxle (clutch, brake or gear etc.) • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0756	Shift solenoid "B" (S2)/Rationality check Shift solenoid "B" (S2)/OFF malfunction Shift solenoid "B" (S2)/ON malfunction
Required sensors/Components	Shift solenoid valve S2	
Frequency of operation	Continuous	
Duration	Less than 10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
OFF malfunction (A)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
ECM selected gear	2nd	
Throttle valve opening angle	10 % or more	Less than 35 %
OFF malfunction (B)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)

Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Current ECM selected gear	2nd	
Last ECM selected gear	1st	
Throttle valve opening angle	7 % or more	–
THlast – TH current THlast: Throttle valve opening angle at last ECM selected gear THcurrent: Throttle valve opening angle at current ECM selected gear	–5 % or more	Less than 5 %
OFF malfunction (C), (D) and (E)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	2nd	
Throttle valve opening angle	7 % or more	Less than 60 %
OFF malfunction (F) and (G)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	3rd	
Throttle valve opening angle	5 % or more	Less than 60 %
OFF malfunction (H)		
IAT (only for malfunction)	–10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	

Braking	OFF	
ECM selected gear	4th	
Throttle valve opening angle	5 % or more	Less than 60 %
OFF malfunction (I)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
Engine idling	ON	
Braking	ON	
Throttle valve opening angle	65 % or more (ECM selected gear 2nd)	Less than 5 % (ECM selected gear 2nd)
	65 % or more (ECM selected gear 3rd)	Less than 3 % (ECM selected gear 3rd)
	65 % or more (ECM selected gear 4th)	Less than 3 % (ECM selected gear 4th)
THcurrent – TH2ndstep THcurrent: Throttle valve opening angle at current ECM selected gear TH2ndstep: Throttle valve opening angle at 2nd judgment step	Less than -10 % or 10 % or more	
Closing change of throttle valve opening angle	Less than -10 % or 10 % or more	
ON malfunction (A)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
ECM selected gear	4th with lock up	
ON malfunction (B)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	-
Spark retard by KCS control	0° CA or more	-
Current ECM selected gear	2nd	
Last ECM selected gear	1st	
Throttle valve opening angle	7 % or more	-

Closing change of throttle valve opening angle	-5 % or more	Less than 5 %
THlast – TH current THlast: Throttle valve opening angle at last ECM selected gear THcurrent: Throttle valve opening angle at current ECM selected gear	-5 % or more	Less than 5 %
ON malfunction (C), (D) and (E)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	2nd	
Throttle valve opening angle	7 % or more	Less than 60 %
ON malfunction (F)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	3rd	
Throttle valve opening angle	5 % or more	Less than 60 %
ON malfunction (G) and (H)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	
Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	OFF	
Braking	OFF	
ECM selected gear	4th	
Throttle valve opening angle	5 % or more	Less than 60 %
ON malfunction (I)		
IAT (only for malfunction)	-10 °C (14 °F) or more	Less than 70 °C (158 °F)
ECT	55 °C (131 °F) or more	Less than 105 °C (221 °F)
Transmission shift position	"D"	
Shift solenoid "A" (S1) circuit	Not circuit malfunction	

Shift solenoid "B" (S2) circuit	Not circuit malfunction	
Torque converter clutch solenoid (SL) circuit	Not circuit malfunction	
Battery voltage	10 V or more	–
Spark retard by KCS control	0° CA or more	–
Engine idling	ON	
Braking	ON	
Throttle valve opening angle	65 % or more (ECM selected gear 2nd)	Less than 5 % (ECM selected gear 2nd)
	65 % or more (ECM selected gear 3rd)	Less than 3 % (ECM selected gear 3rd)
	65 % or more (ECM selected gear 4th)	Less than 3 % (ECM selected gear 4th)
THcurrent – TH2ndstep THcurrent: Throttle valve opening angle at current ECM selected gear TH2ndstep: Throttle valve opening angle at 2nd judgment step	Less than –10 % or 10 % or more	
Closing change of throttle valve opening angle	Less than –10 % or 10 % or more	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
OFF malfunction:	
Following conditions met (1) or (2)	
(1): OFF malfunction (A)	
(2): OFF malfunction (B), (C), (D), (E), (F), (G), (H)	
(1)	
It is necessary 2 judgment/driving cycle 1st judgment: temporary flag ON 2nd judgment: pending fault code ON	
OFF malfunction (A)	
Engine speed	$\geq 1\text{st gear ratio} \times \text{NO} + 0 \text{ rpm}$ NO: Transmission output speed
(2)	
There are 2 judgments steps/driving cycle 1st judgment step: when following conditions OFF malfunction (B) met, temporary flag becomes ON. It is necessary 2 judgment/driving cycle 2nd judgment step: when following conditions met, pending fault code becomes ON. (OFF malfunction (C), (F) and (H)) or (OFF malfunction (D), (E), (G) and (H))	
OFF malfunction (B)	
NElast – NEcurrent NElast: Engine speed at last ECM selected gear NEcurrent: Engine speed at current ECM selected gear	$< 512.5 \text{ rpm}$ at throttle valve opening angle 40 % (Condition vary with throttle valve opening angle)
OFF malfunction (C)	
Engine speed	$\geq 1\text{st gear ratio} \times \text{NO} + 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (D)	
Engine speed	$\geq 2\text{nd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 2\text{nd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed

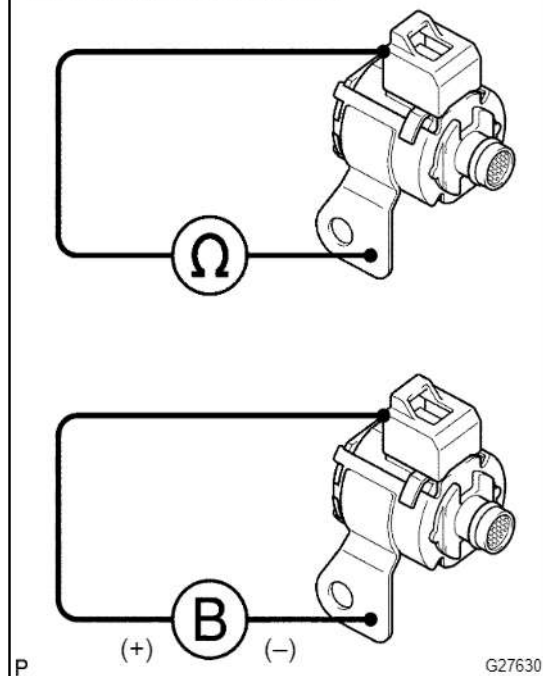
OFF malfunction (E) and (F)	
Engine speed	$\geq 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (G)	
Engine speed	$< 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ and $\geq 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (H)	
Engine speed	$\geq 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
OFF malfunction (I)	
When one of following secondary parameter conditions met, 2nd judgment is stopped.	(See secondary parameters and condition)
ON malfunction	
Following conditions met (1) or (2)	
(1): ON malfunction (A)	
(2): ON malfunction (B), (C), (D), (E), (F), (G), (H)	
(1)	
ON malfunction (A)	
Engine speed	$\geq 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ and $< 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ NO: Transmission output speed
(2)	
There are 2 judgments steps/driving cycle 1st judgment step: when following conditions ON malfunction (B) met, temporary flag becomes ON. It is necessary 2 judgments/driving cycle 2nd judgment step: when following conditions met, pending fault code becomes ON. (ON malfunction (D), (F) and (H)) or (ON malfunction (C), (E), (F) and (G))	
ON malfunction (B)	
NElast – NEcurrent NElast: Engine speed at last ECM selected gear NEcurrent: Engine speed at current ECM selected gear	$< 512.5 \text{ rpm at throttle valve opening angle } 40 \%$ (Condition vary with throttle valve opening angle)
ON malfunction (C)	
Engine speed	$< 1\text{st gear ratio} \times \text{NO} + 50 \text{ rpm}$ NO: Transmission output speed
ON malfunction (D)	
Engine speed	$< 2\text{nd gear ratio} \times \text{NO} + 50 \text{ rpm}$ and $\geq 2\text{nd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
ON malfunction (E)	
Engine speed	$\geq 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed

ON malfunction (F)	
Engine speed	$\geq 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
ON malfunction (G)	
Engine speed	$< 3\text{rd gear ratio} \times \text{NO} + 50 \text{ rpm}$ and $\geq 3\text{rd gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
ON malfunction (H)	
Engine speed	$\geq 4\text{th gear ratio} \times \text{NO} + 50 \text{ rpm}$ or $< 4\text{th gear ratio} \times \text{NO} - 50 \text{ rpm}$ NO: Transmission output speed
ON malfunction (I)	
When one of following secondary parameter conditions met, 2nd judgment is stopped.	(See secondary parameters and condition)

INSPECTION PROCEDURE

1 INSPECT SHIFT SOLENOID VALVE(S2)

Shift Solenoid Valve S2:



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

Standard:

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

- Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE(S2)

OK

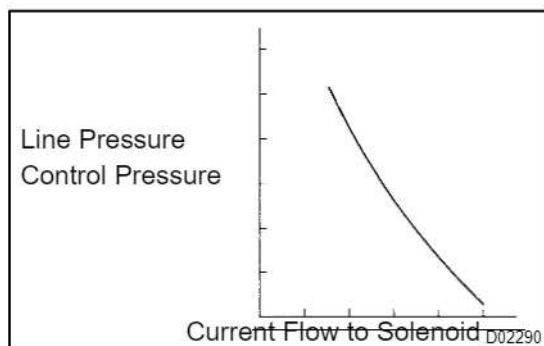
2	INSPECT TRANSMISSION VALVE BODY ASSY (See chapter 2 in the problem symptoms table) (See page 05-374)
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NG	REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (See page 40-23)
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OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (See page 40-7)
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DTC	P2716	PRESSURE CONTROL SOLENOID "D" ELECTRICAL (SHIFT SOLENOID SLT)
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CIRCUIT DESCRIPTION

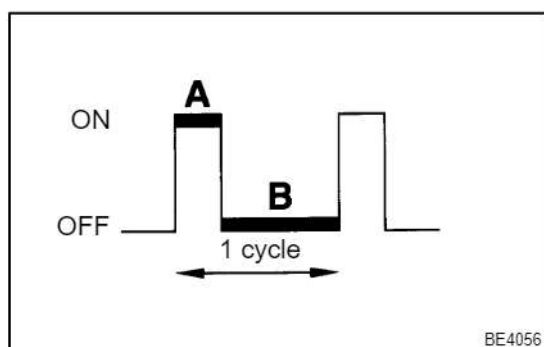
The throttle pressure that is applied to the primary regulator valve (which modulates the line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate the line pressure according the extent of the accelerator pedal depressed or the output of engine power.

This controls the line pressure and provides smooth shifting. Upon receiving a signal of the throttle valve opening angle, the ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure and generating throttle pressure.

(*): 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

$$\text{Duty Ratio} = \frac{A}{A+B} \times 100 (\%)$$



DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) or (b) below is detected 1 sec. or more: (1-trip detection logic) (a) SLT-terminal: 0V (b) SLT-terminal: 12V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM

MONITOR DESCRIPTION

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 cycle 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. When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn ON the MIL.

MONITOR STRATEGY

Related DTCs	P2716	Pressure control solenoid "D"/Range check
Required sensors/Components	Shift solenoid valve SLT	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Solenoid current shut OFF	Not shut OFF	
Battery voltage	11 V or more	–
CPU commanded duty ratio	19 % or more	–

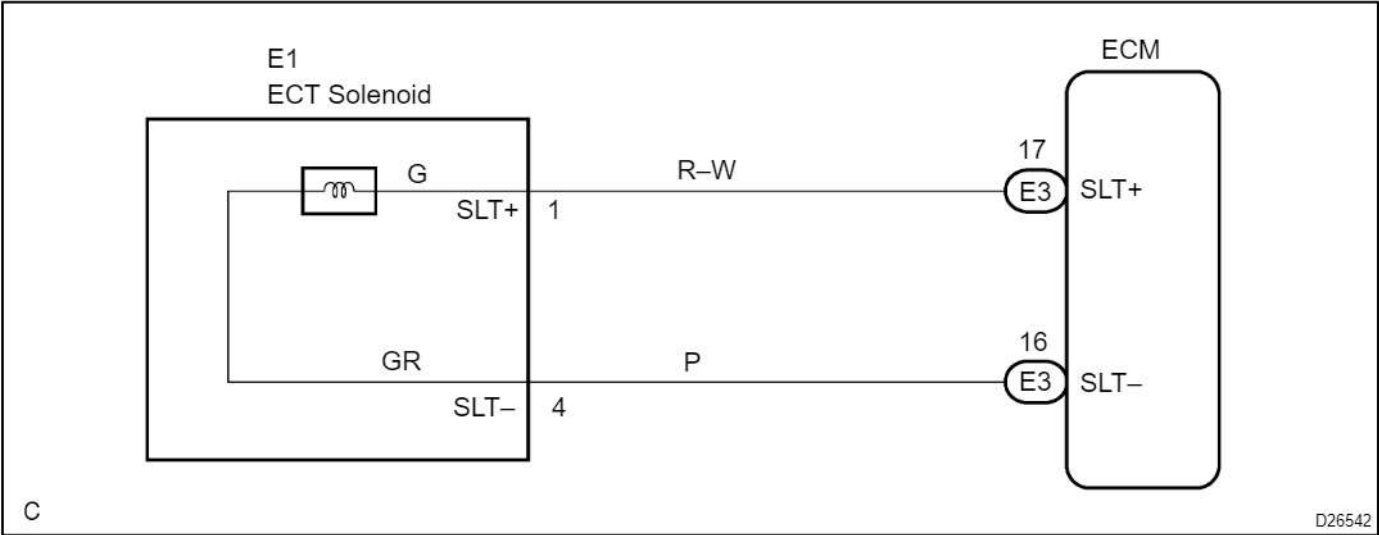
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Diagnostic signal from MIC	Fail

COMPONENT OPERATING RANGE

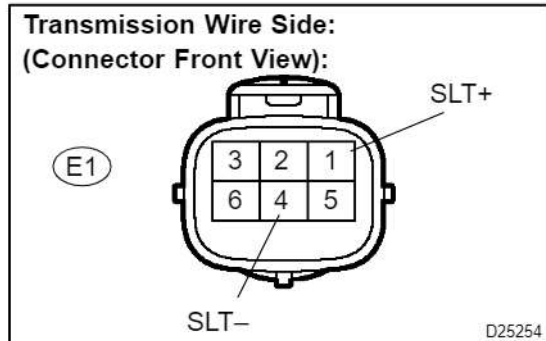
Parameter	Standard value
Shift solenoid valve SLT resistance	5.0 to 5.6 Ω at 20°C (68°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE(SLT)



- Disconnect the transmission wire connector from the transaxle.
- Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 °C (68 °F)
1 (SLT+) – 4 (SLT-)	5.0 to 5.6 Ω

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

Standard (Check for short):

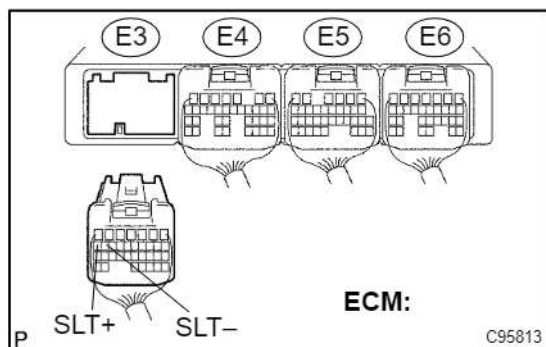
Tester Connection	Specified Condition
1 (SLT+) – Body ground	10 kΩ or higher
4 (SLT-) – Body ground	

NG

Go to step 3

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE – ECM)



- Connect the transmission wire connector to the transaxle.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 °C (68 °F)
E3 – 17 (SLT+) – E3 – 16 (SLT-)	5.0 to 5.6 Ω

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

Standard (Check for short):

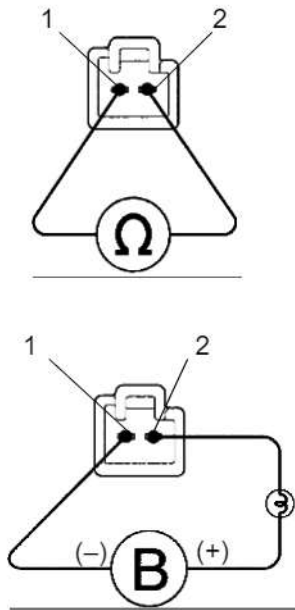
Tester Connection	Specified Condition
E3 – 17 (SLT+) – Body ground	10 kΩ or higher
E3 – 16 (SLT-) – Body ground	

NG

REPAIR OR REPLACE HARNESS OR
CONNECTOR (See page 01-30)

OK

REPLACE ECM (See page 10-11)

3 INSPECT SHIFT SOLENOID VALVE(SLT)**Shift Solenoid Valve SLT:**

D25466

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

Standard:

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

- (c) Connect the positive (+) battery lead with a 21 W bulb to the terminal 2 of the solenoid valve connector and the negative (–) battery lead to the terminal 1 of the solenoid valve connector for checking the solenoid valve operation.

Standard:

The solenoid makes an operating noise.

NG**REPLACE SHIFT SOLENOID VALVE(SLT)****OK****REPAIR OR REPLACE TRANSMISSION WIRE (See page 40-27)**

DTC	P2769	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT LOW (SHIFT SOLENOID VALVE SL)
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DTC	P2770	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT HIGH (SHIFT SOLENOID VALVE SL)
------------	--------------	--

CIRCUIT DESCRIPTION

The shift solenoid valve SL is turned "ON" and "OFF" by signals from the ECM in order to control the hydraulic pressure operation, the lock-up relay valve, which then the controls operation of the lock-up clutch.

Fail safe function:

If the ECM detects a malfunction, it turns the shift solenoid valve SL OFF.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in solenoid valve SL circuit 4 times when solenoid valve SL is operated (2-trip detection logic)	• Short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM
P2770	ECM detects open in solenoid valve SL circuit 4 times when solenoid valve SL is not operated (2-trip detection logic)	• Open in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM

MONITOR DESCRIPTION

Based on the signals from the Throttle Position Sensor, the Airflow Meter and the Crankshaft Position Sensor, the ECM sends a signal to the SL Solenoid Valve to regulate the hydraulic pressure and provide smoother gearshifts. The shift-solenoid valve SL responds to commands from the ECM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the ECM detects an open or short circuit for shift-solenoid SL, it will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2769	Torque converter clutch solenoid/Range check (Low resistance)
	P2770	Torque converter clutch solenoid/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SL	
Frequency of operation	Continuous	
Duration	0.064 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Range check (Low resistance)		
Solenoid	ON	
Time after solenoid OFF to ON	More than 0.008 sec.	—
Range check (High resistance)		
Solenoid	OFF	
Time after solenoid ON to OFF	More than 0.008 sec.	—

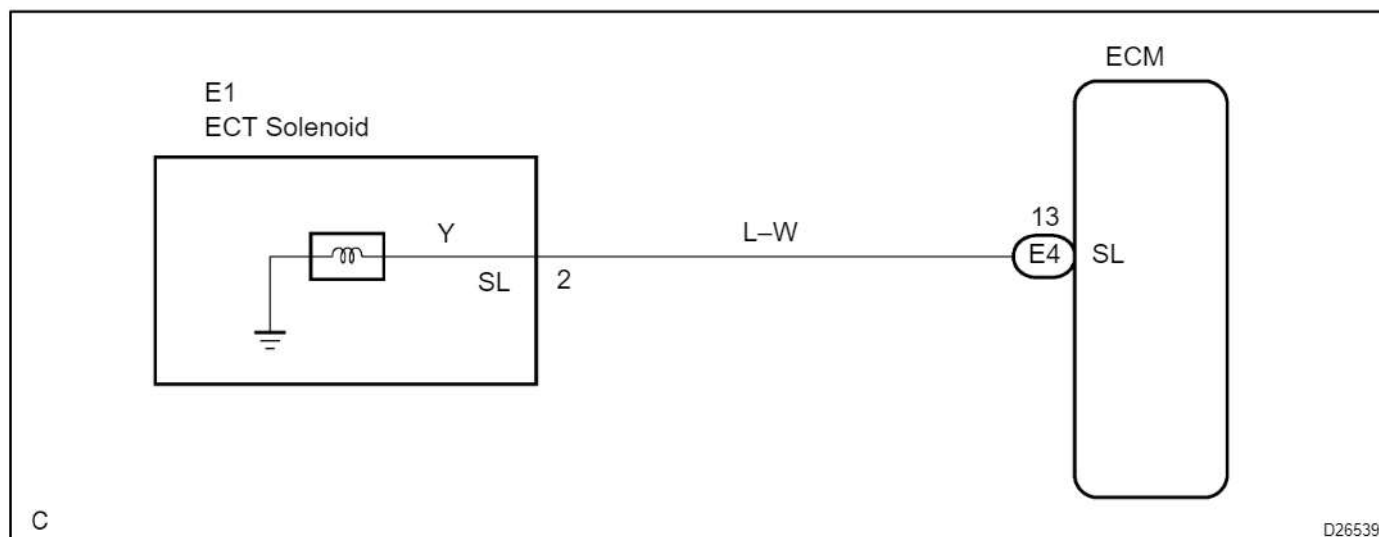
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\leq 8 \Omega$)	4 times (0.064 sec.)
Range check (High resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\geq 100 \text{ k}\Omega$)	4 times (0.064 sec.)

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve SL resistance	11 to 15 Ω at 20°C (68°F)

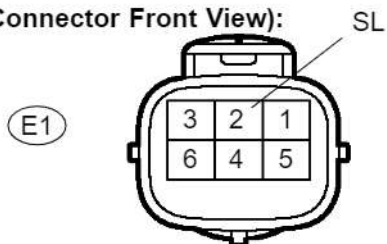
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE(SL)

Transmission Wire Side:
(Connector Front View):



D25254

- Disconnect the transmission wire connector from the transaxle.
- Measure the resistance according to the value(s) in the table below.

Standard:

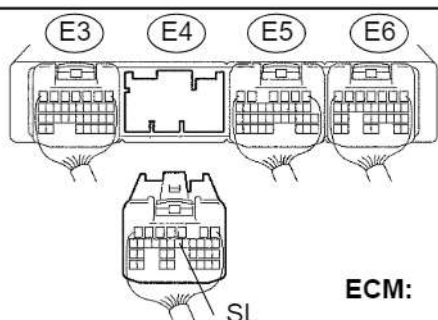
Tester Connection	Specified Condition 20 °C (68 °F)
2 – Body ground	11 to 15 Ω

NG

Go to step 3

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE – ECM)



C95812

- Connect the transmission wire connector.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard:

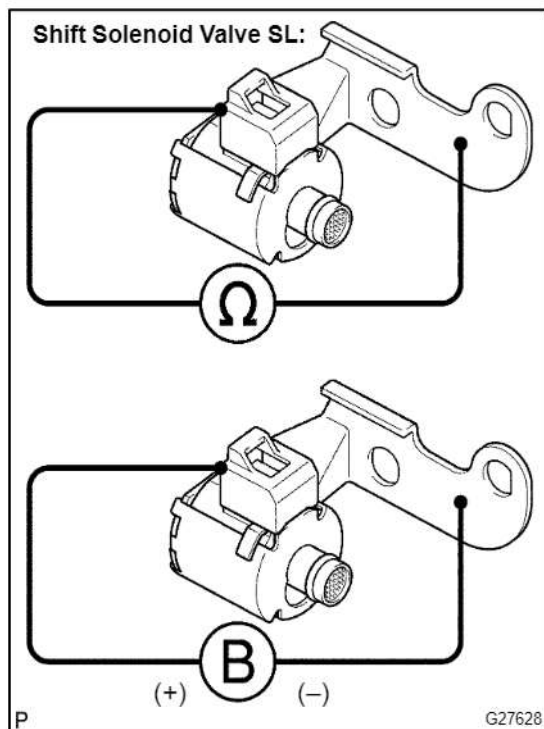
Tester Connection	Specified Condition 20 °C (68 °F)
E4 – 13 (SL) – Body ground	11 to 15 Ω

NG

**REPAIR OR REPLACE HARNESS OR
CONNECTOR (See page 01-30)**

OK

REPLACE ECM (See page 10-11)

3 INSPECT SHIFT SOLENOID VALVE(SL)

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

Standard:

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

- (c) Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid valve makes an operating noise.

NG**REPLACE SHIFT SOLENOID VALVE(SL)****OK****REPAIR OR REPLACE TRANSMISSION WIRE (See page 40-27)**

PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

Part and system name	Definition
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VAV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor "A", Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor "A"	Couter gear speed sensor

Part and system name	Definition
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

DTC	P0973	SHIFT SOLENOID "A" CONTROL CIRCUIT LOW (SHIFT SOLENOID VALVE S1)
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DTC	P0974	SHIFT SOLENOID "A" CONTROL CIRCUIT HIGH (SHIFT SOLENOID VALVE S1)
------------	--------------	--

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the shift solenoid valve S1 and S2 controlled by ECM. If an open or short circuit occurs in either of the solenoid valves, the ECM controls the remaining normal solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

Fail safe function:

If either of the solenoid valve circuits develops an open or short, the ECM turns the other solenoid valve ON and OFF to shift to the gear positions shown in the table below. If both solenoids malfunction, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the above table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

Position	NORMAL			S1 SOLENOID VALVE MALFUNCTIONING			S2 SOLENOID VALVE MALFUNCTIONING			BOTH SOLENOID MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	S1	S2		S1	S2		S1	S2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	O/D
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 4 times when solenoid valve S1 is operated (1-detection logic)	• Short in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM
P0974	ECM detects open in solenoid valve S1 circuit 4 times when solenoid valve S1 is not operated (1-detection logic)	• Open in shift solenoid valve S1 circuit • Shift solenoid valve S1 • ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and the MIL comes on. Illuminating the MIL, the ECM performs the fail-safe and turns the other shift solenoid valves in good condition "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0973	Shift solenoid "A"/Range check (Low resistance)
	P0974	Shift solenoid "A"/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1	
Frequency of operation	Continuous	
Duration	2 times or more	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Range check (Low resistance)		
Solenoid	ON	
Time after solenoid OFF to ON	More than 0.008 sec.	—
Range check (High resistance)		
Solenoid	OFF	
Time after solenoid ON to OFF	More than 0.008 sec.	—

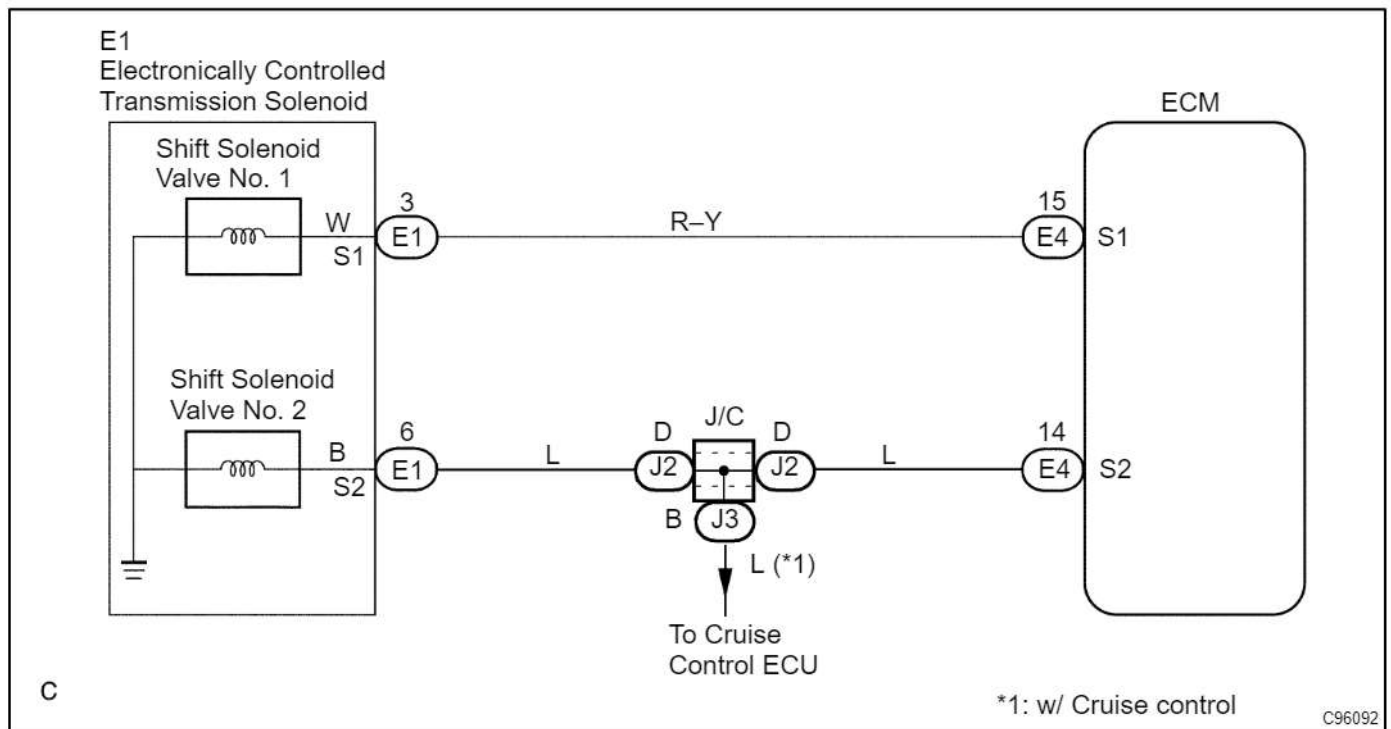
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\leq 8 \Omega$)	4 times (0.064 sec.)
Range check (High resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\geq 100 \text{ k}\Omega$)	4 times (0.064 sec.)

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve S1 resistance	11 to 15 Ω at 20°C (68°F)

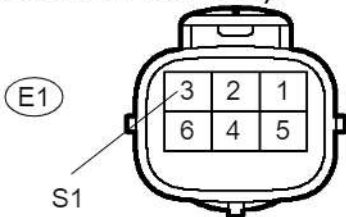
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE(S1)

Transmission Wire Side:
(Connector Front View):



- Disconnect the transmission wire connector from the transaxle.
- Measure the resistance according to the value(s) in the table below.

Standard:

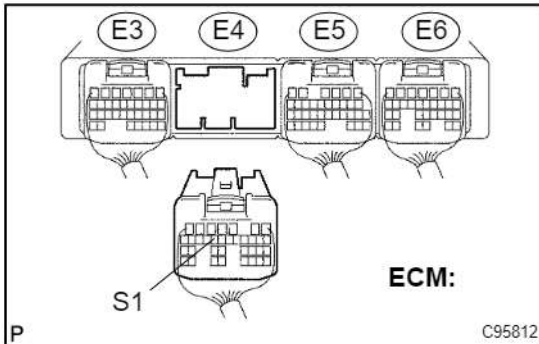
Tester Connection	Specified Condition 20 °C (68 °F)
3 – Body ground	11 to 15 Ω

NG

Go to step 3

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE – ECM)



- Connect the transmission connector to the transaxle.
- Disconnect the connector from the ECM.
- Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 °C (68 °F)
E4 – 15 (S1) – Body ground	11 to 15 Ω

NG

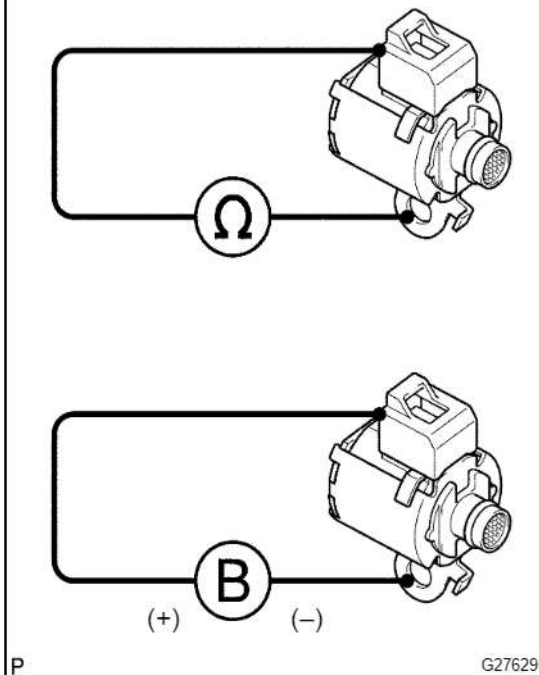
REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

REPLACE ECM (See page 10-11)

3 INSPECT SHIFT SOLENOID VALVE(S1)

Shift Solenoid Valve S1:



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

Standard:

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

- Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE(S1)

OK

REPAIR OR REPLACE TRANSMISSION WIRE (See page 40-27)

DTC	P0976	SHIFT SOLENOID "B" CONTROL CIRCUIT LOW (SHIFT SOLENOID VALVE S2)
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DTC	P0977	SHIFT SOLENOID "B" CONTROL CIRCUIT HIGH (SHIFT SOLENOID VALVE S2)
------------	--------------	--

CIRCUIT DESCRIPTION

See page [05-402](#).

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 4 times when solenoid valve S2 is operated (1-trip detection logic)	• Short in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM
P0977	ECM detects open in solenoid valve S2 circuit 4 times when solenoid valve S2 is not operated (1-trip detection logic)	• Open in shift solenoid valve S2 circuit • Shift solenoid valve S2 • ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and the MIL comes on. Illuminating the MIL, the ECM performs the fail-safe and turns the other shift solenoid valves in good condition "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0976	Shift solenoid "B"/Range check (Low resistance)
	P0977	Shift solenoid "B"/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2	
Frequency of operation	Continuous	
Duration	2 times or more	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Range check (Low resistance)		
Solenoid	ON	
Time after solenoid OFF to ON	More than 0.008 sec.	—
Range check (High resistance)		
Solenoid	OFF	
Time after solenoid ON to OFF	More than 0.008 sec.	—

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\leq 8 \Omega$)	4 times (0.064 sec.)
Range check (High resistance)	
Number of solenoid ON/OFF change with intelligent power MOS diagnosis signal failure (Fail at solenoid resistance $\geq 100 \text{ k}\Omega$)	4 times (0.064 sec.)

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve S2 resistance	11 to 15 Ω at 20°C (68°F)

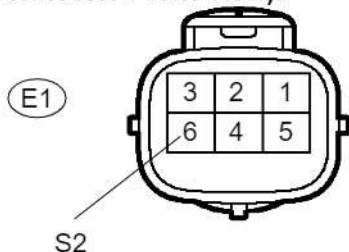
WIRING DIAGRAM

See page 05-402.

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE(S2)

Transmission Wire Side:
(Connector Front View):



D25254

- Disconnect the transmission wire connector from the transaxle.
- Measure the resistance according to the value(s) in the table below.

Standard:

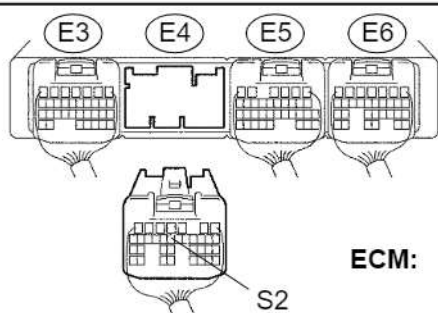
Tester Connection	Specified Condition 20 °C (68 °F)
6 – Body ground	11 to 15 Ω

NG

Go to step 3

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE – ECM)



ECM:

C95812

- Connect the transmission connector to the transaxle.
- Disconnect the connector from the ECM.
- Measure the resistance according to the value(s) in the table below.

Standard:

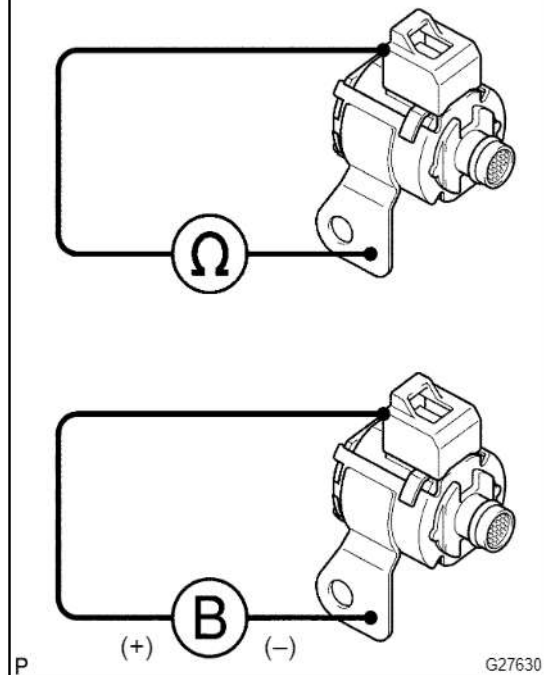
Tester Connection	Specified Condition 20 °C (68 °F)
E4 – 14 (S2) – Body ground	11 to 15 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

REPLACE ECM (See page 10-11)

3 INSPECT SHIFT SOLENOID VALVE(S2)**Shift Solenoid Valve S2:**

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

Standard:

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

- (c) Connect the positive (+) battery lead to the solenoid connector terminal, and the negative (–) battery lead to the solenoid body for checking the solenoid valve operation.

Standard:

The solenoid makes an operating noise.

NG**REPLACE SHIFT SOLENOID VALVE(S2)****OK****REPAIR OR REPLACE TRANSMISSION WIRE (See page 40-27)**

ELECTRONIC CONTROLLED AUTOMATIC TRANSAXLE [ECT] (Apr., 2003)

05C07-05

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or ECM (See page [05-371](#)).

HINT:

Initialization can not be completed by only removing the battery.

INITIALIZATION

1. RESET MEMORY

CAUTION:

Perform the **RESET MEMORY (AT initialization)** when replacing the automatic transaxle assy, engine assy or ECM.

NOTICE:

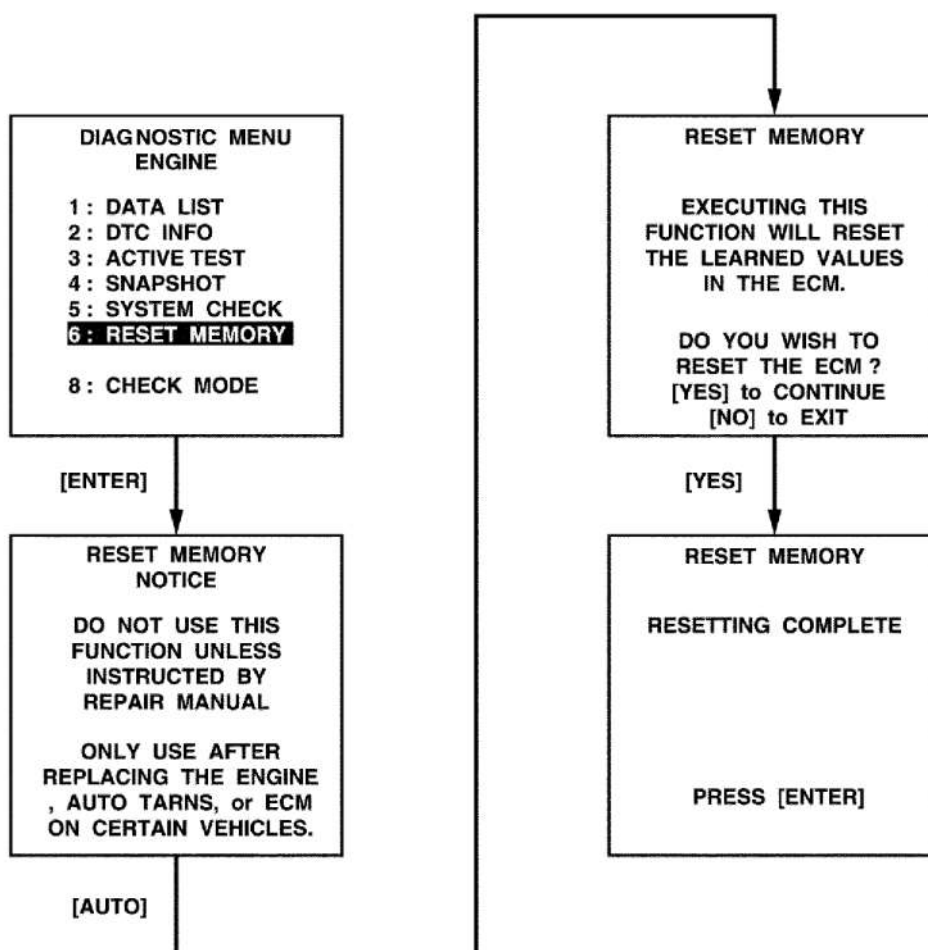
Hand-held tester only

- Turn the ignition switch off.
- Connect the hand-held tester to the DLC3.
- Turn the ignition switch to the ON position.
- Perform the reset memory procedure from the ENGINE menu.

CAUTION:

After performing the **RESET MEMORY**, be sure to perform the **ROAD TEST** described earlier.

Tester menu flow:



ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

- (a) Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. PERFORM ROAD TEST

NOTICE:

Conduct the test at normal operating ATF temperature 50 to 80 °C (122 to 176 °F).

- (a) D position test

Shift into the D position and fully depress the accelerator pedal and check the following points:

- (1) Check up-shift operation.

Check that 1 → 2, 2 → 3 and 3 → O/D up-shift takes place, and that the shift points conform to the automatic shift schedule (See page 03-35).

HINT:

O/D Gear Up-shift Prohibition Control

- Coolant temp. is 55 °C (131 °F) or less and vehicle speed is 70 km/h (43 mph) or less.

O/D and 3rd Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Coolant temp. is 55 °C (131 °F) or less.

3rd Gear Lock-up Prohibition Control

- O/D main switch off (O/D ON)

- (2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up-shift.

- (3) Check for abnormal noises and vibration.

Run in D position lock-up or O/D gear and check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be sure to loss of balance in the differential, torque converter, etc.

- (4) Check kick-down operation.

Check that the possible kick-down vehicle speed limits for 2nd to 1st, 3rd to 2nd, O/D to 3rd kick-downs conform to those indicated on the automatic shift schedule while driving through all gears with the shift lever in the D position (See page 03-35).

- (5) Check for abnormal shock and slip at kick-down.

- (6) Check the lock-up mechanism.

- Drive in D position O/D gear, at a steady speed (lock-up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

- (b) 2 position test

Shift into the 2 position and fully depress the accelerator pedal and check the following points:

- (1) Check up-shift operation.

Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page 03-35).

HINT:

There is no O/D up-shift and lock-up in the 2 position.

- (2) Check engine braking.
While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.
- (3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.
- (c) L position test
Shift into the L position and fully depress the accelerator pedal and check the following points:
 - (1) Check no up-shift.
While running in the L position, check that there is no up-shift to 2nd gear.
 - (2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.
 - (3) Check for abnormal noises during acceleration and deceleration.
- (d) R position test
Shift into the R position and fully depress the accelerator pedal and check for slipping.

CAUTION:

Before conducting this test ensure that the test area is free from people and obstruction.

- (e) P position test
Stop the vehicle on a grade (more than 5°), shift into the P position and release the parking brake.
Check that the vehicle does not move.

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the DTC check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for trouble-shooting.

The Matrix Chart is divided into 3 chapters.

- If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

CHAPTER 1: ELECTRONIC CIRCUIT MATRIX CHART

Symptom	Suspect Area	See page
No up-shift (A particular gear, from 1st to 3rd gear, is not up-shifted)	ECM	01-30
No up-shift (3rd → O/D)	1. O/D main switch circuit 2. Electronically controlled transmission communication circuit *1 3. O/D cancel signal circuit *1 4. ECM	05-417 05-770 05-419 01-30
No down-shift (O/D → 3rd)	1. O/D main switch circuit 2. Electronically controlled transmission communication circuit *1 3. O/D cancel signal circuit *1 4. ECM	05-417 05-770 05-419 01-30
No down-shift (A particular gear, from 3rd to 1st gear, is not down-shifted)	ECM	01-30
No lock-up or No lock-up off	ECM	01-30
Shift point too high or too low	ECM	01-30
Up-shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch circuit 2. Electronically controlled transmission communication circuit *1 3. O/D cancel signal circuit *1 4. ECM	05-417 05-770 05-419 01-30
Up-shift to O/D from 3rd while engine is cold	ECM	01-30
Harsh engagement (N → D)	ECM	01-30
Harsh engagement (Lock-up)	ECM	01-30
Harsh engagement (Any driving position)	ECM	01-30
Poor acceleration	ECM	01-30
Engine stalls when starting off or stopping	ECM	01-30
No kick-down	ECM	01-30
Malfunction in shifting	1. Park/neutral position switch circuit 2. ECM	05-379 01-30

*1: w/ Cruise control

Chapter 2: On-vehicle repair

(★ : A245E/A246E automatic transaxle repair manual Pub. No. RM941U)

Symptom	Suspect Area	See page
Does not move in any forward ranges	Off-vehicle matrix chart	–
Does not move in reverse range	Off-vehicle matrix chart	–
Does not move in any range	1. Manual valve 2. Valve body assembly (Primary regulator valve) 3. Valve body assembly (Manual valve) 4. Off-vehicle matrix chart	★ ★ ★ –
No-up shift (1st → 2nd)	1. Valve body assembly (1 – 2 shift valve) 2. Off-vehicle matrix chart	★ –
No-up shift (2nd → 3rd)	1. Valve body assembly (2 – 3 shift valve) 2. Off-vehicle matrix chart	★ –
No-up shift (3rd → O/D)	1. Valve body assembly (3 – 4 shift valve) 2. Off-vehicle matrix chart	★ –
No-down shift (O/D → 3rd)	1. Valve body assembly (3 – 4 shift valve) 2. Off-vehicle matrix chart	★ –
No-down shift (3rd → 2nd)	1. Valve body assembly (2 – 3 shift valve) 2. Off-vehicle matrix chart	★ –
No-down shift (2nd → 1st)	1. Valve body assembly (1 – 2 shift valve) 2. Off-vehicle matrix chart	★ –
Harsh engagement (N → R)	1. Valve body assembly (C ₂ accumulator) 2. Off-vehicle matrix chart	★ –
Harsh engagement (N → D)	1. Valve body assembly (C ₁ accumulator) 2. Off-vehicle matrix chart	★ –
Harsh engagement (N → L)	1. Valve body assembly (C ₁ accumulator) 2. Valve body assembly (Low coast modulator valve) 3. Off-vehicle matrix chart	★ ★ –
Harsh engagement (1st → 2nd "D" range)	1. Valve body assembly (Accumulator control valve) 2. Valve body assembly (B ₂ accumulator) 3. Off-vehicle matrix chart	★ ★ –
Harsh engagement (1st → 2nd "2" range)	1. Valve body assembly (B ₂ accumulator) 2. Valve body assembly (Accumulator control valve) 3. Valve body assembly (2nd coast modulator control) 4. Off-vehicle matrix chart	★ ★ ★ –
Harsh engagement (1st → 2nd → 3rd → O/D)	Valve body assembly (Primary regulator valve)	★
Harsh engagement (2nd → 3rd)	1. Valve body assembly (C ₂ accumulator) 2. Valve body assembly (Accumulator control valve) 3. Off-vehicle matrix chart	★ ★ –
Harsh engagement (3rd → O/D)	1. Valve body assembly (Accumulator control valve) 2. Valve body assembly (C ₃ accumulator) 3. Off-vehicle matrix chart	★ ★ –
Harsh engagement (O/D → 3rd)	1. Valve body assembly (B ₄ accumulator) 2. Off-vehicle matrix chart	★ –
Harsh engagement (3rd → 2nd)	1. Valve body assembly (C ₂ accumulator) 2. Off-vehicle matrix chart	★ –
Slip (Forward & Reverse)	1. Valve body assembly (Primary regulator valve) 2. Oil strainer 3. Off-vehicle matrix chart	★ 40-23 –
Slip ("R" range, 1st, 2nd, 3rd, O/D)	Off-vehicle matrix chart	–

Symptom	Suspect Area	See page
No engine braking (1st "L" range)	1. Valve body assembly (Low coast modulator valve) 2. Off-vehicle matrix chart	★ –
No engine braking (2nd "2" range)	1. Valve body assembly (2nd coast modulator valve) 2. Off-vehicle matrix chart	★ –
No kick down	1. Valve body assembly (1 – 2 shift valve) 2. Valve body assembly (2 – 3 shift valve) 3. Valve body assembly (3 – 4 shift valve)	★ ★ ★
Poor acceleration	1. Valve body assembly (Primary regulator valve) 2. Off-vehicle matrix chart	★ –
No lock-up	1. Valve body assembly (Lock-up relay valve) 2. Off-vehicle matrix chart	★ –

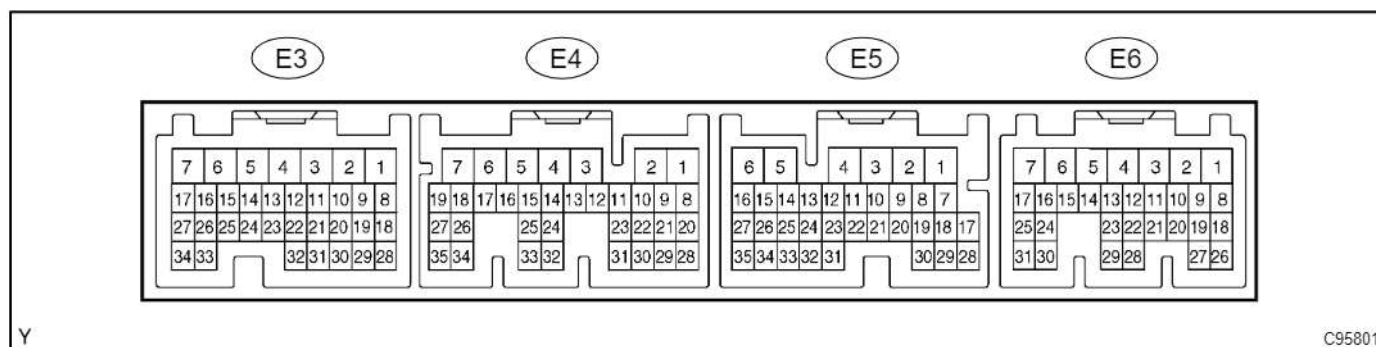
Chapter 3: Off-vehicle repair

(★ : A245E/A246E automatic transaxle repair manual Pub. No. RM941U)

Symptom	Suspect Area	See page
Does not move in any forward ranges	Forward clutch (C ₁)	★
Does not move in reverse range	1. Direct clutch (C ₂) 2. 1st and reverse brake (B ₃) 3. U/D brake (B ₄)	★ ★ ★
Does not move in any ranges	1. Torque converter clutch 2. Oil pump 3. U/D one-way clutch (F ₃) 4. Front planetary gear 5. Rear planetary gear	40-20 ★ ★ ★ ★
No-up shift (1st → 2nd)	1. 2nd brake (B ₂) 2. No.1 one-way clutch (F ₁)	★ ★
No-up shift (2nd → 3rd)	Direct clutch (C ₂)	★
No-up shift (3rd → O/D)	U/D clutch (C ₃)	★
No-down shift (O/D → 3rd)	1. U/D brake (B ₄) 2. U/D one-way clutch (F ₃)	★ ★
No-down shift (3rd → 2nd)	No.1 one-way clutch (F ₁)	★
No-down shift (2nd → 1st)	No.2 one-way clutch (F ₂)	★
Harsh engagement (N → R)	1. Direct clutch (C ₂) 2. 1st and reverse brake (B ₃)	★ ★
Harsh engagement (N → D)	1. Forward clutch (C ₁) 2. On-vehicle matrix chart	★ –
Harsh engagement (N → L)	Forward clutch (C ₁)	★
Harsh engagement (1st → 2nd "D" range)	1. 2nd brake (B ₂) 2. No.1 one-way clutch (F ₁)	★ ★
Harsh engagement (1st → 2nd "2" range)	1. 2nd coast brake (B ₁) 2. 2nd brake (B ₂) 3. No.1 one-way clutch (F ₁)	★ ★ ★
Harsh engagement (2nd → 3rd)	Direct clutch (C ₂)	★
Harsh engagement (3rd → O/D)	U/D clutch (C ₃)	★
Harsh engagement (O/D → 3rd)	U/D brake (B ₄)	★
Harsh engagement (3rd → 2nd)	Direct clutch (C ₂)	★
Slip (Forward & Reverse)	1. Torque converter clutch 2. Oil pump	40-20 ★
Slip ("R" range)	1. Direct clutch (C ₂) 2. 1st and reverse brake (B ₃)	★ ★
Slip (1st)	1. Forward clutch (C ₁) 2. No.2 one-way clutch (F ₂) 3. U/D one-way clutch (F ₃)	★ ★ ★

Symptom	Suspect Area	See page
Slip (2nd)	1. Forward clutch (C ₁) 2. 2nd brake (B ₂) 3. No.1 one-way clutch (F ₁) 4. U/D one-way clutch (F ₃)	★ ★ ★ ★
Slip (3rd)	1. Forward clutch (C ₁) 2. Direct clutch (C ₂) 3. U/D one-way clutch (F ₃)	★ ★ ★
Slip (O/D)	1. Forward clutch (C ₁) 2. Direct clutch (C ₂) 3. U/D clutch (C ₃)	★ ★ ★
No engine braking (1st "L" range)	1st and reverse brake (B ₃)	★
No engine braking (2nd "2" range)	2nd coast brake (B ₁)	★
Poor acceleration	1. Torque converter clutch 2. Forward clutch (C ₁)	40-20 ★
No lock-up	Torque converter clutch	40-20
Engine stalls when starting off or stopping	Torque converter clutch	40-20

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ODLP (E5-7) – E1 (E4-7)	LG – BR	O/D OFF indicator light circuit	IG switch ON and O/D OFF indicator light lights up	Below 3 V
			IG switch ON and O/D OFF indicator light goes off	10 to 14 V
L (E5-8) – E1 (E4-7)	LG-B – BR	L shift position switch signal	IG switch ON and shift lever L position	10 to 14 V
			IG switch ON and shift lever except L position	Below 1 V
2 (E5-9) – E1 (E4-7)	LG – BR	2 shift position switch signal	IG switch ON and shift lever 2 position	10 to 14 V
			IG switch ON and shift lever except 2 position	Below 1 V
R (E5-11) – E1 (E4-7)	R-B – BR	R shift position switch signal	IG switch ON and shift lever R position	10 to 14 V
			IG switch ON and shift lever except R position	Below 1 V
STP (E5-19) – E1 (E4-7)	G-W – BR	Stop lamp switch signal	IG switch ON and Brake pedal is depressed	7.5 to 14 V
			IG switch ON and Brake pedal is released	Below 1.5 V
SPD (E5-17) – E1 (E4-7)	V-W – BR	Speed signal	IG switch ON and rotate driving wheel slowly	Pulse generation
ODMS (E5-29) – E1 (E4-7)	LG-B – BR	O/D main switch signal	IG switch ON	10 to 14 V
			IG switch ON and press continuously O/D main switch	Below 1 V
NSW (E4-8) – E1 (E4-7)	R – BR	Park neutral switch signal	IG switch ON and shift lever P and N position	Below 1 V
			IG switch ON and shift lever except P and N position	10 to 14 V
SL (E4-13) – E1 (E4-7)	L-W – BR	SL solenoid signal	IG switch ON	Below 1 V
			Vehicle driving under lock-up range	10 to 14 V
S1 (E4-15) – E1 (E4-7)	R-Y – BR	S1 solenoid signal	IG switch ON	10 to 14 V
			1st or 2nd gear	10 to 14 V
			3rd or O/D gear	Below 1 V
S2 (E4-14) – E1 (E4-7)	L – BR	S2 solenoid signal	IG switch ON	Below 1 V
			1st or O/D gear	Below 1 V
			2nd or 3rd gear	10 to 14 V

SLT+ (E3-17) – SLT- (E3-16)	R-W – P	SLT solenoid signal	IG switch ON	10 to 14 V
OD1 (E5-18)*1 – E1 (E4-7)	R-Y*1 – BR	O/D cancel signal	IG switch ON	10 to 14 V

*1: w/ Cruise control

DTC	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)
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DTC	P0850	PARK/NEUTRAL SWITCH INPUT CIRCUIT
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CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0705	2 or more switches are ON simultaneously for P, R, N, 2 and L positions (2-trip detection logic)	
P0850	Park/neutral position switch remains ON (P, N position) during driving under conditions (a) and (b) for 30 sec. (2-trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 – 2,500 rpm	• Open or short in park/neutral position switch circuit • Park/neutral position switch • ECM

MONITOR DESCRIPTION

The park/neutral position switch detects the gearshift position and sends a signal to the ECM.

For security, the park/neutral position switch detects the gearshift position so that engine can be started only when the vehicle is in P or N shift position.

When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N, 2, or L the ECM interprets this as a fault in the switch. The ECM will turn on the MIL.

MONITOR STRATEGY

P0705

Related DTCs	P0705	Shift lever position select switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0850

Related DTCs	P0850	Park/neutral position switch/Verify switch cycling
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITION**P0705**

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
The typical enabling condition is not available.	–	

P0805

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page 05-369	
Vehicle speed	70 km/h (43 mph) or more	–
Engine speed	1,500 rpm or more	2,700 rpm or less
Intake air amount per revolution	0.43 g/rev. or more	–

TYPICAL MALFUNCTION THRESHOLDS**P0705**

Detection criteria	Threshold
Number of the following signal input at the same time.	2 or more
Park/neutral position switch	ON
L shift position switch	ON
2 shift position switch	ON
R shift position switch	ON

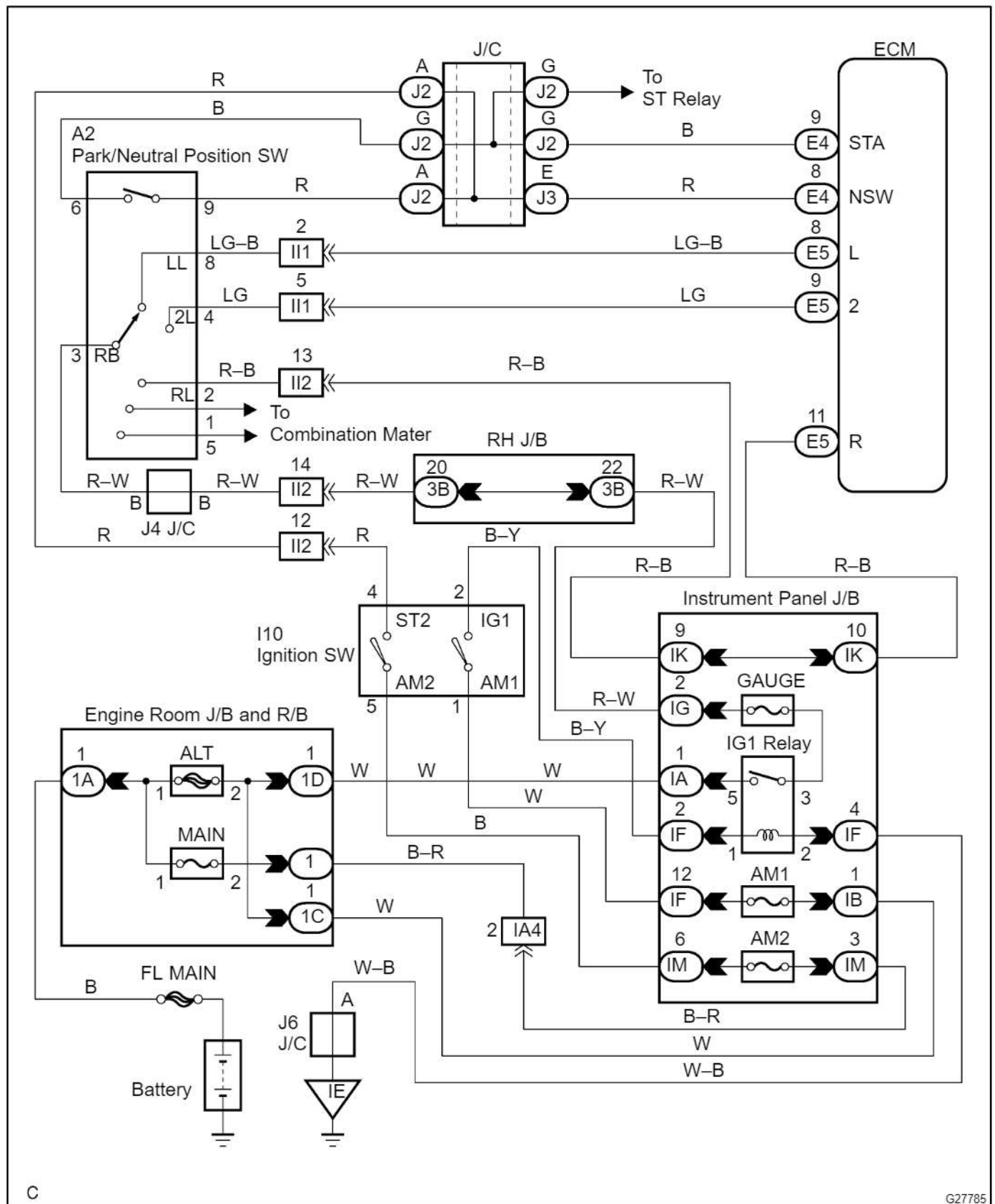
P0850

Detection criteria	Threshold
PNP signal	ON

COMPONENT OPERATING RANGE

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



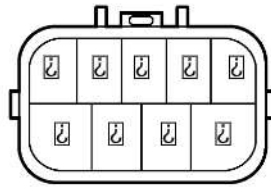
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G27785

INSPECTION PROCEDURE

1 INSPECT PARK/NEUTRAL POSITION SWITCH ASSY

Switch Side:
(Connector Front View):



G27076

- (a) Disconnect the park/neutral position switch connector.
(b) Measure resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard:

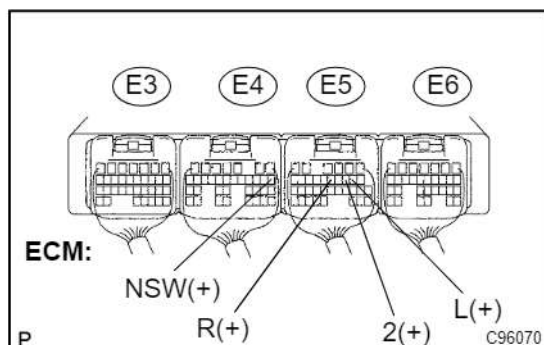
Shift Position	Tester Connection	Specified Condition
P	1 – 3 and 6 – 9	Below 1 Ω
Except P		10 k Ω or higher
R	2 – 3	Below 1 Ω
Except R		10 k Ω or higher
N	3 – 5 and 6 – 9	Below 1 Ω
Except N		10 k Ω or higher
D	3 – 7	Below 1 Ω
Except D		10 k Ω or higher
2	3 – 4	Below 1 Ω
Except 2		10 k Ω or higher
L	3 – 8	Below 1 Ω
Except L		10 k Ω or higher

NG

REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (See page 40-3)

OK

2 CHECK HARNESS AND CONNECTOR(PARK/NEUTRAL POSITION SWITCH – ECM)



- Connect the the park/neutral position switch connector.
- Turn the ignition switch to the ON position, and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard:

Shift Position	Tester Connection	Specified condition
P and N	E4 – 8 (NSW) – Body ground	Below 1 V
Except P and N		10 to 14 V
R	E5 – 11 (R) – Body ground	10 to 14 V*
Except R		Below 1 V
2	E5 – 9 (2) – Body ground	10 to 14 V
Except 2		Below 1 V
L	E5 – 8 (L) – Body ground	10 to 14 V
Except L		Below 1 V

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (See page 01-30)

OK

REPLACE ECM (See page 10-11)

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used at step 3, 4, 6, 9.

1 Vehicle Brought to Workshop



2 Customer Problem Analysis (See page 05-349)



3 Connect the OBD II scan tool or hand-held tester to DLC3



4 Check and Clear DTC and Freeze Frame Data (See page 05-353)



5 Visual Inspection



6 Setting the Check Mode Diagnosis (See page 05-354)



7 Problem Symptom Confirmation (See page 05-356)



Symptom does not occur: Go to step 8



Symptom occur: Go to step 9

8 Symptom Simulation (See page 01-20)



9 DTC Check (See page 05-353)



DTC is not output: Go to step 10



DTC is output: Go to step 18

10 Basic Inspection (See page 40-2, 40-6 and 40-44)

NG Go to step 20

OK

11 Mechanical System Test (See page 05-358)

NG Go to step 17

OK

12 Hydraulic Test (See page 05-360)

NG Go to step 17

OK

13 Manual Shifting Test (See page 05-361)

NG Go to step 15

OK

14 Problem Symptoms Table Chapter 1 (See page 05-374)

NG Go to step 19

OK

15 Problem Symptoms Table Chapter 2 (See page 05-374)

NG Go to step 17

OK

16 Problem Symptoms Table Chapter 3 (See page 05-374)

NG

17 Part Inspection

Go to step 20

18 DTC Chart (See page 05-372)

19	Circuit Inspection
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20	Identification of Problem
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21	Repair
----	--------



22	Confirmation Test
----	-------------------



End
