

DTC**U0100****Lost Communication with ECM/PCM "A"****DESCRIPTION**

The engine control unit intercommunicates with the TCM with the Controller Area Network (CAN). If there is a problem in this intercommunication, the TCM sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0100	Following conditions are met for 1.25 seconds (1 trip detection logic): • Engine switch on (IG) • Battery voltage is 10.5 V or more • No intercommunication between the ECM and TCM	TCM

MONITOR STRATEGY

Related DTCs	U0100: Verify communication
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1.25 seconds
MIL Operation	Immediate
Sequence of Operation	None

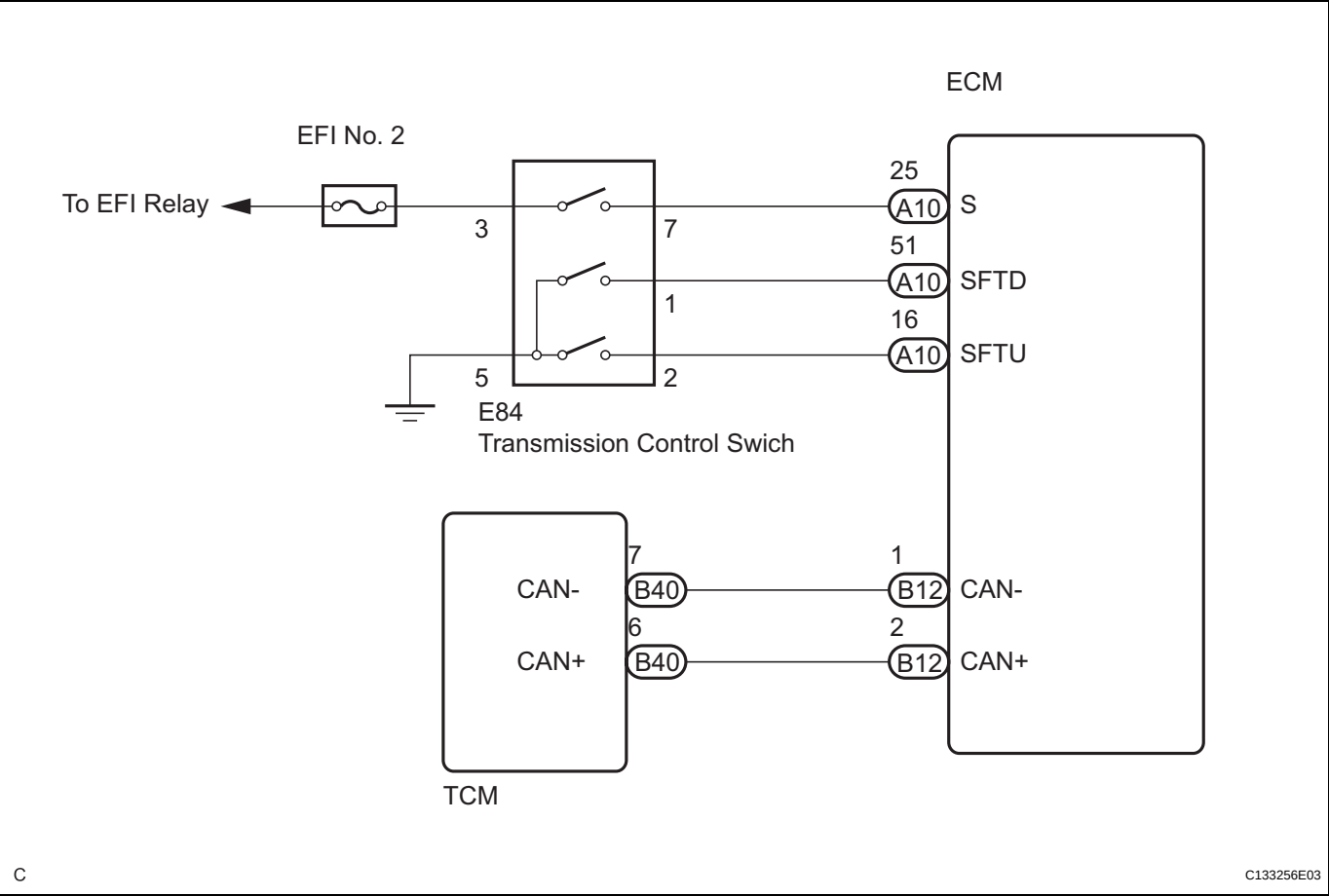
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Battery Voltage	10.5 V or more
Engine Switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Communication between TCM and ECM	No communication
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WIRING DIAGRAM

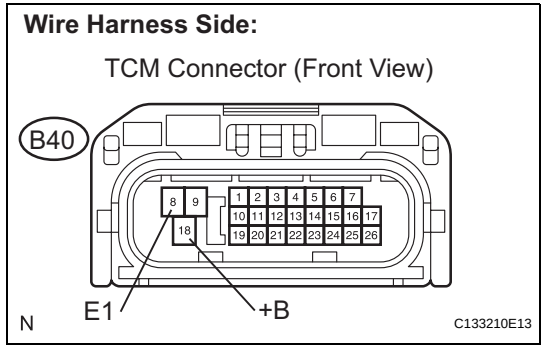


INSPECTION PROCEDURE

HINT:

- AX
- Refer to inspection procedure for CAN communication system (See page CA-11).
 - If the CAN communication malfunctions, the TCM cannot receive the current data from the ECM. In this case, the freeze frame data output from the TCM has not been updated, so the data will not be useful for the inspection. However, reading the Data List as the first step in troubleshooting is effective to find malfunctions.
 - The malfunction area can be checked using the BUS CHECK function on the intelligent tester (See page CA-41).

1 CHECK ECU TERMINAL VOLTAGE (+B AND E1 TERMINALS)



- (a) Disconnect the TCM connector.
(b) Turn the engine switch on (IG).
(c) Measure the voltage of the TCM connector.
Standard voltage

Tester Connection	Specified Condition
B40-18 (+B) - B40-8 (E1)	9 to 14 V

- (d) Turn the engine switch off.
(e) Measure the resistance of the TCM connector.
Standard resistance

Tester Connection	Specified Condition
B40-8 (E1) - Body ground	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR
CONNECTOR

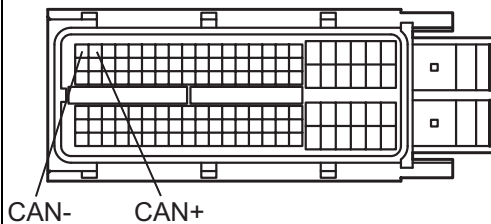
OK

2

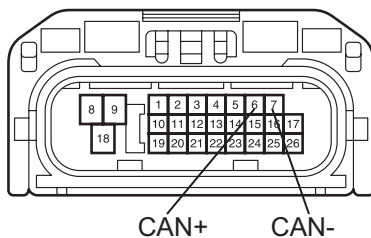
CHECK HARNESS AND CONNECTOR (TCM - ECM)

Wire Harness Side:

ECM Connector (Front View)



TCM Connector (Front View)



C133242E03

- Disconnect the B40 TCM connector.
- Disconnect the B12 ECM connector.
- Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
B40-6 (CAN+) - B12-2 (CAN+)	Below 1 Ω
B40-7 (CAN-) - B12-1 (CAN-)	Below 1 Ω
B40-6 (CAN+) or B12-2 (CAN+) - Body ground	1 M Ω or more
B40-7 (CAN-) or B12-1 (CAN-) - Body ground	1 M Ω or more

NG

REPAIR OR REPLACE HARNESS OR
CONNECTOR

OK

3

CHECK IF DTC OUTPUT RECURS

- Connect the intelligent tester to the DLC3.
- Clear the DTC.
- Replace the TCM.
HINT:
Replace the TCM with the TCM of a normally functioning vehicle of the same model.
- Start the engine.
- Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0100	A
No DTC	B

B

REPLACE TCM

A

REPLACE ECM

AX

DTC	P2810	Pressure Control Solenoid "G" Electrical (Shift Solenoid Valve SL4)
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DESCRIPTION

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in either of the shift solenoid valve, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P2810	The TCM checks for an open or short in the shift solenoid valve SL4 circuit while driving and shifting gears. (1-trip detection logic) Output signal duty equals 100%. (NOTE: SL4 output signal duty is less than 100% under normal condition.)	- Open or short in shift solenoid valve SL4 circuit - Shift solenoid valve SL4 - TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page [AX-38](#))

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more
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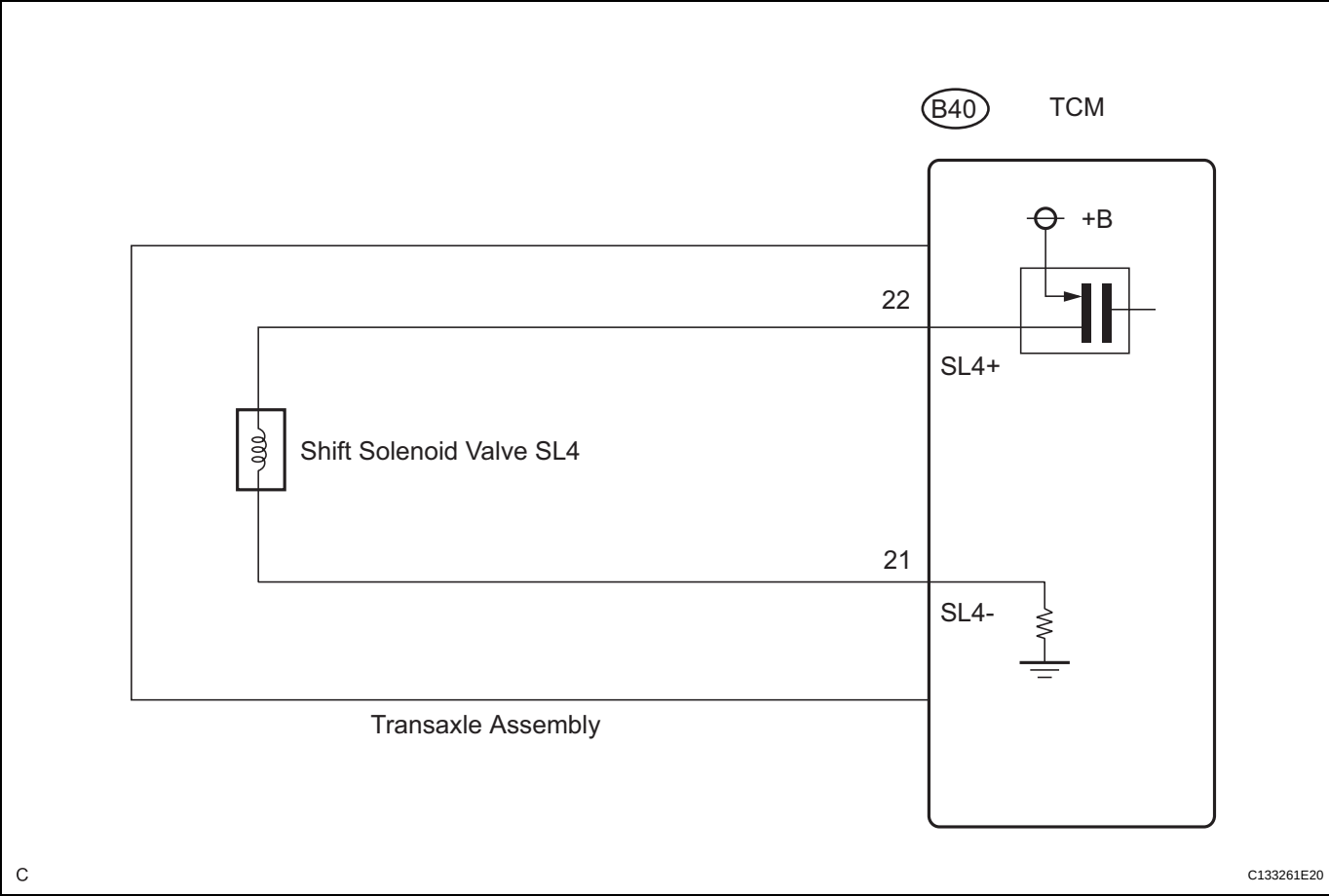
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more
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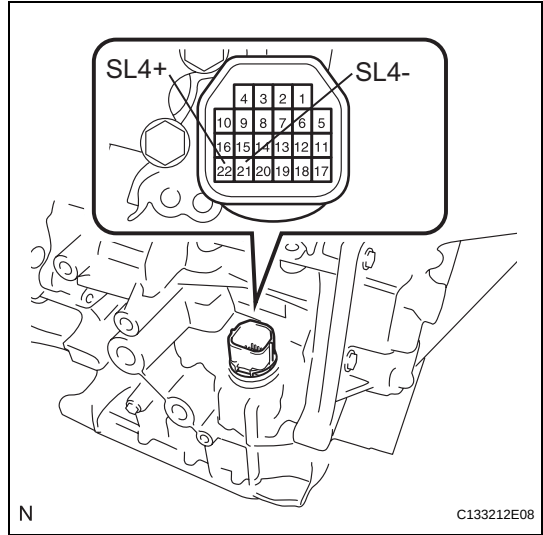
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SL4 CIRCUIT)

AX



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
22 (SL4+) - 21 (SL4-)	5.0 to 5.6 Ω

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

Standard resistance:

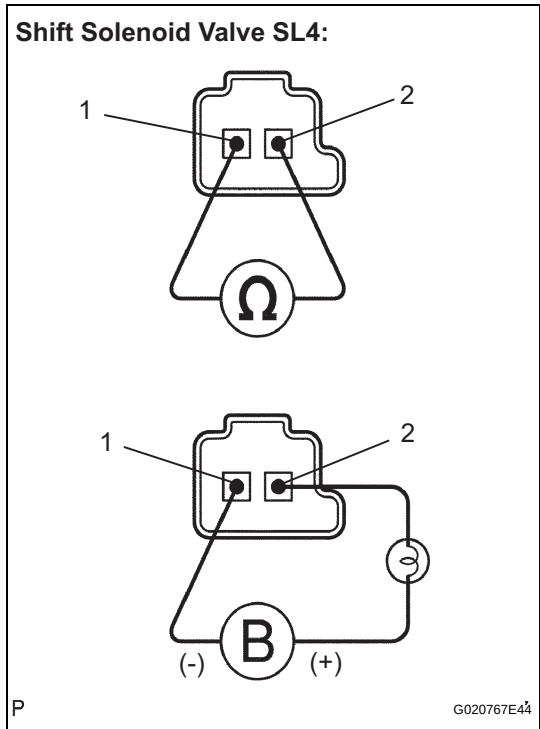
Check for short

Tester Connection	Specified Condition
22 (SL4+) - Body ground	10 kΩ or higher
21 (SL4-) - Body ground	10 kΩ or higher

OK REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE SL4



- (a) Remove the shift solenoid valve SL4.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating noise.

NG REPLACE SHIFT SOLENOID VALVE SL4

OK

REPLACE TRANSMISSION WIRE

DTC	P2808	Pressure Control Solenoid "G" Performance or Stuck OFF (Shift Solenoid Valve SL4)
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DESCRIPTION

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).

Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P2808	The engine revs freely when 3rd or 5th gear is requested. (2-trip detection logic) When any of the following is detected. In addition, the condition that 4th gear is engaged when 4th gear is requested occurs twice. (2-trip detection logic) - When 1st gear is requested, 3rd gear is engaged. - When 2nd gear is requested, 3rd gear is engaged. - When 6th gear is requested, 5th gear is engaged.	- Shift solenoid valve SL4 (open or closed) - Valve body (blocked) - Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P2808: Shift solenoid valve SL4/OFF malfunction Shift solenoid valve SL4/ON malfunction
Required sensors/Components	Shift solenoid valve SL4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A): 0.5 sec. OFF malfunction (B): 0.8 sec. ON malfunction: 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Transmission range	"D"
Transmission fluid temperature	Above -10°C (5°F)

OFF malfunction (A):

TCM select gear	3rd or 5th
Throttle valve opening angle	3% or more

OFF malfunction (B):

TCM select gear	3rd
Throttle valve opening angle	4.5% or more
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (A):

TCM select gear	1st
Time after transmission to 1st gear	0.1 sec. or more
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (B):

TCM select gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (C):

TCM select gear	6th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (D):

TCM select gear	4th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

TYPICAL MALFUNCTION THRESHOLDS**OFF malfunction (A):**

Engine speed - Turbine speed x Gear ratio	1,000 rpm or more
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OFF malfunction (B):

Turbine speed / Output speed	3.304 to 7.724
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ON malfunction (A) and (B):

Turbine speed / Output speed	1.399 to 1.649
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ON malfunction (C):

Turbine speed / Output speed	0.705 to 0.836
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ON malfunction (D):

Turbine speed / Output speed	0.998 to 1.138
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INSPECTION PROCEDURE**AX 1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2808)**

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P2808" is output	A
"P2808" and other DTCs	B

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A**Go to step 3****B**

2

PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:

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

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

HINT:

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

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page [AX-38](#)).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:

- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:

The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

- (d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:

Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gears, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

- (e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N ^{*1}	
Shift solenoid SL4	Stuck ON ^{*3}	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N ^{*1}	6th	
Shift solenoid SLT	Stuck ON	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	E
	Stuck OFF ^{*3}	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When the shift solenoid SLT is stuck OFF, gear shifting is normal.

A

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

B

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)

C

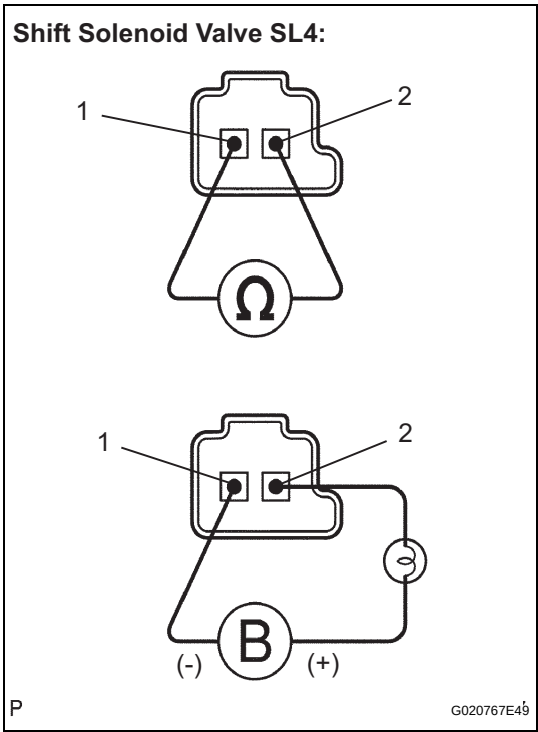
GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

E

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

D

3 INSPECT SHIFT SOLENOID VALVE SL4



- (a) Remove the shift solenoid valve SL4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE SL4

OK

4 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG

REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

5 TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

DTC	P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)
DTC	P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DESCRIPTION

The shift solenoid valve SL is turned ON or OFF by signals from the TCM to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch.

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

Fail-safe function:

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

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, the air flow meter and the crankshaft position sensor, the TCM sends a signal to the solenoid valve SL to regulate the hydraulic pressure and provide smoother torque converter clutch engagement. The shift solenoid valve SL responds to commands from the TCM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the TCM detects an open or short circuit for shift solenoid valve SL, it will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve SL/Range check (Low resistance) P2770: Shift solenoid valve SL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	1 time
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance):

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P2770: Range check (High resistance):

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
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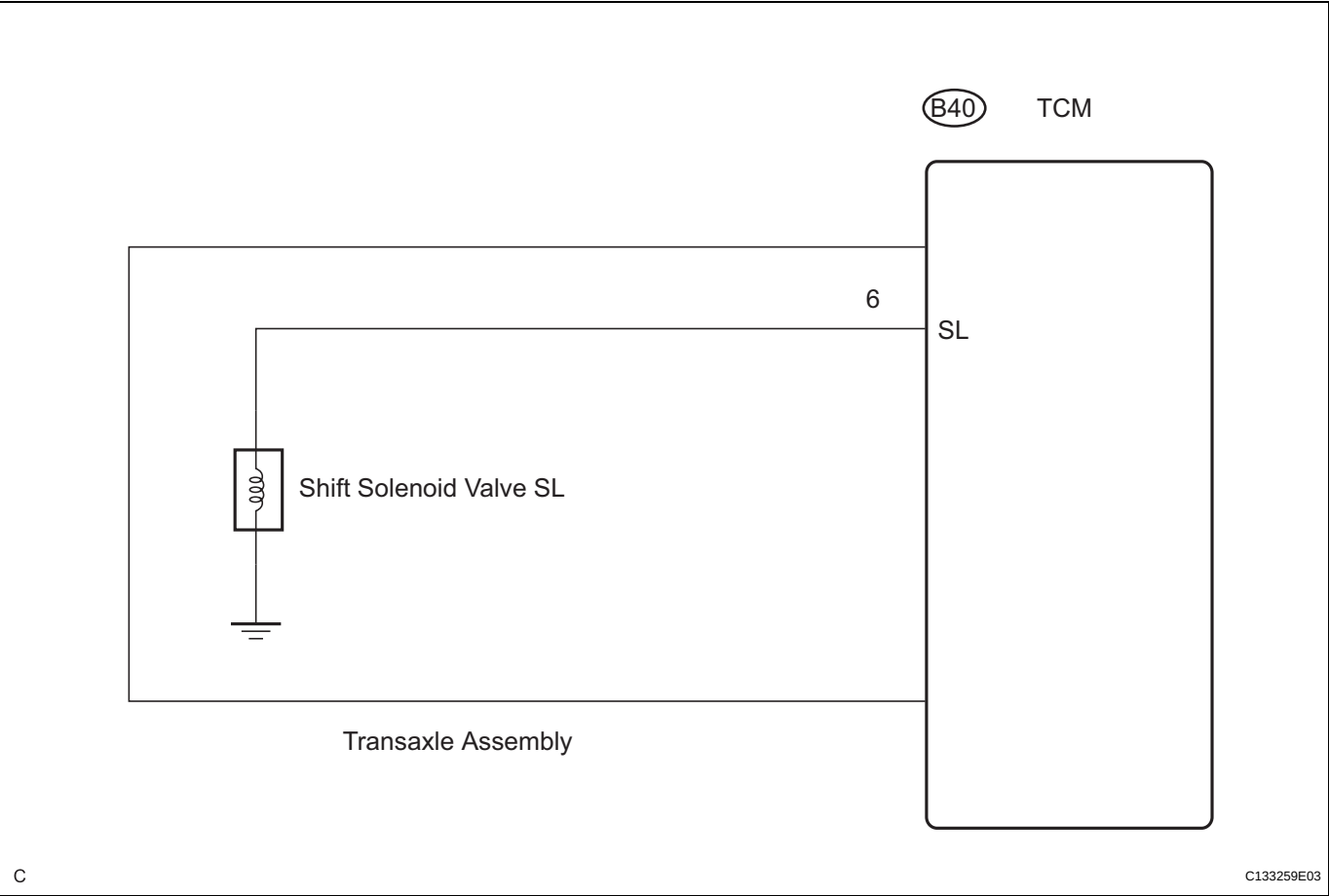
P2770: Range check (High resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more
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COMPONENT OPERATING RANGE

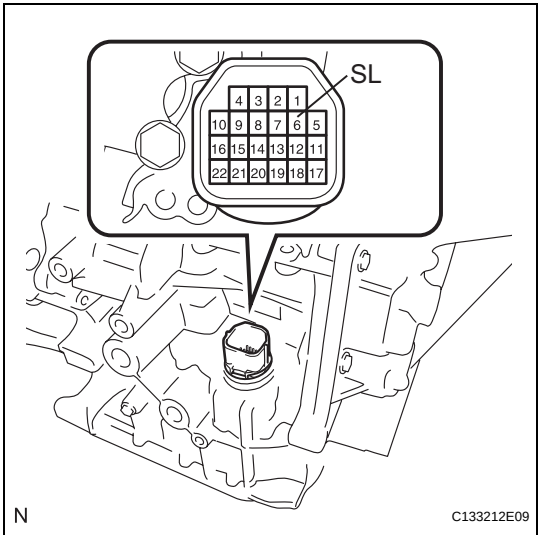
Shift solenoid valve SL	Resistance: 11 to 15 Ω at 20°C (68°F)
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WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL)



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance of the transmission wire.

Standard resistance

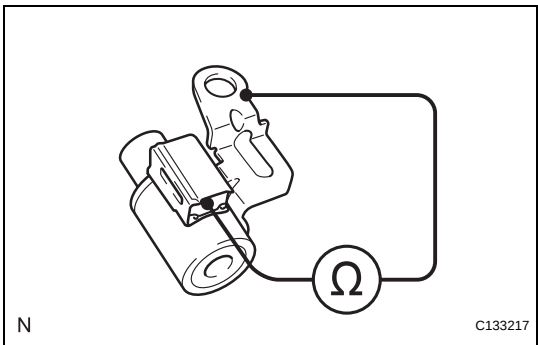
Tester Connection	Condition	Specified Condition
6 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

OK

REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE SL (RESISTANCE)



- (a) Remove the shift solenoid valve SL.
- (b) Measure the resistance between the solenoid valve terminal and solenoid valve body.

Standard resistance:

11 to 15 Ω at 20°C (68°F)

NG

REPLACE SHIFT SOLENOID VALVE SL

OK

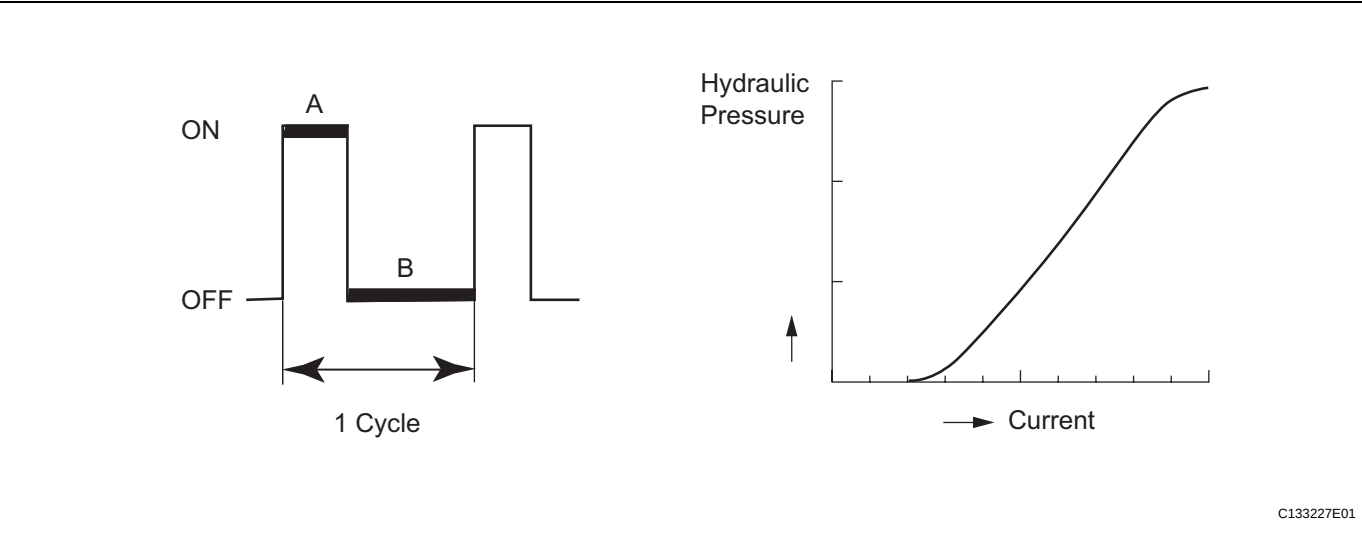
REPLACE TRANSMISSION WIRE

AX

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)
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DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the TCM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.



(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then Duty Ratio = $A / (A + B) \times 100 (\%)$.

DTC No.	DTC Detection Condition	Trouble Area
P2759	Open or short is detected in shift solenoid valve SLU circuit for 1 second or more while driving (1-trip detection logic).	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • TCM

MONITOR DESCRIPTION

When an open or short in a shift solenoid valve (SLU) circuit is detected, the TCM determines there is a malfunction. The TCM will turn on the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P2759: Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more
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Malfunction (A):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

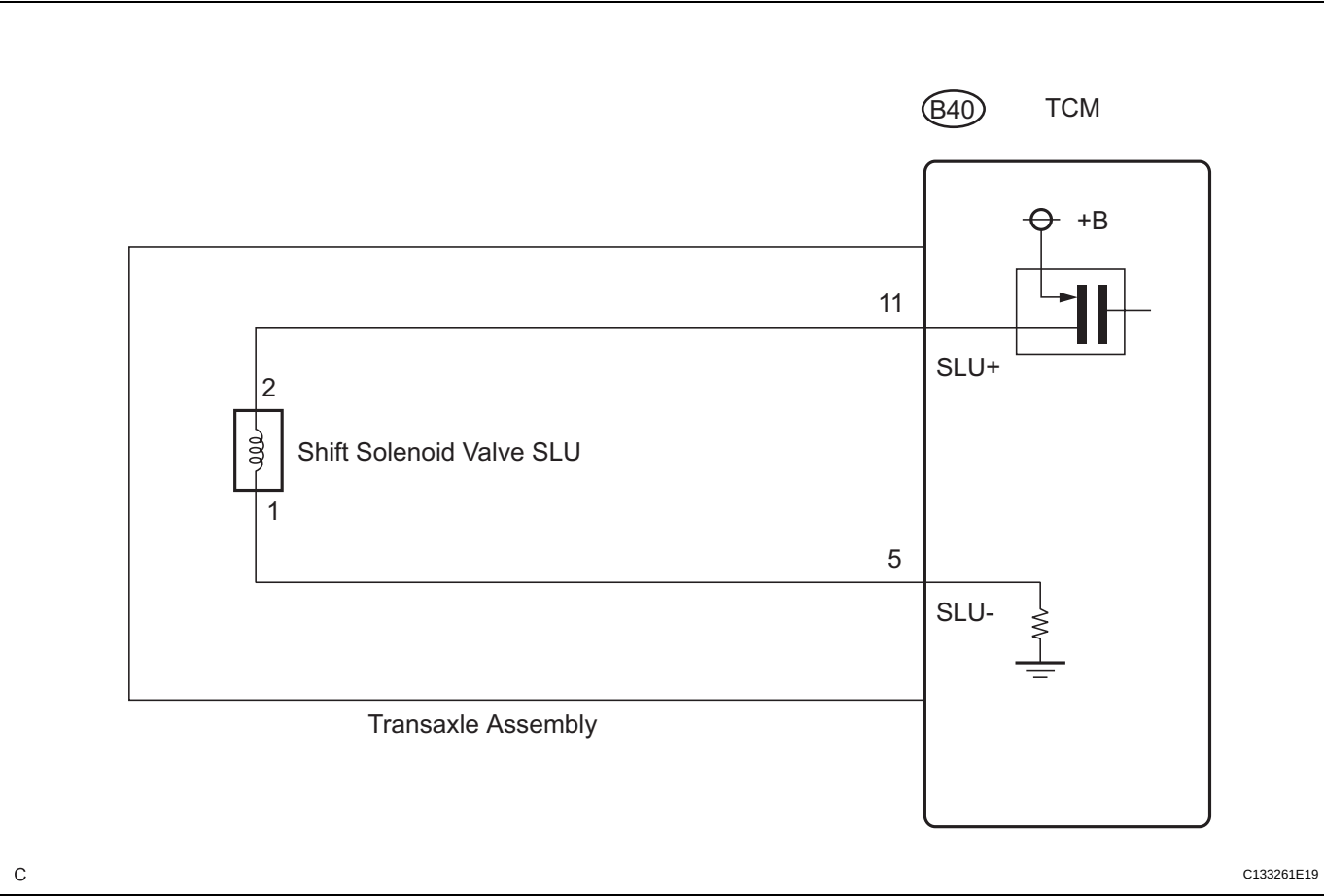
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more
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COMPONENT OPERATING RANGE

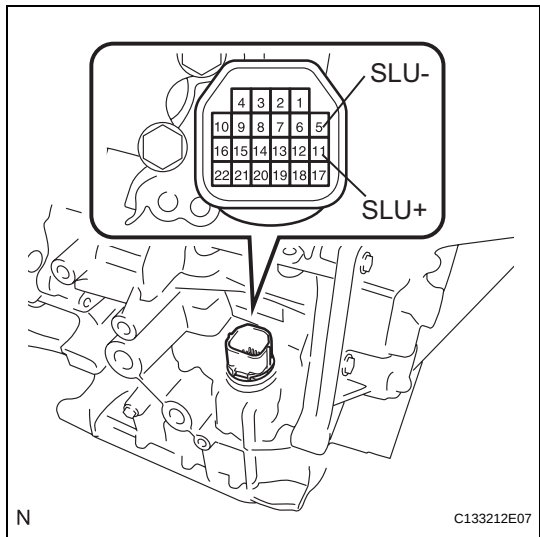
Output signal duty	Less than 100%
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WIRING DIAGRAM



INSPECTION PROCEDURE

1INSPECT TRANSMISSION WIRE (SLU)



- (a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
11 (SLU+) - 5 (SLU-)	5.0 to 5.6 Ω

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

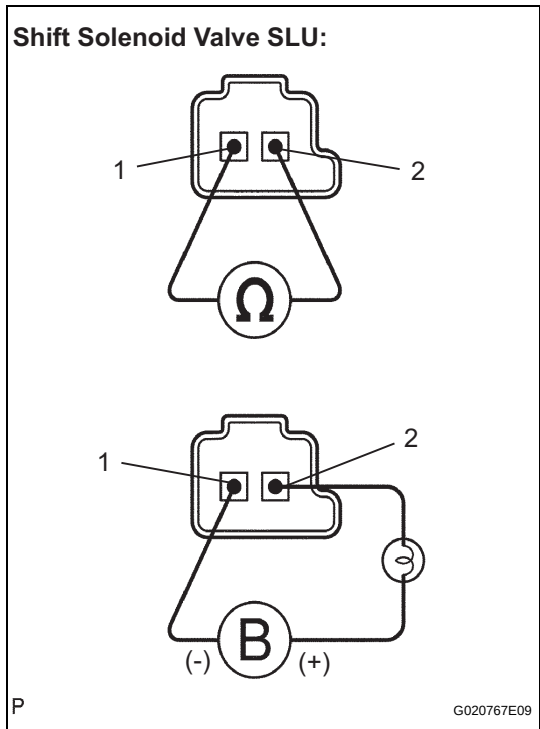
Standard resistance:
Check for short

Tester Connection	Specified Condition
11 (SLU+) - Body ground	10 kΩ or higher
5 (SLU-) - Body ground	10 kΩ or higher

OKREPLACE TCM

NG

2INSPECT SHIFT SOLENOID VALVE SLU



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating sound.

NGREPLACE SHIFT SOLENOID VALVE SLU

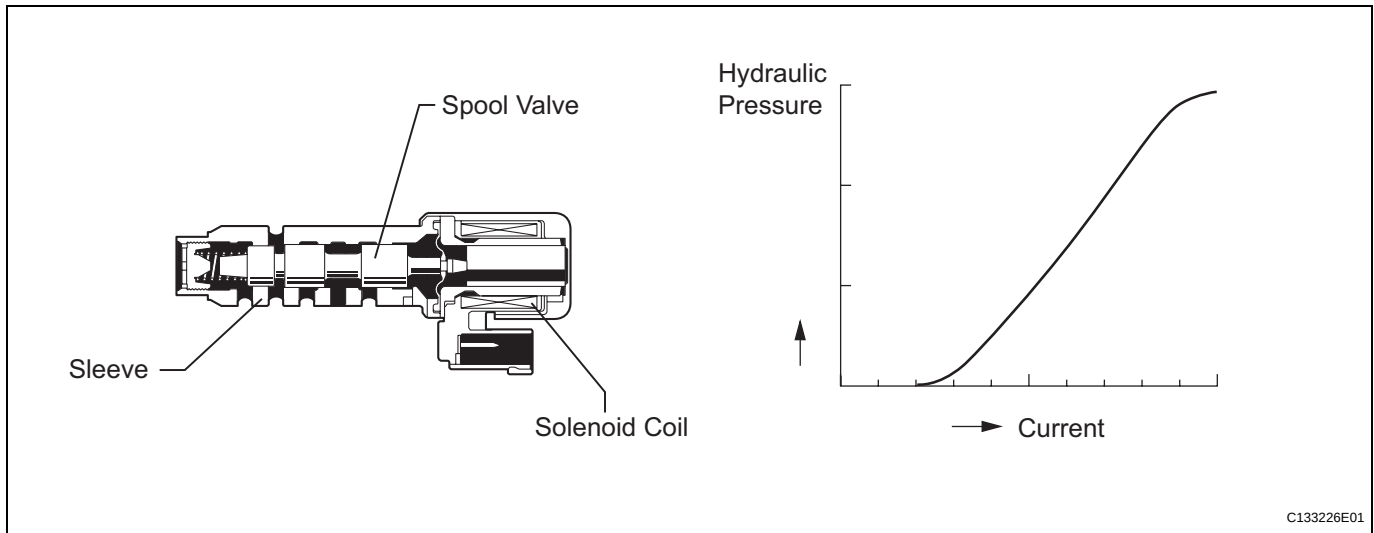
OK

REPLACE TRANSMISSION WIRE

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)
------------	--------------	---

SYSTEM DESCRIPTION

The TCM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.



The TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SLU, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P2757	When both of the following are detected (2-trip detection logic): - Lock-up does not occur when requested. - Transmission fluid pressure switch No. 3 is OFF. When both of the following are detected (2-trip detection logic): - Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. - Lock-up occurs when the shift solenoid valve SLU is requested to turn on in the lock-up range.	- Shift solenoid valve SLU (open or closed) - Valve body (blocked) - Torque converter clutch - Automatic transaxle (clutch, brake or gear, etc.) - Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the turbine (input) speed sensor NT, output speed sensor NC, engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SLU. When the SLU is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SLU or lock-up system performance.

The TCM will turn on the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
(Engine speed is at least 70 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
(The difference between engine speed and input turbine speed is less than 20 rpm.)

MONITOR STRATEGY

Related DTCs	P2757: Shift solenoid valve SLU OFF malfunction Shift solenoid valve SLU ON malfunction
Required sensors/Components	Shift solenoid valve SLU
Frequency of operation	Continuous
Duration	OFF malfunction (A): 3.5 sec. OFF malfunction (B): 0.05 sec. ON malfunction: 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
Knock sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission shift position	"D"
ECT (Engine coolant temperature)	40°C (104°F) or more
Spark advance from Max. retard timing by KCS control	0°CA or more
TFT (Transmission fluid temperature)	-10°C (14°F) or more
TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more
Torque converter clutch circuit	Circuit is not malfunctioning
ECT circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

OFF malfunction (A):

TCM lock-up command	ON
Duration time from lock-up on command	3 sec. or more
Shift solenoid valve SLU	ON malfunction not occurring

ON malfunction:

TCM lock-up command	OFF (SLU pressure: less than 4 kPa (0.04 kgf/cm ² , 0.6 psi))
Duration time from lock-up on command	0.064 sec. or more
Throttle valve opening angle	7% or more
Vehicle speed	Less than 37.3 mph (60 km/h)

TYPICAL MALFUNCTION THRESHOLDS**OFF malfunction:**

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	OFF

ON malfunction:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	Less than 35 rpm
(b) Transmission fluid pressure switch	ON

COMPONENT OPERATING RANGE

Speed sensor (NT)	Input speed is equal to engine speed when lock-up is ON.
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INSPECTION PROCEDURE**1. ACTIVE TEST****HINT:**

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

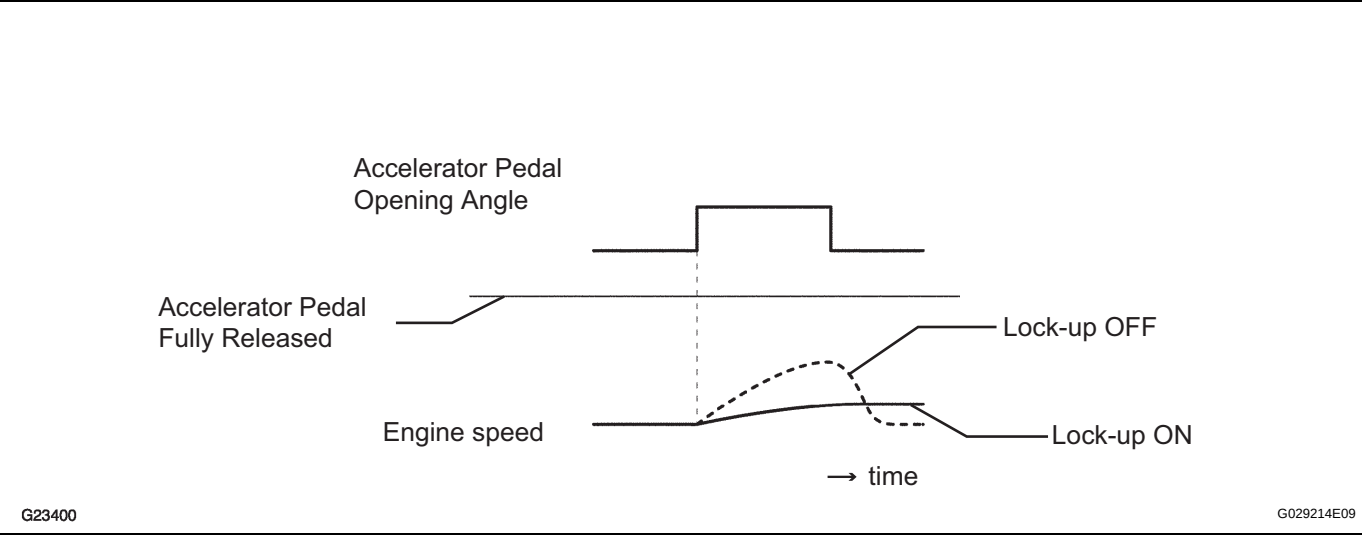
- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
- (g) According to the display on the tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] - Throttle valve opening angle: Less than 35% - Vehicle Speed: 37 mph (60 km/h) or more	Possible to check the SLU operation.

HINT:

- This test can be conducted when the vehicle speed is 37 mph (60 km/h) or more.
- This test can be conducted with the 6th gear.

- (h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



- HINT:
- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
 - Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically.)

1

CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2757)

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P2757" is output	A
"P2757" and other DTCs	B

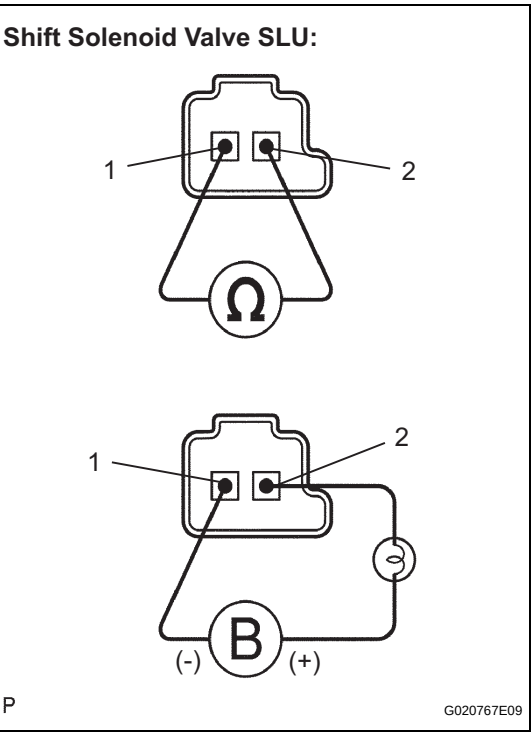
HINT:
If any other codes besides "P2757" are output, perform troubleshooting for those DTCs first.

A

B

GO TO DTC CHART

2 INSPECT SHIFT SOLENOID VALVE SLU



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG

REPLACE SHIFT SOLENOID VALVE SLU

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG

REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Check the torque converter clutch assembly (See page [AX-248](#)).

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

AX

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)
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DESCRIPTION

Refer to DTC P2714 (See page [AX-133](#)).

DTC No.	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1-trip detection logic).	- Open or short in shift solenoid valve SLT circuit - Shift solenoid valve SLT - TCM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the TCM interprets this as a fault. The TCM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/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 CONDITIONS**ALL:**

The monitor will run whenever this DTC is not present	None
Solenoid current cut status	Not cut
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	10 V to 12 V
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Malfunction (B):

Battery voltage	10 V or more and less than 12 V
Target current	0.75 A

Malfunction (C):

Battery voltage	8 V or more
Target current	1 A

Malfunction (D):

Battery voltage	11 V or more
Target current	1 A or more

Malfunction (E):

Battery voltage	11 V or more
Target current	0.1 A or more
Commanded voltage - Last commanded voltage	Less than 0.02 V

TYPICAL MALFUNCTION THRESHOLDS

Malfunction (A) and (B):

Output signal duty	100% or more
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Malfunction (C):

Output signal duty	0% or less
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Malfunction (D):

Output signal monitor	No signal
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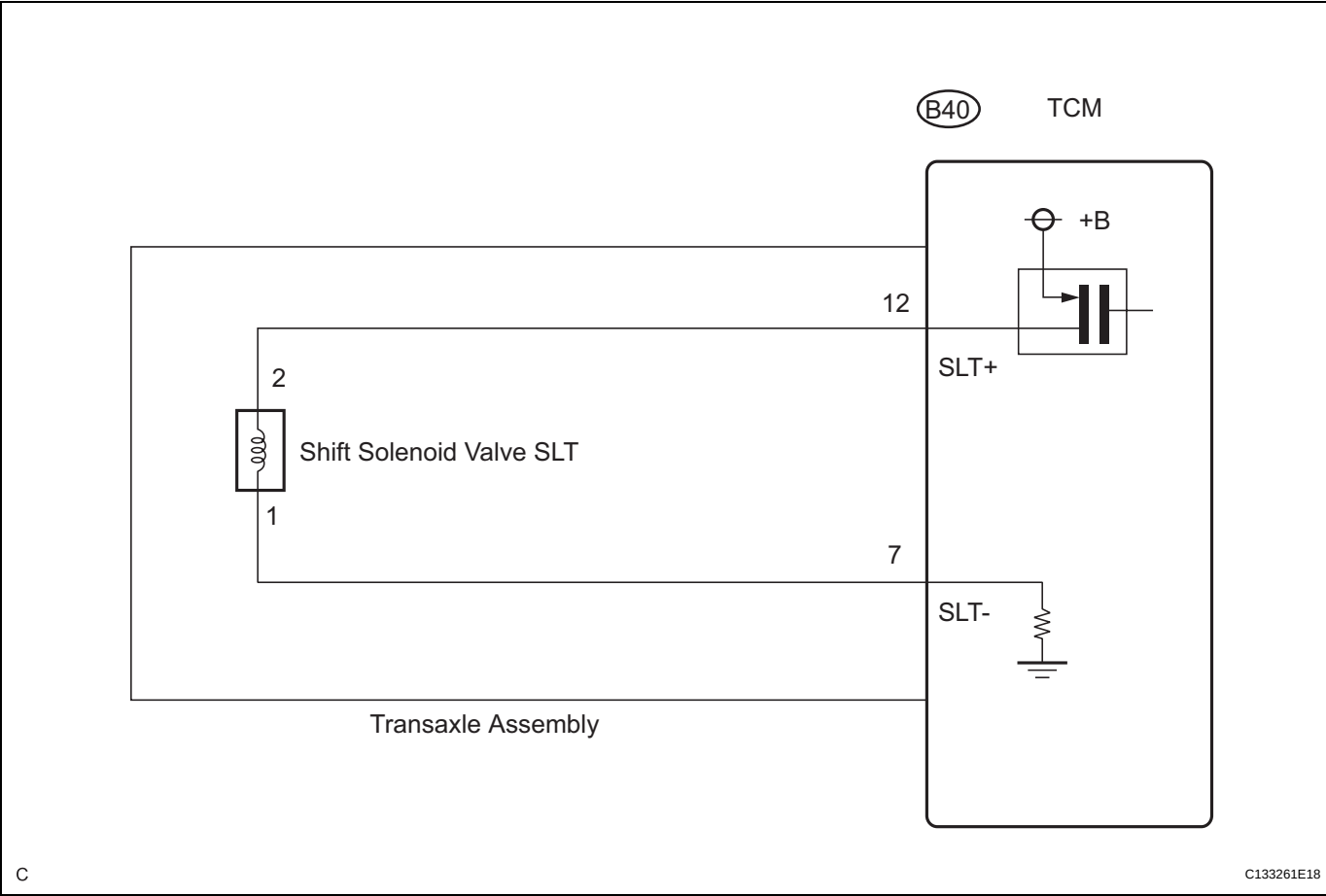
Malfunction (E):

Commanded voltage - Last commanded voltage	0.02 V or more
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COMPONENT OPERATING RANGE

Output signal duty	Less than 100%
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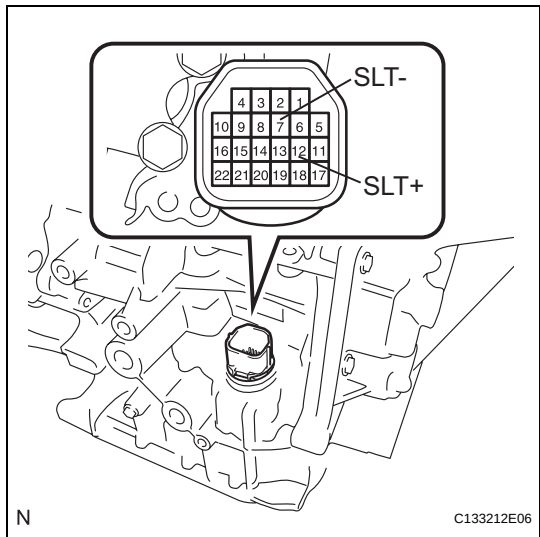
WIRING DIAGRAM



AX

INSPECTION PROCEDURE

1INSPECT TRANSMISSION WIRE (SLT)



- (a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
12 (SLT+) - 7 (SLT-)	5.0 to 5.6 Ω

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

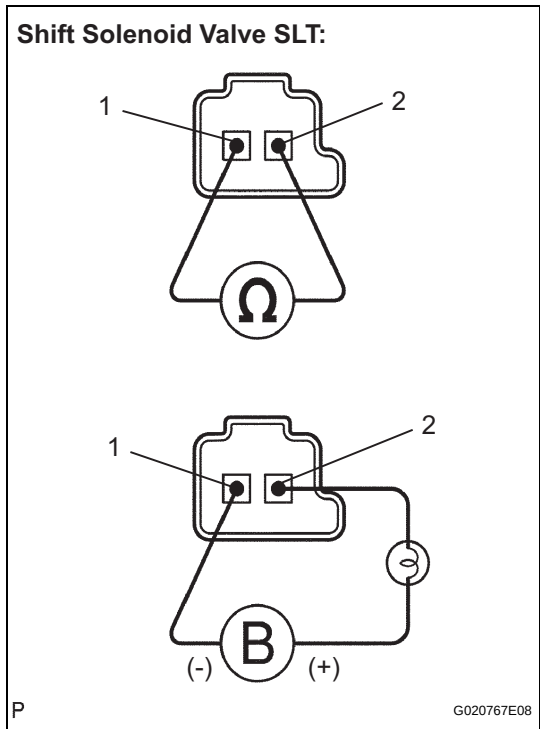
Standard resistance:
Check for short

Tester Connection	Specified Condition
12 (SLT+) - Body ground	10 kΩ or higher
7 (SLT-) - Body ground	10 kΩ or higher

OKREPLACE TCM

NG

2INSPECT SHIFT SOLENOID VALVE SLT



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating sound.

NGREPLACE SHIFT SOLENOID VALVE SLT

OK

REPLACE TRANSMISSION WIRE

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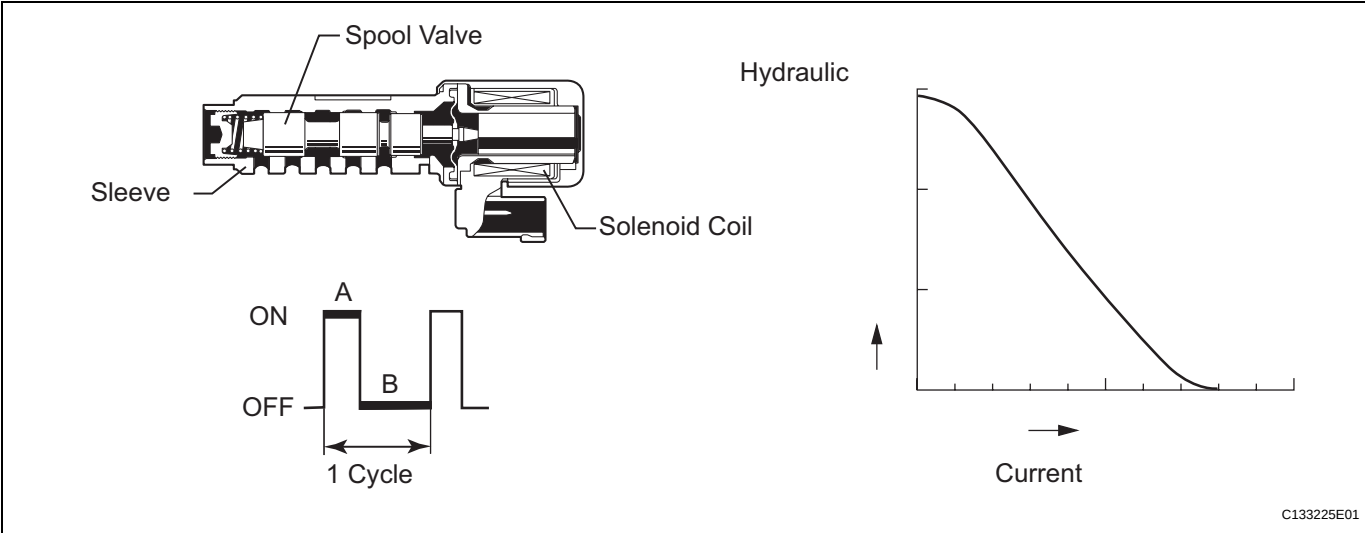
SYSTEM DESCRIPTION

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 TCM adjusts the duty ratio (*) of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

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

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



DTC No.	DTC Detection Condition	Trouble Area
P2714	The ECM detects a malfunction in the shift solenoid valve SLT (ON side) according to the difference in the speed between the turbine and the output shaft, and also by the transmission fluid pressure. (2-trip detection logic)	- Shift solenoid valve SLT (open) - Shift solenoid valve SL1, SL2, SL3 or SL4 (open or closed) - Valve body (blocked) - Automatic transaxle (clutch, brake or gear, etc.)

AX

MONITOR DESCRIPTION

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

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

NOTICE:

If driving continues under these conditions, the clutches will burn out and the vehicle will no longer be drivable.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ON malfunction:

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
TFT sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLT circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission range	"D"
Engine	Starting
TFT	-10°C (5°F) or more
Input turbine torque	100 N*m or more
Turbine speed	250 rpm or more
Output speed	250 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

ON malfunction:

Detection criteria	Threshold
Turbine speed - Output speed x Gear ratio at output speed 1,000 rpm (Condition varies with output speed)	75 rpm or more

INSPECTION PROCEDURE

AX

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

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and turn the intelligent tester on.
- Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- Read the DTCs using the intelligent tester.

Result

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

HINT:

If a solenoid is stuck ON, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A
INSPECT SHIFT SOLENOID VALVE SLT
B

2

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

NOTICE:

- Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F)
- Be sure to prevent SST hose from interfering with the exhaust pipe.
- This check must be conducted after checking and adjusting the engine.
- Perform the test with the A/C OFF.

HINT:

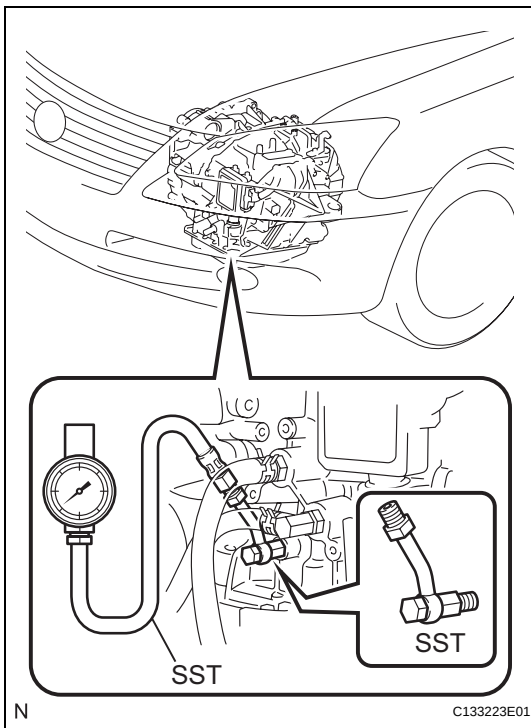
Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

- Turn the engine switch off.
- Lift the vehicle up.
- Remove the test plug on the transmission case center right side and connect SST.

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

- Lower the vehicle.
- Fully apply the parking brake and chock the 4 wheels.
- Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- Start the engine.
- Warm up the ATF (Automatic Transmission Fluid).
- Measure the line pressure when the engine is idling.
- Turn on the tester.
- Enter the following items: DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SOLENOID (SLT)".
- Follow the instructions on the tester and perform the ACTIVE TEST.
- Measure the line pressure with SST.



AX

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

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check that the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used in the HYDRAULIC TEST (See page [AX-16](#)) as well.

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

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

OK

NG Go to step 5

3 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFTING TEST)

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

HINT:
Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.
The DATA LIST can be displayed during the ACTIVE TEST.

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Start the engine.
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
- (g) Follow the instructions on the tester and read the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] - IDL: ON [Others] - Press "→" button: Shift up - Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:

- This test can be conducted when the vehicle is stopped.
- When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.

HINT:

The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

- (h) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:

Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gears, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

- (i) Compare the TCM gear shift command and the actual gear position.

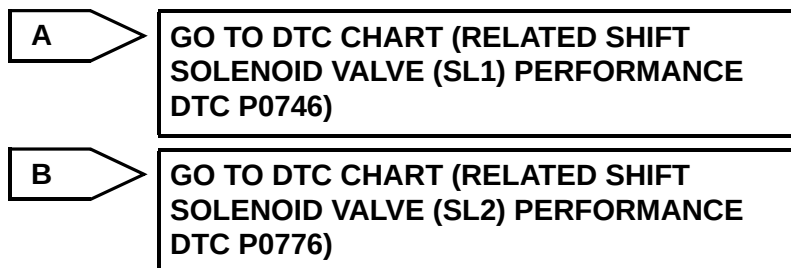
Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N ^{*1}	N ^{*1}	N ^{*1}	N ^{*1}	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N ^{*1}	N ^{*1}	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N ^{*1}	
Shift solenoid SL4	Stuck ON ^{*3}	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N ^{*1}	6th	
Shift solenoid SLT	Stuck ON	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	E
	Stuck OFF ^{*3}	1st	2nd	3rd	4th	5th	6th	

AX

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When the shift solenoid SLT is stuck OFF, gear shifting is normal.



C

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

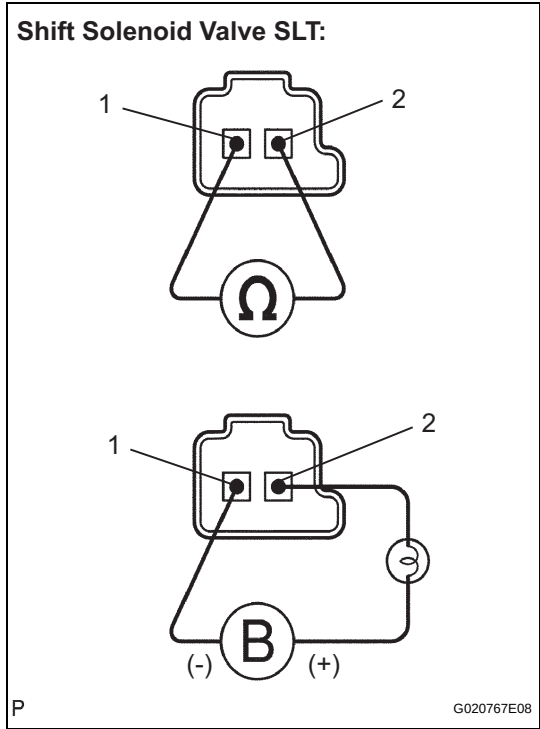
D

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

E

4

INSPECT SHIFT SOLENOID VALVE SLT



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG

REPLACE SHIFT SOLENOID VALVE SLT

OK

5

INSPECT TRANSMISSION VALVE BODY ASSEMBLY

- OK:
- There are no foreign objects on each valve.

NG

REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

6

INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

- (a) Check the torque converter clutch assembly (See page [AX-248](#)).

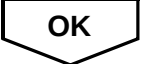
OK:

The torque converter clutch operates normally.



NG

REPLACE TORQUE CONVERTER CLUTCH
ASSEMBLY



OK

REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

DTC	P0989	Transmission Fluid Pressure Switch No.3 Circuit Low
DTC	P0990	Transmission Fluid Pressure Switch No.3 Circuit High

DESCRIPTION

ATF pressure switch No. 3 is installed in the lock-up solenoid ATF output passage and is used to detect a malfunction in the lock-up solenoid.

DTC No.	DTC Detection Condition	Trouble Area
P0989	Transmission fluid pressure switch No. 3 is OFF when lock-up occurs in response to a lock-up request (2 trip detection logic).	- ATF temperature sensor assembly (ATF pressure switch No. 3) - Transmission wire - TCM
P0990	When both of the following are detected (2 trip detection logic): - Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. - Lock-up does not occur when shift solenoid valve (SLU) is requested to turn off in the lock-up range.	

MONITOR DESCRIPTION

The TCM illuminates the MIL and stores the DTC when the TCM detects that the ATF pressure switch is OFF with the lock-up solenoid ON or when the TCM detects that the ATF pressure switch is ON with the lock-up solenoid OFF.

MONITOR STRATEGY

Related DTCs	P0989: Transmission fluid pressure switch No. 3 OFF malfunction P0990: Transmission fluid pressure switch No. 3 ON malfunction
Required sensors/Components	Transmission fluid pressure switch No. 3
Frequency of operation	Continuous
Duration	P0989: 1.8 sec., P0990: 1.2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
Knock sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission shift position	"D"
ECT (Engine coolant temperature)	40°C (104°F) or more
Spark advance from Max. retard timing by KCS control	0°CA or more
TFT (Transmission fluid temperature)	-10°C (14°F) or more

TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more
Torque converter clutch circuit	Circuit is not malfunctioning
ECT circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

P0989:

TCM lock-up command	ON
Engine speed - Turbine speed	Less than 20 rpm
Throttle valve opening angle	7% or more
Vehicle speed	Less than 62 mph (100 km/h)
Shift solenoid valve SLU	Not ON malfunction

P0990:

TCM indicated pressure valve of SLU	Less than 4 kPa
TCM lock-up command	OFF
Shift solenoid valve SLU	Not malfunction
Shift solenoid valve SL	Not OFF malfunction

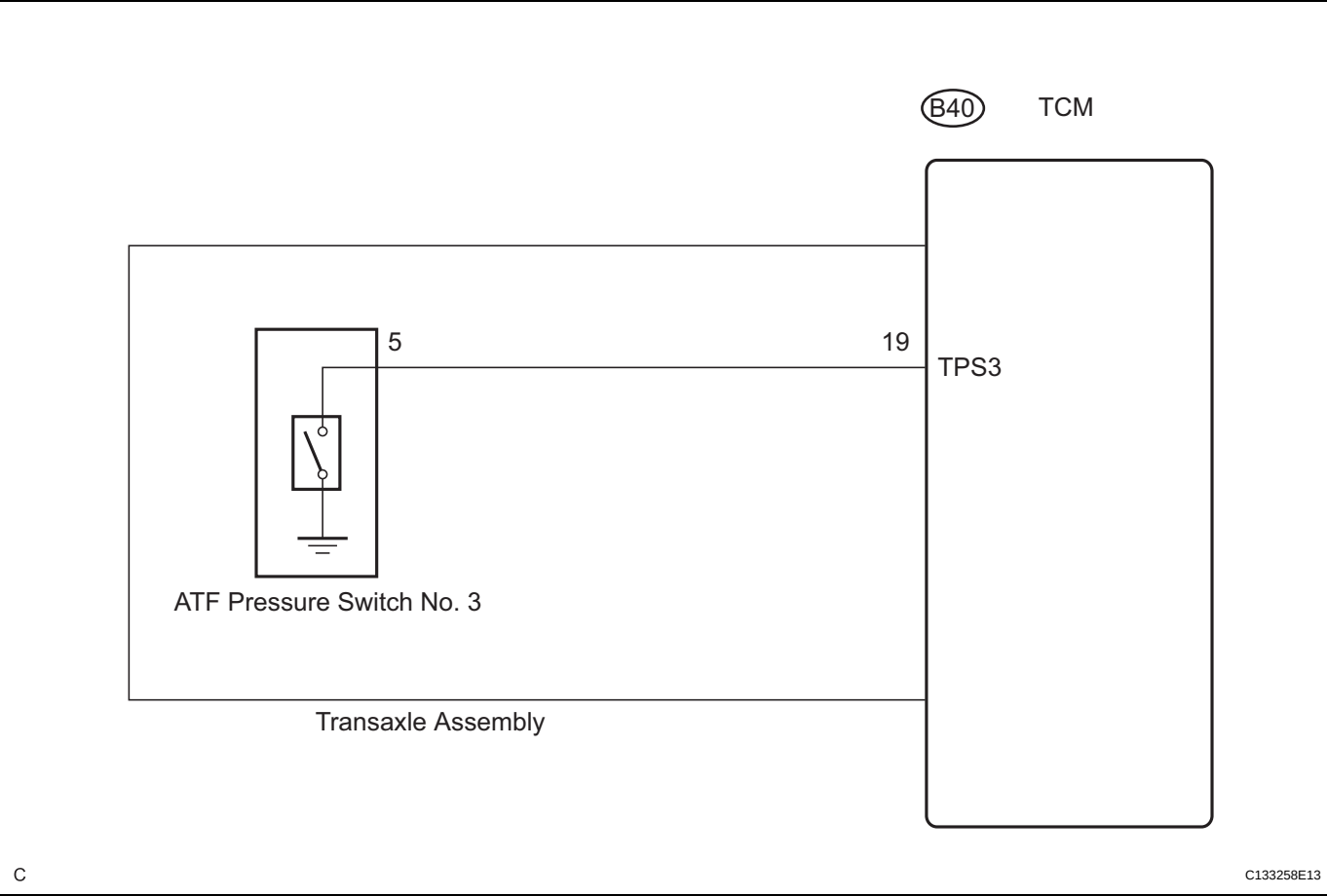
TYPICAL MALFUNCTION THRESHOLDS**P0989:**

Transmission fluid pressure switch No. 3	OFF
--	-----

P0990:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	20 rpm or more
(b) Transmission fluid pressure switch No. 3	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0989 OR P0990)

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0990" is output	A
Only "P0989" is output	B
"P0989 or P0990" and other DTCs	C

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B

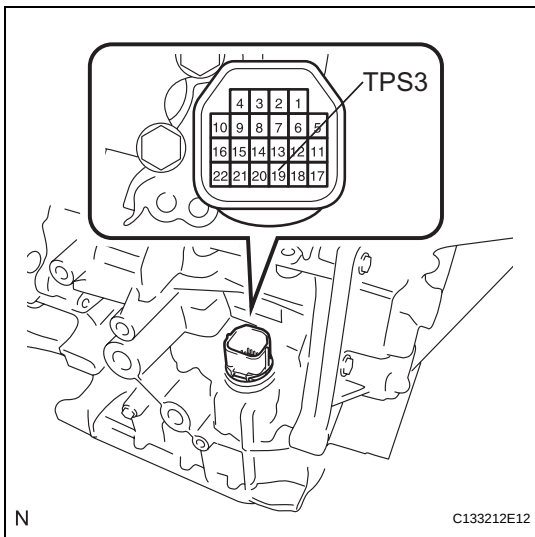
Go to step 4

C

GO TO DTC CHART

A

2 CHECK TRANSMISSION WIRE (SHORT TO GROUND)



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

Standard resistance

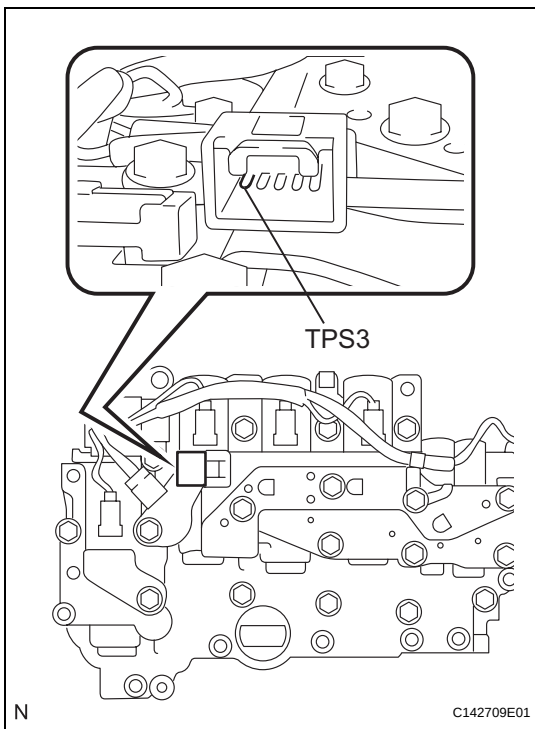
Tester Condition	Specified Condition
19 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

OK

REPLACE TCM

NG

3 CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 3)



- (a) Disconnect the connector from the ATF temperature sensor assembly.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
5 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

NG

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

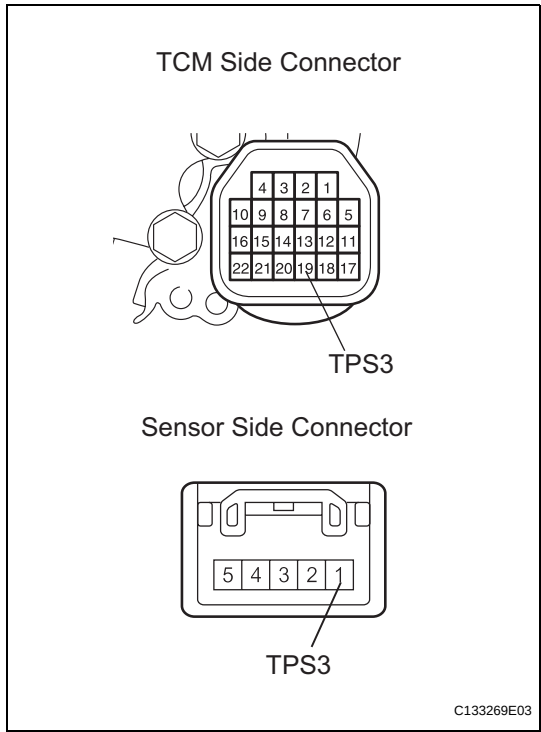
OK

REPLACE TRANSMISSION WIRE

AX

4

CHECK TRANSMISSION WIRE



- (a) Remove the TCM.
- (b) Disconnect the connector from the ATF temperature sensor assembly.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
19 (TPS3) - 1 (TPS3)	Below 1 Ω
19 (TPS3) or 1 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

NG

REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

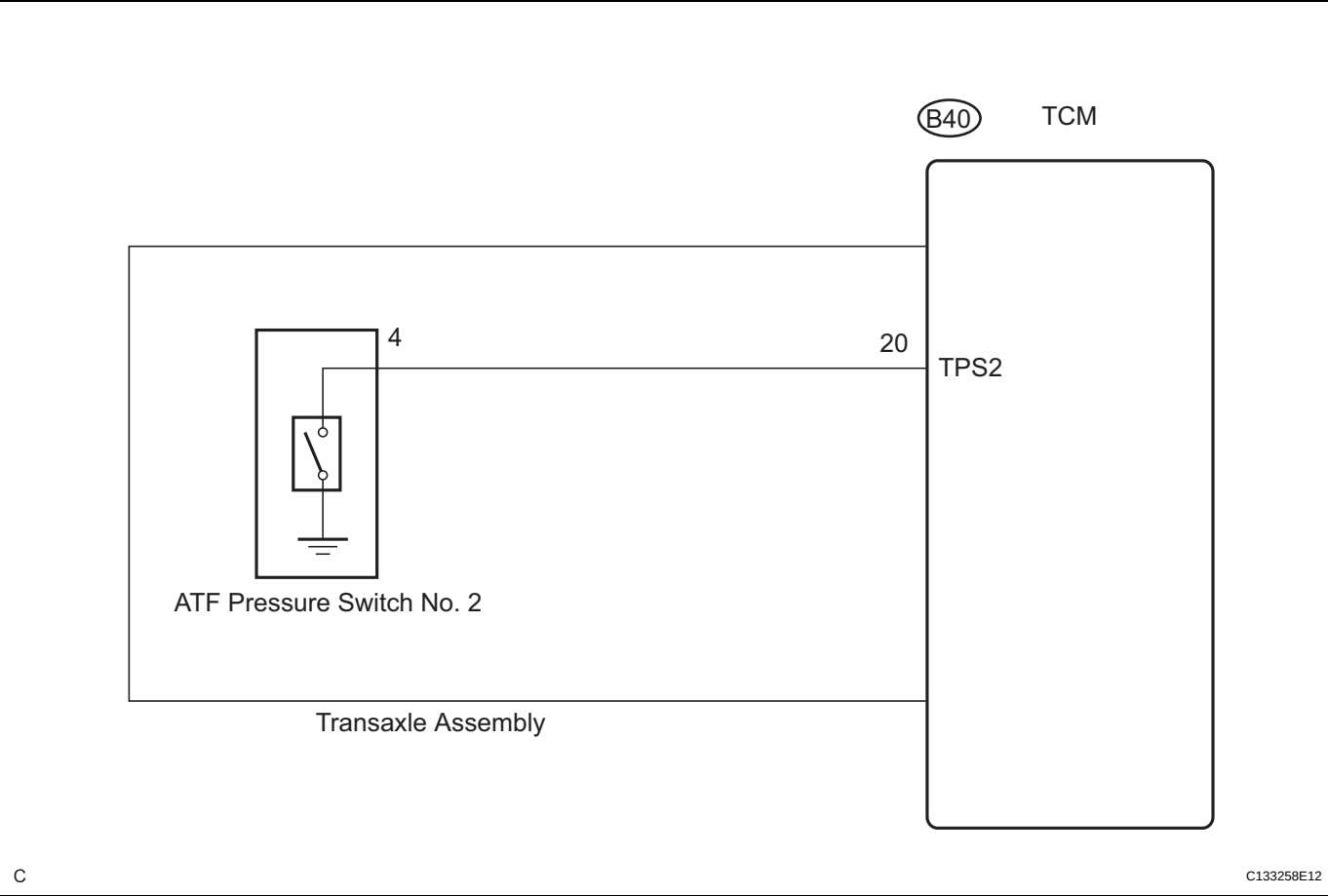
DTC	P0877	Transmission Fluid Pressure Switch No.2 Circuit Low
DTC	P0878	Transmission Fluid Pressure Switch No.2 Circuit High

DESCRIPTION

ATF pressure switch No. 2 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0877	ATF pressure switch No. 2 OFF is detected twice when any of the gears from 4th to 6th engages normally.	- ATF temperature sensor assembly (ATF pressure switch No. 2) - Transmission wire - TCM
P0878	ATF pressure switch No. 2 ON is detected twice when any of the gears from 1st to 3rd engages normally.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0877 OR P0878)

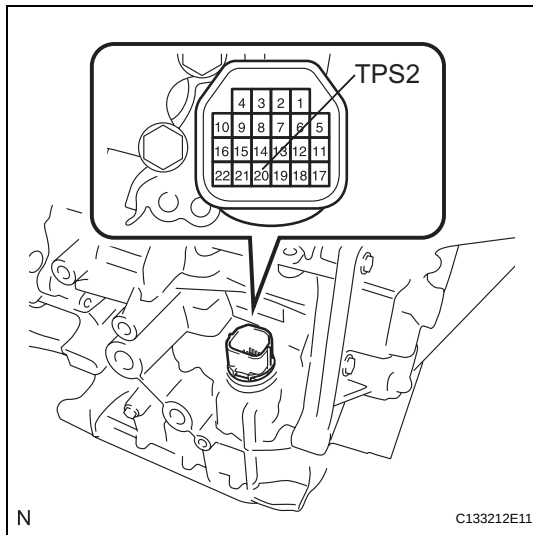
- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0878" is output	A
Only "P0877" is output	B
"P0877 or P0878" and other DTCs	C

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B**Go to step 4****C****GO TO DTC CHART****A****2 CHECK TRANSMISSION WIRE (SHORT TO GROUND)**

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

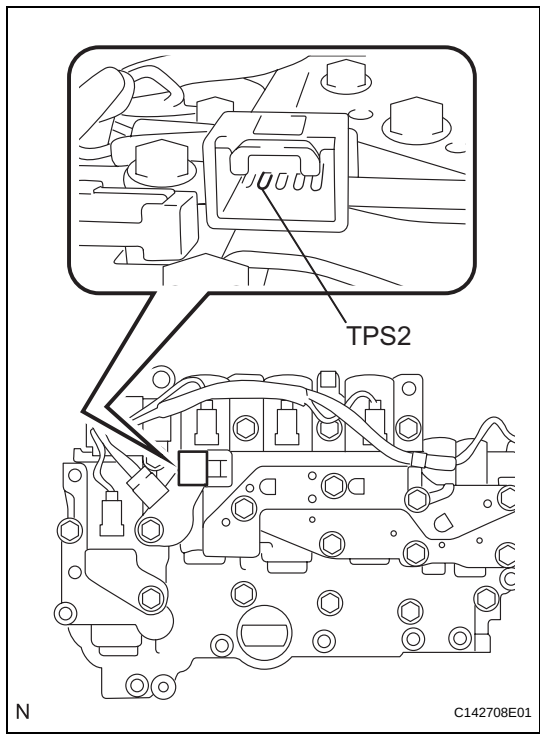
Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

OK**REPAIR OR REPLACE TCM****NG****AX**

3

CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 2)



- (a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
4 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

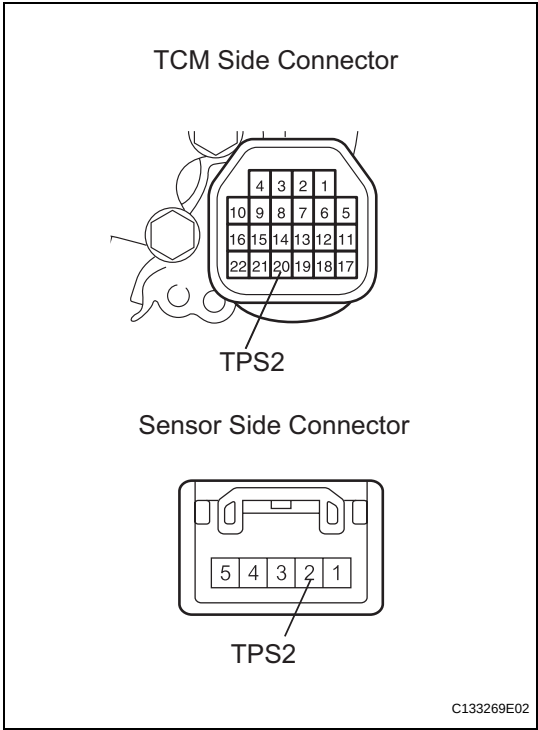
NG

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

OK

REPLACE TRANSMISSION WIRE

4 CHECK TRANSMISSION WIRE



- (a) Remove the TCM.
- (b) Disconnect the connector from the ATF temperature sensor assembly.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - 2 (TPS2)	Below 1 Ω
20 (TPS2) or 2 (TPS2) - Body ground (Valve body assembly)	10 k Ω or higher

NG

REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

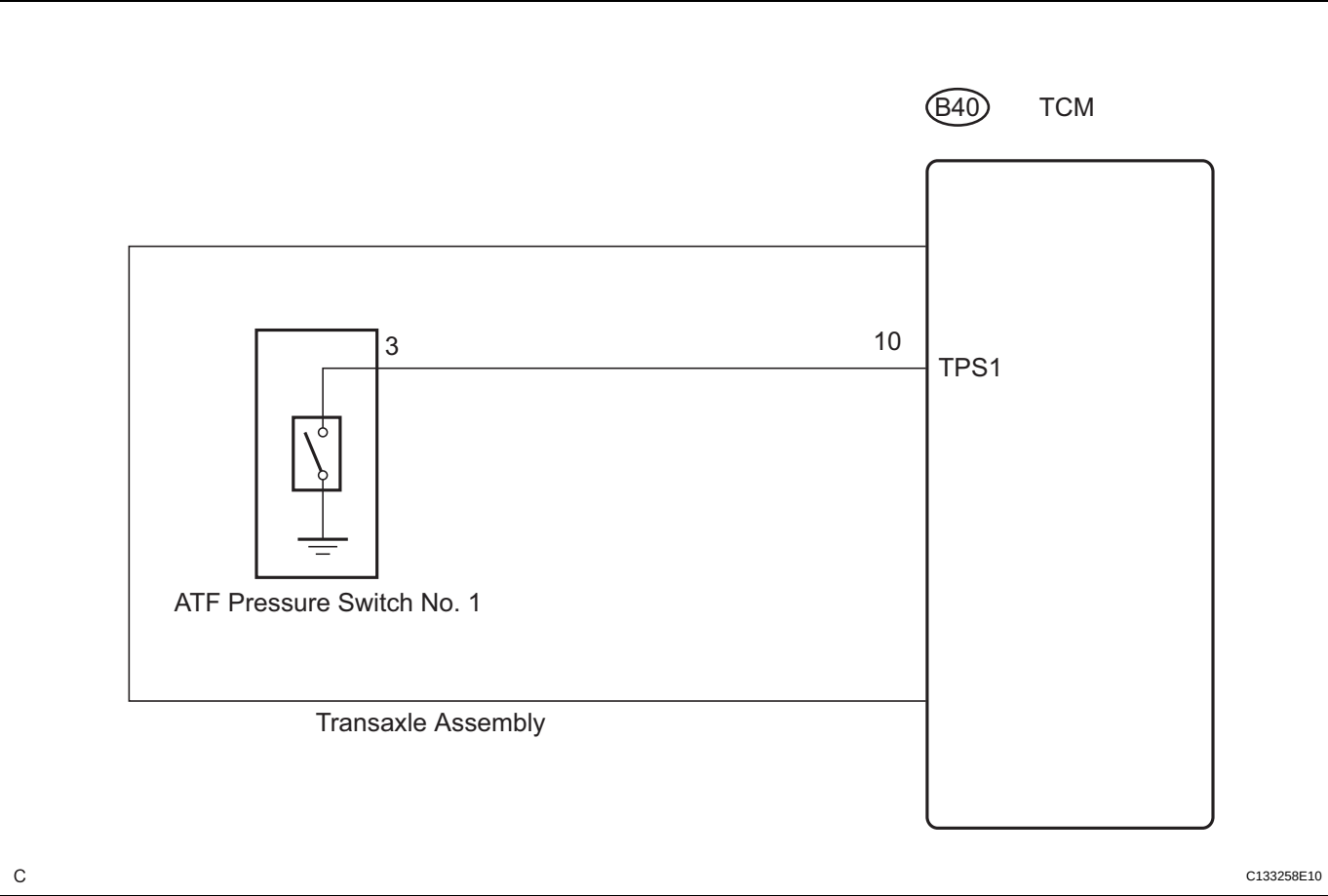
DTC	P0872	Transmission Fluid Pressure Switch No.1 Circuit Low
DTC	P0873	Transmission Fluid Pressure Switch No.1 Circuit High

DESCRIPTION

ATF pressure switch No. 1 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0872	ATF pressure switch No. 1 OFF is detected twice when any of the gears from 1st to 4th engages normally.	- ATF temperature sensor assembly (ATF pressure switch No. 1) - Transmission wire - TCM
P0873	ATF pressure switch No. 1 ON is detected twice when 5th or 6th gear engages normally.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0872 OR P0873)

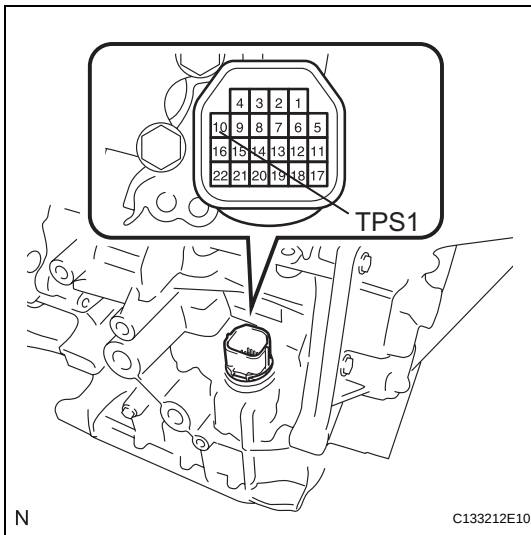
- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0873" is output	A
Only "P0872" is output	B
"P0872 or P0873" and other DTCs	C

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B**Go to step 4****C****GO TO DTC CHART****A****2 CHECK TRANSMISSION WIRE (SHORT TO GROUND)**

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

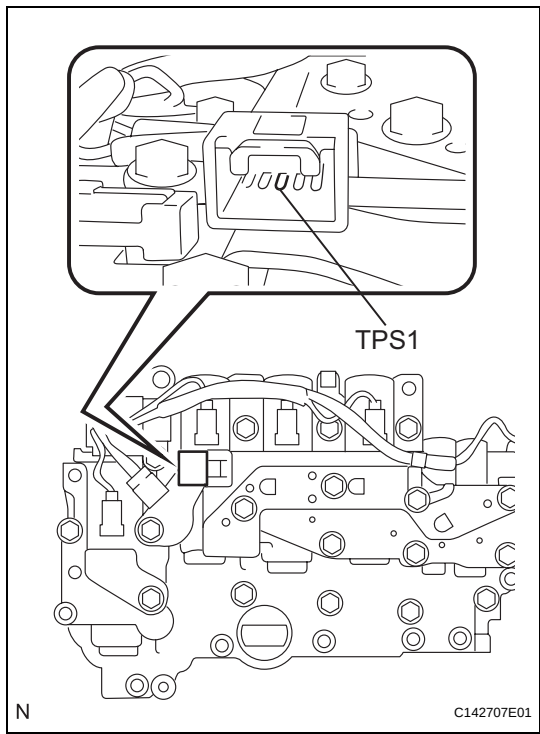
Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - Body ground (Valve body assembly)	10 k Ω or higher

OK**REPLACE TCM****NG****AX**

3

CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 1)



- (a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
3 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

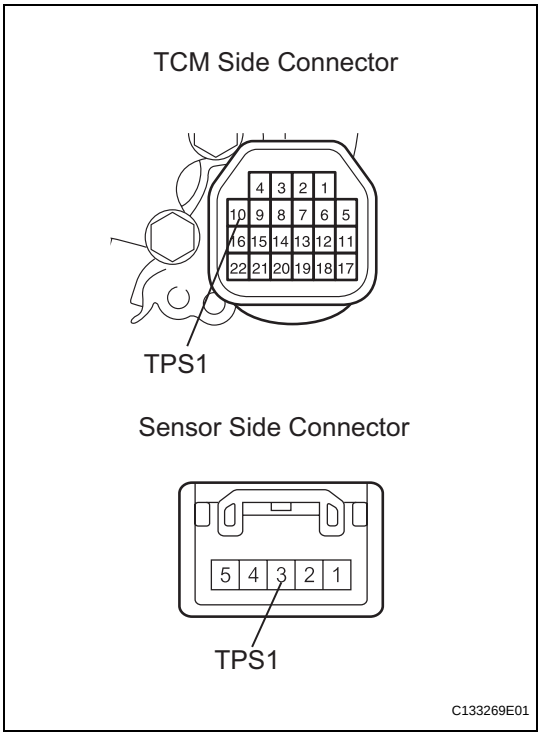
NG

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

OK

REPLACE TRANSMISSION WIRE

4 CHECK TRANSMISSION WIRE



- (a) Remove the TCM.
- (b) Disconnect the connector from the ATF temperature sensor assembly.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - 3 (TPS1)	Below 1 Ω
10 (TPS1) or 3 (TPS1) - Body ground (Valve body assembly)	10 k Ω or higher

NG

REPLACE TRANSMISSION WIRE

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

DTC	P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)
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DESCRIPTION

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P0798	The TCM checks for an open or short in the shift solenoid valve SL3 circuit while driving and shifting gears. (1-trip detection logic) Output signal duty equals 100%. (NOTE: SL3 output signal duty is less than 100% under normal condition.)	- Open or short in shift solenoid valve SL3 circuit - Shift solenoid valve SL3 - TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page [AX-38](#))

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

AX**TYPICAL ENABLING CONDITIONS****ALL:**

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more
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Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

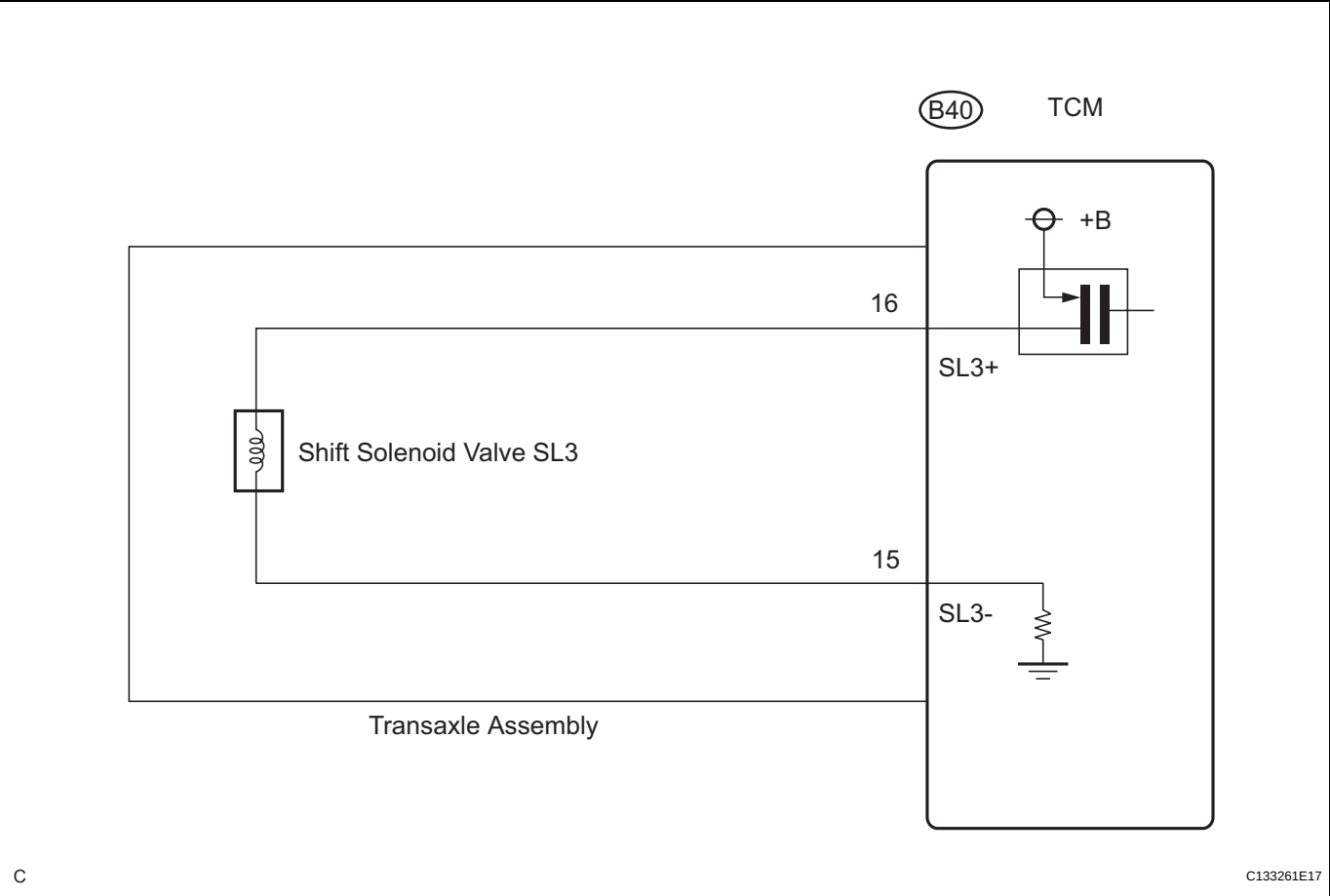
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%
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COMPONENT OPERATING RANGE

Output signal duty	Less than 100%
--------------------	----------------

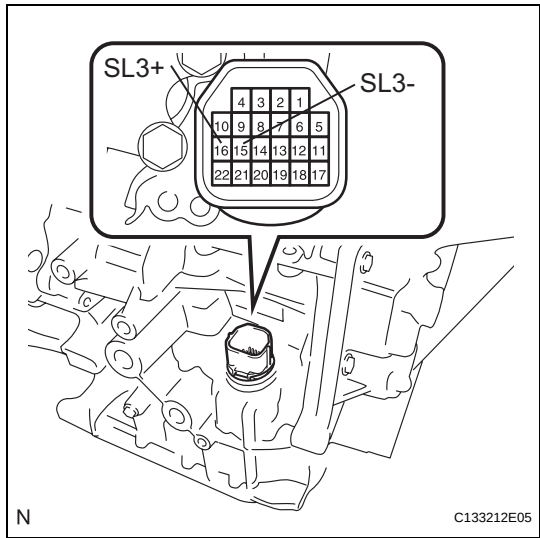
WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1 INSPECT TRANSMISSION WIRE (SL3)



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
16 (SL3+) - 15 (SL3-)	5.0 to 5.6 Ω

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

Standard resistance:
Check for short

Tester Connection	Specified Condition
16 (SL3+) - Body ground	10 kΩ or higher
15 (SL3-) - Body ground	10 kΩ or higher

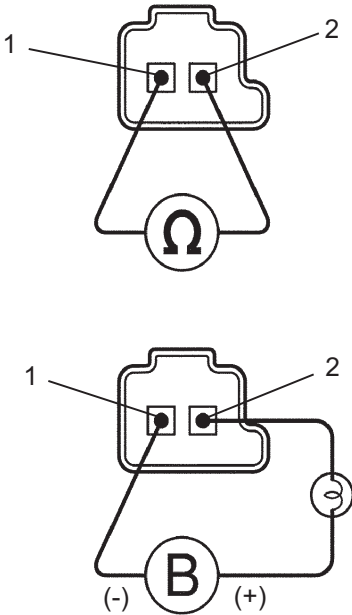
OK

REPLACE TCM

NG

2 INSPECT SHIFT SOLENOID VALVE (SL3)

Shift Solenoid Valve SL3:



- (a) Remove the shift solenoid valve SL3.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE (SL3)

OK

REPLACE TRANSMISSION WIRE

DTC	P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)
------------	--------------	---

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).

Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0796	The engine revs freely when 2nd or 6th gear is requested (2-trip detection logic). When the following is detected twice (2-trip detection logic): When 1st gear is requested, 2nd gear is engaged.	- Shift solenoid valve SL3 (open or closed) - Valve body (blocked) - Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0796: Shift solenoid valve SL3/OFF malfunction Shift solenoid valve SL3/ON malfunction
Required sensors/Components	Shift solenoid valve SL3, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) and (B) 0.5 sec. OFF malfunction (C) and (D) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (-14°F)
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning

Electronic throttle system	Circuit is not malfunctioning
----------------------------	-------------------------------

OFF malfunction (A):

TCM selected gear	2nd
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	1,200 kPa
TCM indicated pressure value of SL2	0 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (B):

TCM selected gear	6th
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	0 kPa
TCM indicated pressure value of SL2	1,200 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (C):

TCM selected gear	2nd
Throttle valve opening angle:	
(When condition "D" is not detected)	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
(When condition "D" is detected)	0.5% or more at engine speed 500 rpm (condition varies with engine speed)
ECT (engine coolant temperature)	40°C (104°F) or more

OFF malfunction (D):

Throttle valve opening angle	0.5% or more at engine speed 500 rpm (condition varies with engine speed)
------------------------------	---

ON malfunction:

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) or more
Engine speed - Turbine speed	50 rpm or more
ECT (engine coolant temperature)	Above 40°C (104°F)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) or (B) or ((C) and (D)), or ON malfunctions

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A):

Turbine speed - Output speed x 2nd gear ratio	1,000 rpm or more
---	-------------------

OFF malfunction (B):

Turbine speed - Output speed x 6th gear ratio	1,000 rpm or more
---	-------------------

OFF malfunction (C):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724
--	----------------

OFF malfunction (D):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724
--	----------------

ON malfunction:

Input (turbine) speed/Intermediate shaft speed	1.901 to 2.340
--	----------------

INSPECTION PROCEDURE

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0796)

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0796" is output	A
"P0796" and other DTCs	B

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A**Go to step 3****B****2 PERFORM ACTIVE TEST BY INTELLIGENT TESTER****NOTICE:**

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

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

HINT:

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page [AX-38](#)).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:

- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:

The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

- (d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:

Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gears, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

- (e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N ^{*1}	N ^{*1}	N ^{*1}	N ^{*1}	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N ^{*1}	N ^{*1}	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N ^{*1}	
Shift solenoid SL4	Stuck ON ^{*3}	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N ^{*1}	6th	
Shift solenoid SLT	Stuck ON	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	E
	Stuck OFF ^{*3}	1st	2nd	3rd	4th	5th	6th	

HINT:

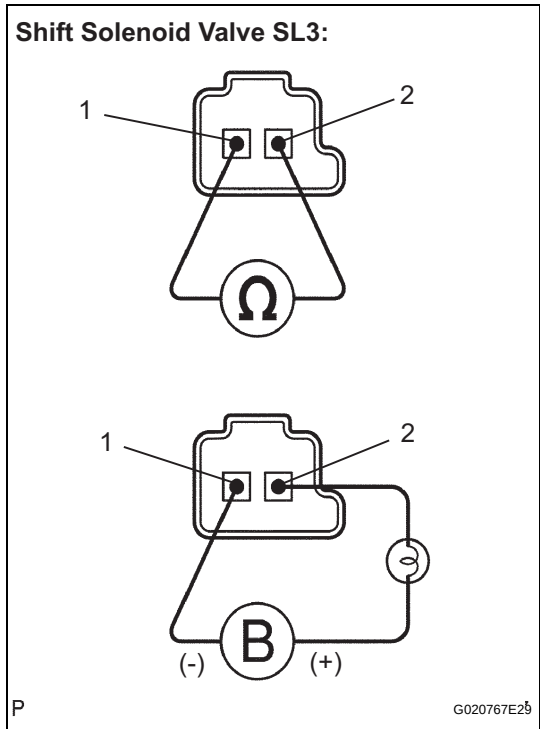
- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)
B	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)
D	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)
E	GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

C

3

INSPECT SHIFT SOLENOID VALVE (SL3)



- (a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE (SL3)

OK

4

INSPECT TRANSMISSION VALVE BODY ASSEMBLY

AX

OK:
There are no foreign objects on each valve and they operate smoothly.

NG

REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

5

INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:
The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

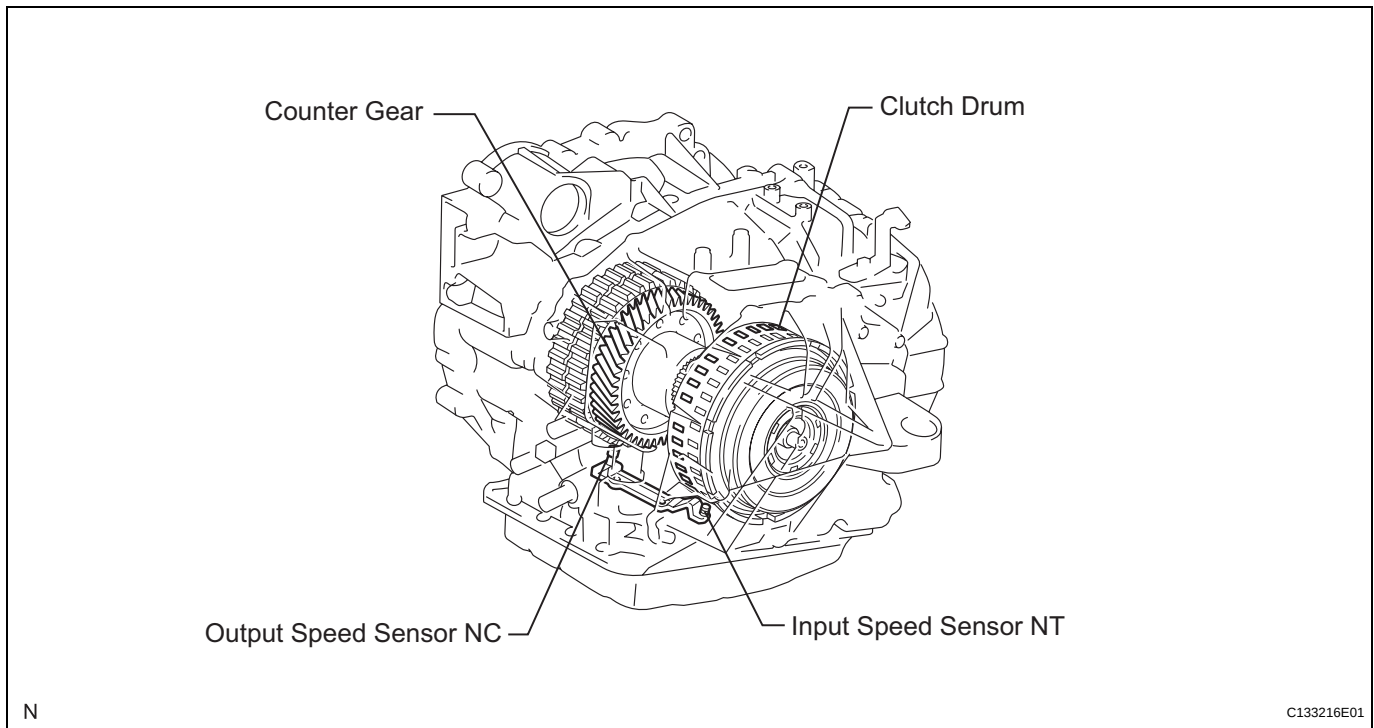
OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0791	Intermediate Shaft Speed Sensor "A" Circuit
DTC	P0793	Intermediate Shaft Speed Sensor "A"

DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input speed of transaxle. By comparing the input turbine speed signal (NC) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



DTC No.	DTC Detection Condition	Trouble Area
P0791	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 2 seconds or more.	- Transmission revolution sensor (speed sensor NC) - TCM
P0793	When the vehicle speed is 15.5 mph (25 km/h) or higher, the counter gear speed is less than 300 rpm for 2 seconds or more.	

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm ^{*1} although the output shaft revolution is more than 1,000 rpm ^{*2}, the TCM interprets this as a fault, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 31 mph (50 km/h) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT) /Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous

Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Vehicle speed	15.5 mph (25 km/h) or more
Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

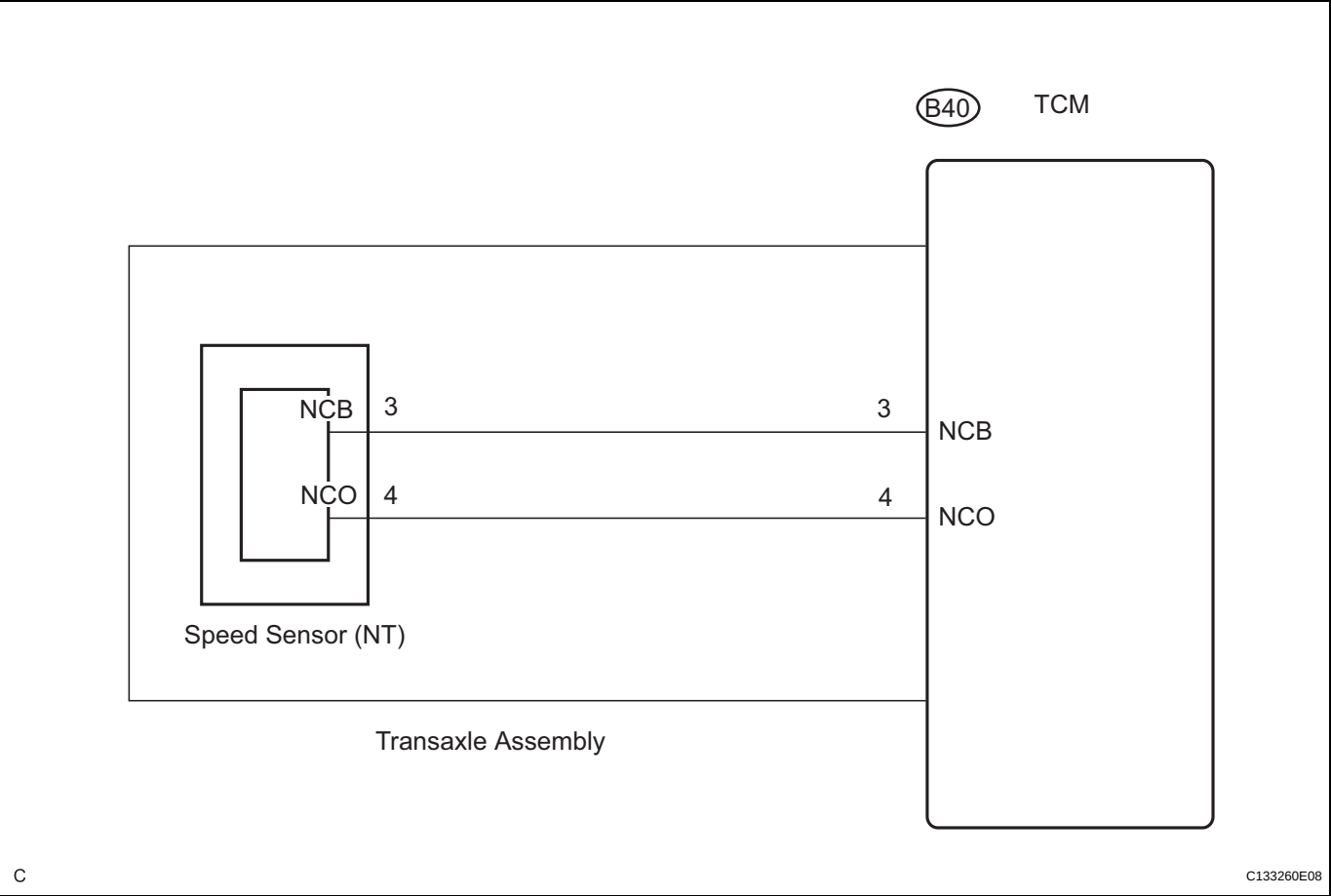
P0791:

Sensor voltage	Less than 0.1 V or more than 1.9 V
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P0793:

Sensor signal rpm	Less than 300 rpm
-------------------	-------------------

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / ENHANCED OBD / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

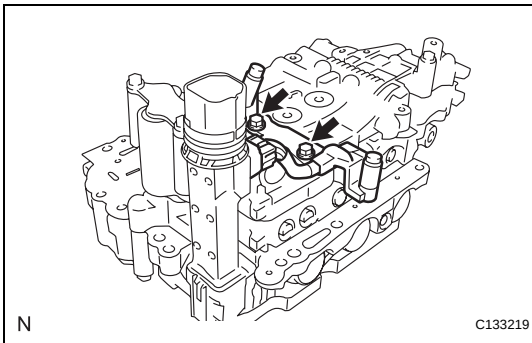
Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	HINT: - Lock-up ON (after warming up the engine); input turbine speed (NC) is equal to the engine speed. - Lock-up OFF (Idling at N position); input turbine speed (NC) is nearly equal to the engine speed.

HINT:

- SPD (NC) is always 0 while driving: Open or short in the sensor or circuit.
- SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 31 mph (50 km/h) or more: Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1

INSPECT SPEED SENSOR (SENSOR INSTALLATION)



- (a) Make sure that the connector is properly connected, and check the speed sensor installation.

OK:

The installation bolts are tightened properly and there is no clearance between the sensor and transaxle case.

NG

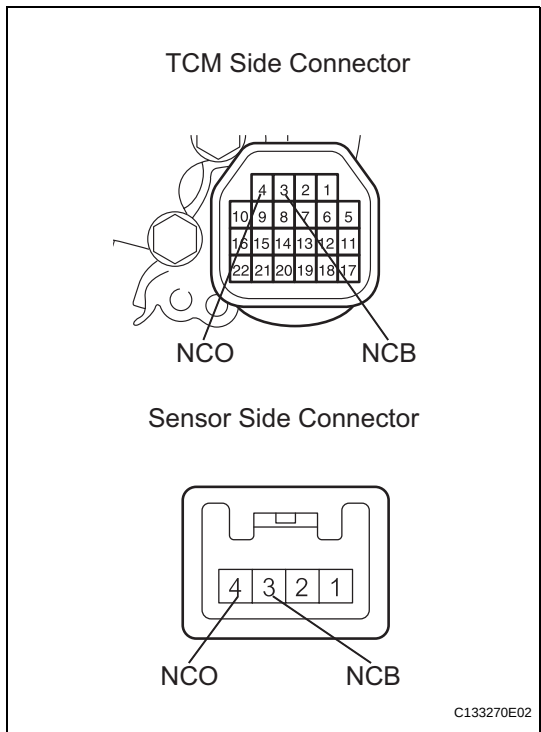
REPAIR OR REPLACE SPEED SENSOR

OK

AX

2

CHECK TRANSMISSION WIRE



- (a) Remove the TCM.
 - (b) Disconnect the speed sensor connector from the transmission wire.
 - (c) Measure the resistance according to the value(s) in the table below.
- Standard resistance**

Tester Condition	Specified Condition
NCO - NCO	Below 1 Ω
NCB - NCB	Below 1 Ω
NCO - NCB	10 kΩ or higher

NG

REPLACE TRANSMISSION WIRE

OK

3

REPLACE SPEED SENSOR

NEXT

4

CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0791 AND/OR P0793 IS OUTPUT AGAIN)

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester main switch ON.
- (c) Perform the monitor drive pattern (See page [AX-26](#)).
- (d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0791 or P0793" is output	A
No output	B

B

END

A

REPLACE TCM

DTC	P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)
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DESCRIPTION

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page [AX-38](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0778	The TCM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears. (1-trip detection logic) Output signal duty equals to 100%. (NOTE: SL2 output signal duty is less than 100% under normal condition.)	- Open or short in shift solenoid valve SL2 circuit - Shift solenoid valve SL2 - TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any of the shift solenoid valve circuits, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)

While driving and shifting gears, if the TCM detects an open or short in the shift solenoid valve SL2 circuit, the TCM determines there is a malfunction (See page [AX-38](#)).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more
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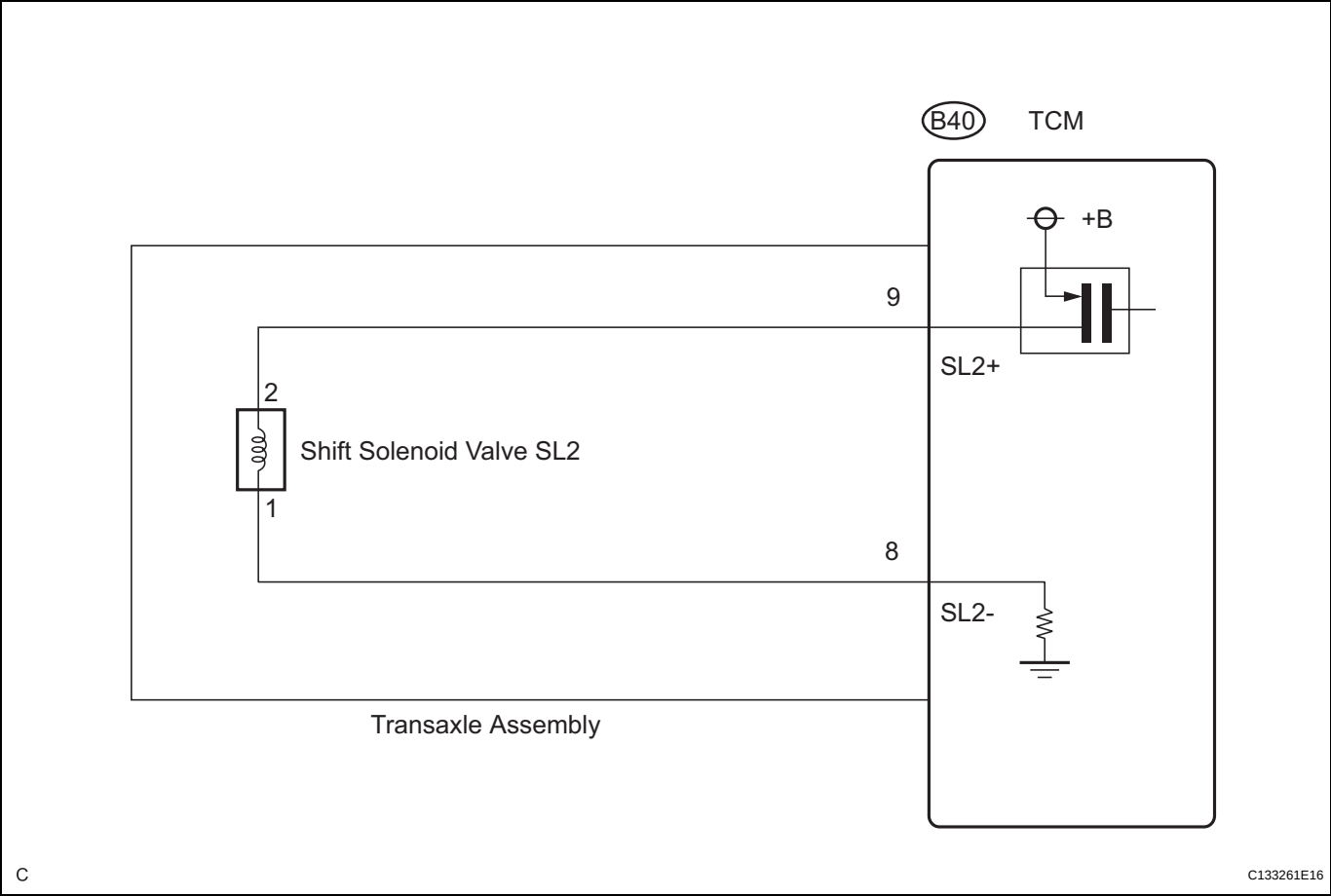
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more
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WIRING DIAGRAM



INSPECTION PROCEDURE

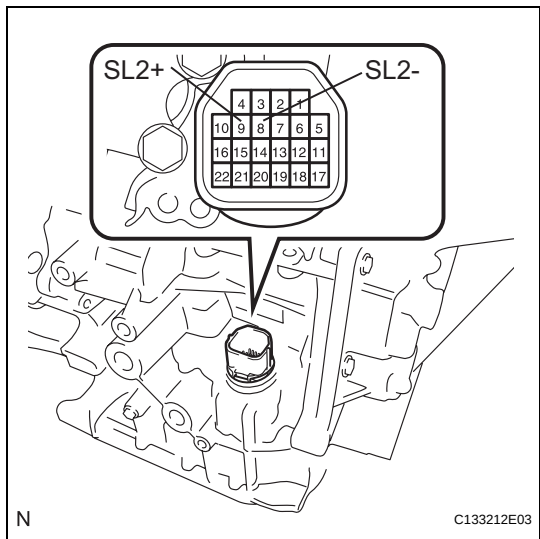
HINT:

The shift solenoid valve SL2 is turned on or off automatically when the shift lever is in the D position:

TCM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL2	OFF	OFF	OFF	ON	ON	ON

1

INSPECT TRANSMISSION WIRE (SL2)



- (a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
9 (SL2+) - 8 (SL2-)	5.0 to 5.6 Ω

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

Standard resistance:
Check for short

Tester Connection	Specified Condition
9 (SL2+) - Body ground	10 kΩ or higher
8 (SL2-) - Body ground	10 kΩ or higher

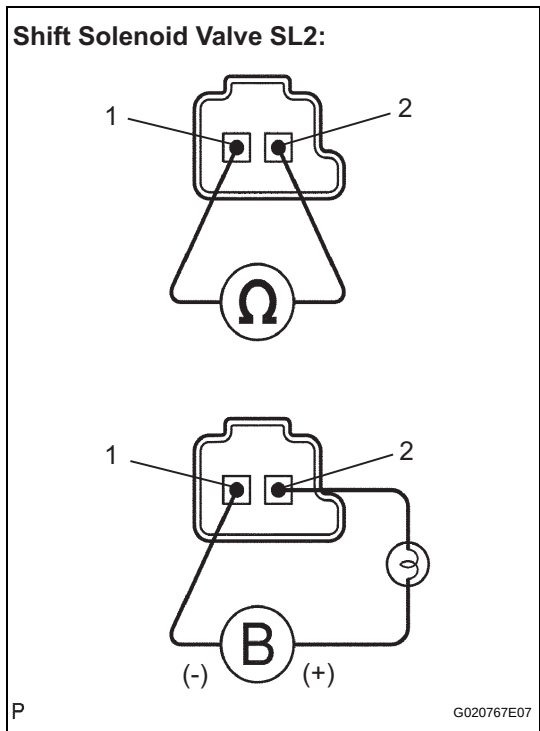
OK

REPLACE TCM

NG

2

INSPECT SHIFT SOLENOID VALVE SL2



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating sound.

NG

REPLACE SHIFT SOLENOID VALVE SL2

OK

REPLACE TRANSMISSION WIRE

DTC	P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)
------------	--------------	---

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).

Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The engine revs freely when 4th, 5th, or 6th gear is requested (2-trip detection logic). When any of the following is detected twice (2-trip detection logic): - When 1st gear is requested, 4th gear is engaged. - When 2nd gear is requested, 4th gear is engaged. - When 3rd gear is requested, 4th gear is engaged.	- Shift solenoid valve SL2 (open or closed) - Valve body (blocked) - Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction 0.5 sec. ON malfunction 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	-10°C (-14°F) or more
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning

CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

OFF malfunction:

TCM selected gear	4th, 5th or 6th
TCM indicated pressure value of SL2	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction (A):

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
ECT (Engine coolant temperature)	40°C (104°F) or more
Engine speed - Turbine speed	50 rpm or more

ON malfunction (B):

TCM selected gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more

ON malfunction (C):

TCM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more

TYPICAL MALFUNCTION THRESHOLDS**OFF malfunction:**

Input (turbine) speed-Intermediate shaft speed x Gear ratio	1,000 rpm or more
---	-------------------

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138
--	----------------

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0776)
----------	---

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and turn the intelligent tester on.
- Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0776" is output	A
"P0776" and other DTCs	B

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A

Go to step 3

B

2

PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:

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

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

HINT:

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirm of the problem (See page [AX-38](#)).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:

- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:

The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

- (d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:

Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

- (e) Compare the TCM gear shift command and the actual gear position.

AX

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N ^{*1}	N ^{*1}	N ^{*1}	N ^{*1}	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N ^{*1}	N ^{*1}	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N ^{*1}	
Shift solenoid SL4	Stuck ON ^{*3}	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N ^{*1}	6th	
Shift solenoid SLT	Stuck ON	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	N ^{*2}	E
	Stuck OFF ^{*3}	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When the shift solenoid SLT is stuck OFF, gear shifting is normal.

A

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)

C

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

D

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

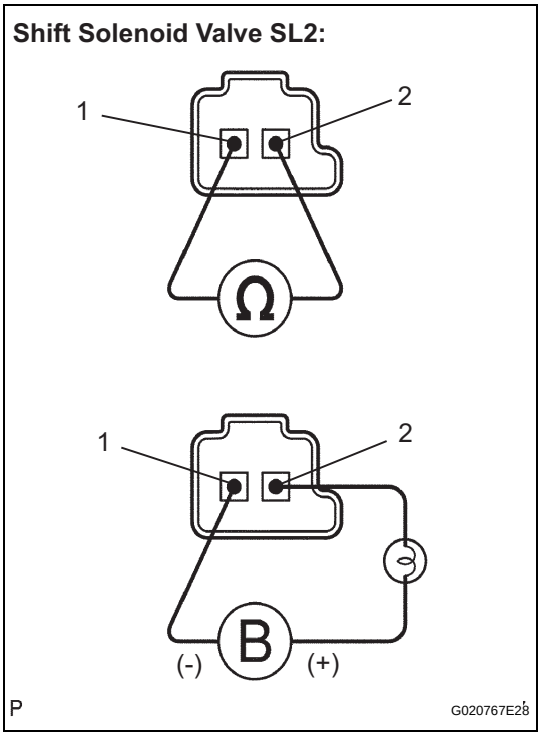
E

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

B

AX

3 INSPECT SHIFT SOLENOID VALVE (SL2)



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE (SL2)

OK

4 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG

REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

5 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG

REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

AX

DTC	P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)
------------	--------------	--

DESCRIPTION

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page [AX-38](#)).

DTC No.	DTC Detection Condition	Trouble Area
P0748	The TCM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gears. (1-trip detection logic) Output signal duty equals 100%. (NOTE: SL1 output signal duty is less than 100% under normal condition.)	- Open or short in shift solenoid valve SL1 circuit - Shift solenoid valve SL1 - TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The TCM causes gear shifts to occur by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)

While driving and shifting between 4th and 5th gears, if the TCM detects an open or short in the shift solenoid valve SL1 circuit, the TCM determines there is a malfunction (See page [AX-38](#)).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more
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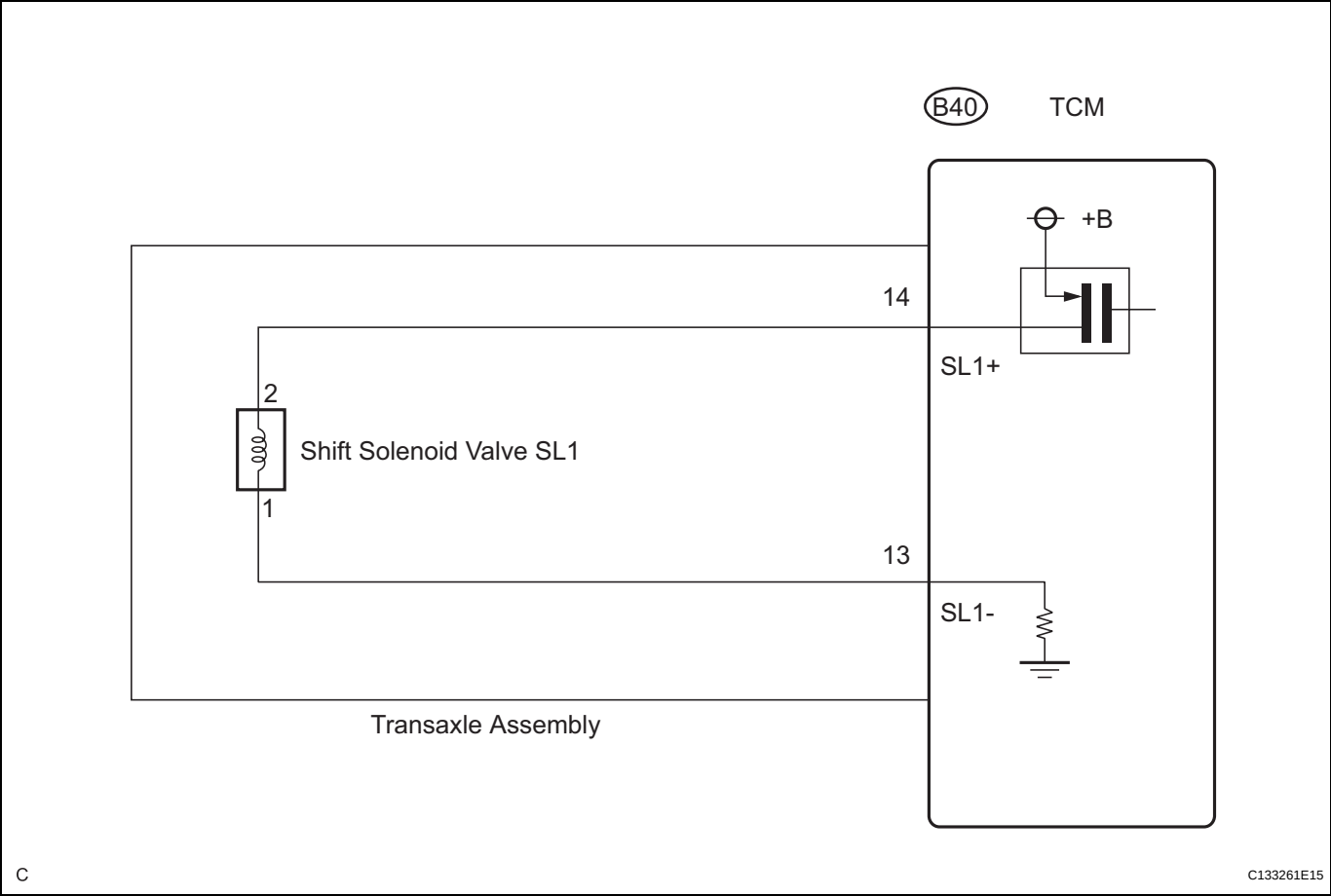
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more
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WIRING DIAGRAM



INSPECTION PROCEDURE

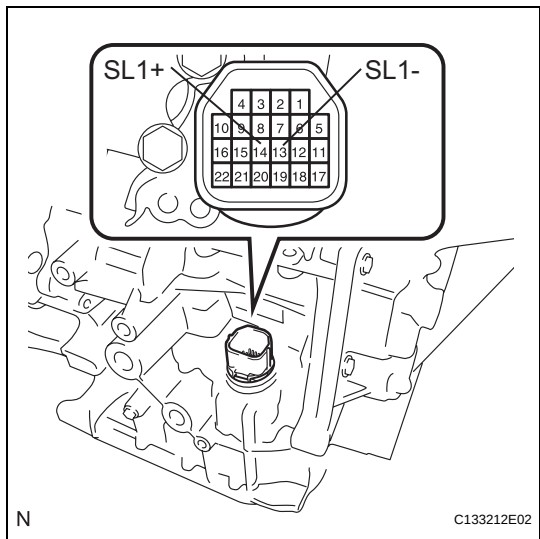
HINT:

The shift solenoid valve SL1 is turned on or off automatically when the shift lever is in the D position:

TCM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	ON	ON	ON	ON	OFF	OFF

1

INSPECT TRANSMISSION WIRE (SL1)



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
14 (SL1+) - 13 (SL1-)	5.0 to 5.6 Ω

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

Standard resistance:
Check for short

Tester Connection	Specified Condition
14 (SL1+) - Body ground	10 kΩ or higher
13 (SL1-) - Body ground	10 kΩ or higher

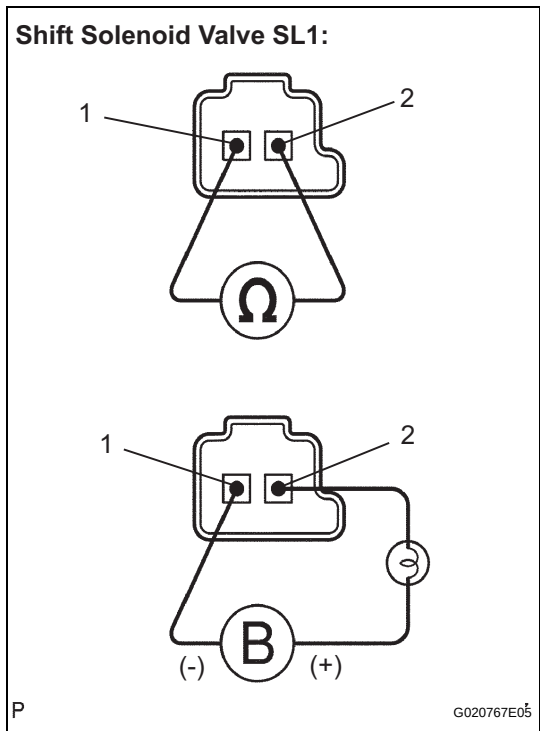
OK

REPLACE TCM

NG

2

INSPECT SHIFT SOLENOID VALVE SL1



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating sound.

NG

REPLACE SHIFT SOLENOID VALVE SL1

OK

REPLACE TRANSMISSION WIRE

DTC	P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)
------------	--------------	---

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).

Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The engine revs freely when 1st, 2nd, 3rd, or 4th gear is requested (2-trip detection logic). When either of the following is detected twice (2-trip detection logic): - When 5th gear is requested, 4th gear is engaged. - When 6th gear is requested, 4th gear is engaged.	- Shift solenoid valve SL1 (open or closed) - Valve body (blocked) - Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1 OFF malfunction Shift solenoid valve SL1 ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	ON malfunction: 0.8 sec. OFF malfunction: 0.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	-10°C (14°F) or more
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

OFF malfunction:

TCM selected gear	1st, 2nd, 3rd or 4th
TCM indicated pressure value of SL1	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction:

TCM selected gear	5th or 6th
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction:

Turbine speed - Output speed x Gear ratio	1,000 or more
---	---------------

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138
--	----------------

INSPECTION PROCEDURE**1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0746)**

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

AX**Result**

Display (DTC output)	Proceed to
Only "P0746" is output	A
"P0746" and other DTCs	B

HINT:

If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A**Go to step 3****B****2 PERFORM ACTIVE TEST BY SHIFT****NOTICE:**

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

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the intelligent tester on.
- (c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

HINT:

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirmation of the problem (See page AX-38).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] - Press "←" button: Shift up - Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:

- This test can be conducted when the vehicle is stopped.
- When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.

HINT:

The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

- (d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:

Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

- (e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral

- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When the shift solenoid SLT is stuck OFF, gear shifting is normal.

B

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)

C

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

D

GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

E

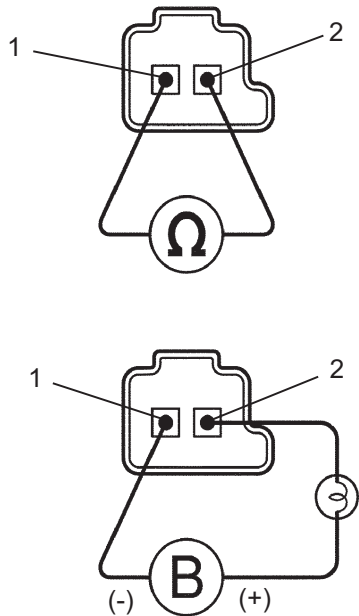
GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)

A

3

INSPECT SHIFT SOLENOID VALVE (SL1)

Shift Solenoid Valve SL1:



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

Standard resistance

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

- (c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating noise.

NG

REPLACE SHIFT SOLENOID VALVE (SL1)

OK

4 INSPECT TRANSMISSION VALVE BODY ASSEMBLY**OK:**

There are no foreign objects on each valve and they operate smoothly.

NG**REPAIR OR REPLACE TRANSMISSION
VALVE BODY ASSEMBLY****OK****5 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY****OK:**

The torque converter clutch operates normally.

NG**REPLACE TORQUE CONVERTER CLUTCH
ASSEMBLY****OK****REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY**

DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)
------------	--------------	---

SYSTEM DESCRIPTION

The TCM uses signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor to help determine the engagement timing of the lock-up clutch. The TCM monitors the engagement of the clutch using the turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor.

Then the TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SL, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P0741	When both of the following are detected (2-trip detection logic): - Lock-up does not occur when requested. - Transmission fluid pressure switch No. 3 is ON.	- Shift solenoid valve SL (closed) - Valve body (blocked) - Torque converter clutch - Automatic transaxle (clutch, brake or gear etc.) - Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing the input turbine rpm (NT) to the counter gear rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SL. When the SL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SL or lock-up system performance. The TCM will turn on the MIL and store the DTC.

HINT:

Example:

When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
(Engine speed is at least 70 rpm greater than the input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
(The difference between the engine speed and input turbine speed is less than 20 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve SL OFF malfunction Shift solenoid valve SL ON malfunction
Required sensors/Components	Shift solenoid valve SL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	40°C (104°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-10°C (-14°F) or more
TFT sensor circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Turbine speed sensor circuit	No circuit malfunction
Intermediate shaft speed sensor circuit	No circuit malfunction
Torque converter clutch circuit	No circuit malfunction
Knock control sensor circuit	No circuit malfunction
Shift solenoid valve SL1 circuit	No circuit malfunction
Shift solenoid valve SL2 circuit	No circuit malfunction
Shift solenoid valve SL3 circuit	No circuit malfunction
Shift solenoid valve SL4 circuit	No circuit malfunction
Shift solenoid valve SLU circuit	No circuit malfunction
CAN communication circuit	No circuit malfunction
Electronic throttle system	No circuit malfunction
TCM selected gear	No 1st
Vehicle speed	15.5 miles (25 km)
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

AX

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Following conditions are met	(a) and (b)
(a) Engine Speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	ON

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and so on to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

1. PERFORM ACTIVE TEST

- Warm up the engine.
- Turn the engine switch off.
- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Turn the intelligent tester on.
- When using the intelligent tester:
Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".

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

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 37 mph (60 km/h) or more	Possible to check the SL operation.

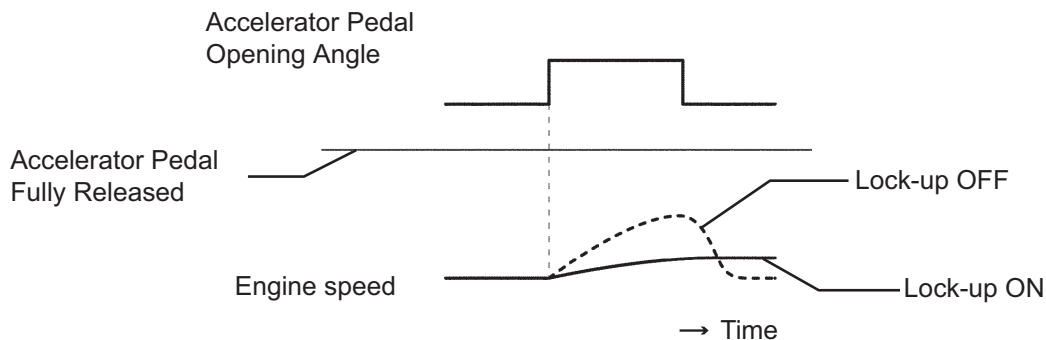
HINT:

- This test can be conducted when the vehicle speed is 37 mph (60 km/h) or more.
- This test can be conducted in the 6th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



G23400

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1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0741)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and turn the intelligent tester on.
- Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCs	B

HINT:

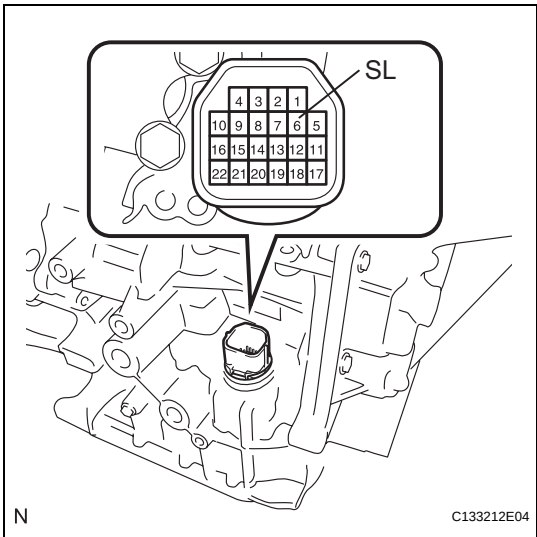
If any other codes besides "P0741" are output, perform the troubleshooting for those DTCs first.

B

GO TO DTC CHART

A

2 CHECK TRANSMISSION WIRE



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

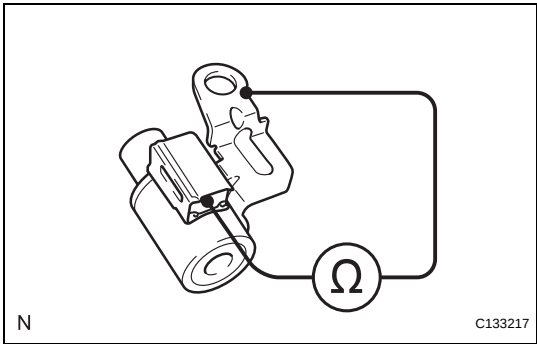
Tester Connection	Specified Condition 20°C (68°F)
6 (SL) - Body ground	11 to 15 Ω

OK

Go to step 4

NG

3 CHECK SHIFT SOLENOID VALVE SL (RESISTANCE)



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

Standard resistance

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

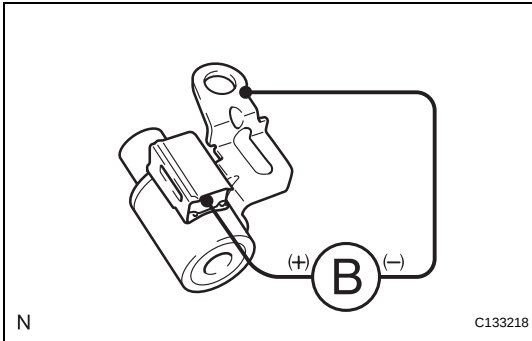
NG

REPLACE SHIFT SOLENOID VALVE SL

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AX

4 CHECK SHIFT SOLENOID VALVE SL (OPERATION)

- (a) Remove the shift solenoid valve SL.
- (b) Connect a positive (+) lead to the terminal of the solenoid connector, and a negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG**REPLACE SHIFT SOLENOID VALVE SL****OK****5 CHECK TRANSMISSION VALVE BODY ASSEMBLY****OK:**

There are no foreign objects on each valve and they operate smoothly.

NG**REPAIR OR REPLACE TRANSMISSION WIRE****OK****6 CHECK TORQUE CONVERTER CLUTCH ASSEMBLY****OK:**

The torque converter clutch operates normally.

NG**REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY****OK****REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY**

DTC**P0724****Brake Switch "B" Circuit High****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 signal to the TCM. Then the TCM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 2 mph (3 km/h)) and GO (19 mph (30 km/h) or more) fashion 5 times. (2-trip detection logic).	- Short in stop light switch signal circuit - Stop light switch - TCM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during "stop and go" driving, the TCM interprets this as a fault in the stop light switch, illuminates the MIL, and stores the DTC. The vehicle must stop (less than 2 mph (3 km/h)) and go (19 mph (30 km/h) or more) five times for two consecutive driving cycles in order to set this DTC.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The stop light switch remains ON during GO and STOP 10 times.

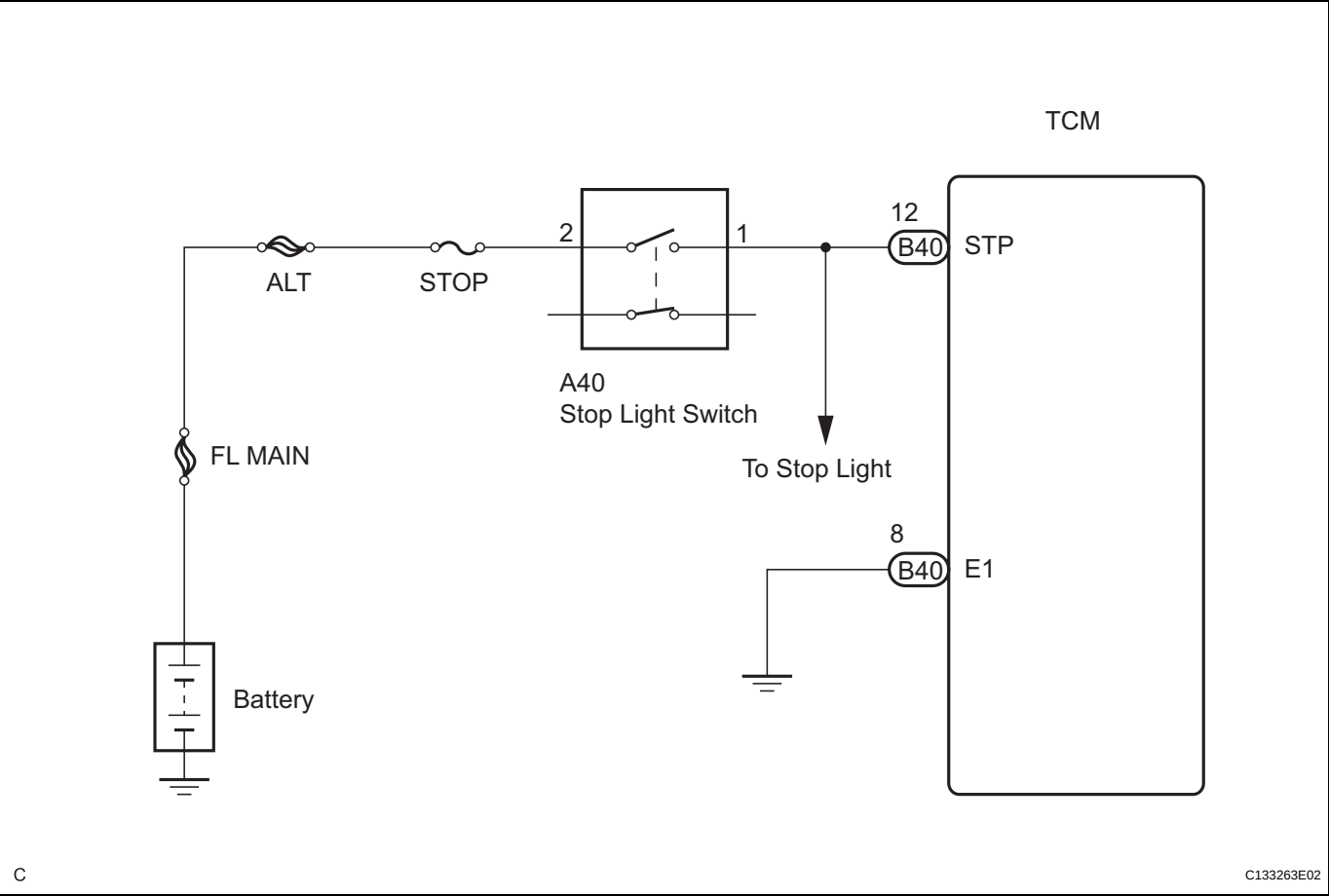
GO and STOP are defined as follows;

The monitor will run whenever this DTC is not present.	None
GO: (Vehicle speed is 18.63 mph (30 km/h) or more)	18.7 mph (30 km/h) or more
STOP: (Vehicle speed is less than 1.86 mph (3 km/h))	Less than 1.86 mph (3 km/h)
Starter	OFF
Battery voltage	8 V or more
Engine switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Switch status	ON stuck
---------------	----------

WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1

READ VALUE OF DATA LIST (STP SIGNAL)

- HINT:
According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.
- (a) Turn the engine switch off.
 - (b) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
 - (c) Turn the engine switch on (IG).
 - (d) Turn on the tester.
 - (e) Enter the following items: "DIAGNOSIS / OBD / MOBD / ECT / DATA LIST".
 - (f) According to the display on the tester, read "DATA LIST".

Standard

Item	Measurement Item/ Range (display)	Normal Condition
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF

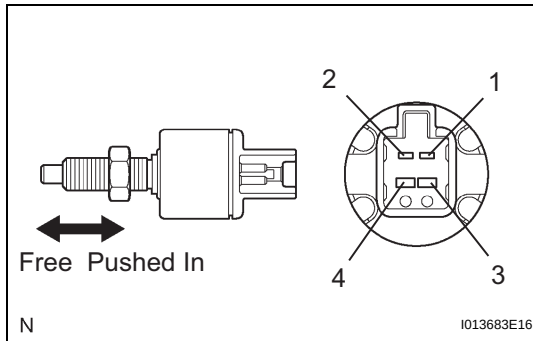
NOTICE:

In the table above, the conditions listed under "Normal Condition" are reference conditions. Do not depend solely on these reference conditions when deciding whether a part is faulty.

OK

Go to step 3

NG

2 INSPECT STOP LIGHT SWITCH ASSEMBLY

- (a) Remove the stop light switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Switch Position	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 k Ω or higher
Switch pin free	3 - 4	10 k Ω or higher
Switch pin pushed in	3 - 4	Below 1 Ω

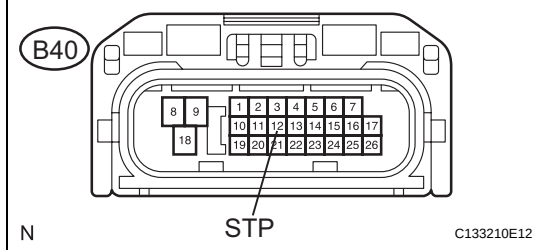
NG

REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

3 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - TCM)**Wire Harness Side:**

TCM Connector (Front View)



- (a) Install the stop light switch assembly.
(b) Disconnect the TCM connector.
(c) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard voltage

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	B40-12 (STP) - Body ground	10 to 14 V
Brake pedal is released	B40-12 (STP) - Body ground	Below 1 V

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TCM

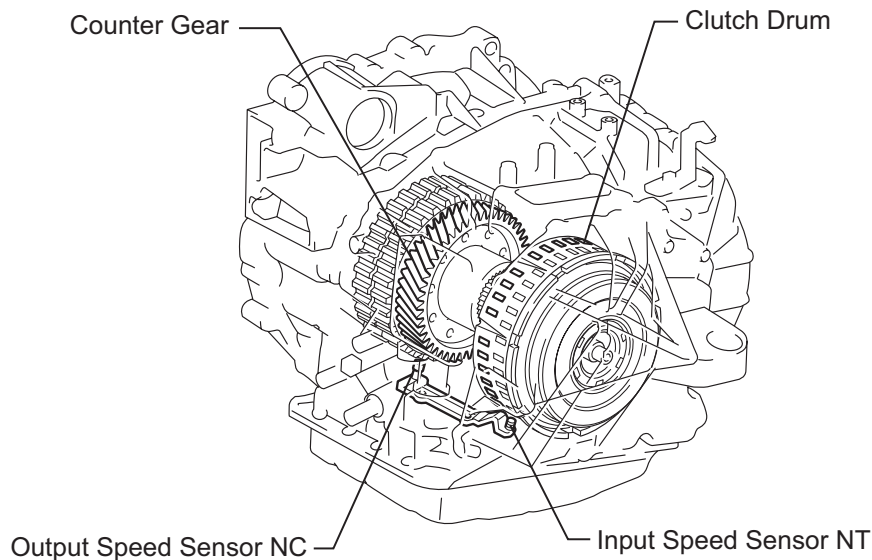
AX

DTC	P0715	Input / Turbine Speed Sensor Circuit Malfunction
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DTC	P0717	Input Speed Sensor Circuit No Signal
------------	--------------	---

SYSTEM DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of transaxle. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



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DTC No.	DTC Detection Condition	Trouble Area
P0715	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 4.5 seconds or more.	
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more (1-trip detection logic): (a) Vehicle speed: 31 mph (50 km/h) or more (b) Park/neutral position switch (STAR and R) is OFF (c) Speed sensor (NT): less than 300 rpm	- Transmission revolution sensor (speed sensor NT) - TCM

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm ^{*1} although the output shaft revolution is more than 1,000 rpm ^{*2}, the TCM interprets this as a fault, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 31 mph (50 km/h) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input
--------------	---

Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0715:

Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

P0717:

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Shift change	Shift change is completed before starting next shift change operation
TCM selected gear	2nd, 3rd, 4th, 5th or 6th
Output shaft rpm	1,000 rpm or more
STAR switch	OFF
R switch	OFF
Engine	Running
Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0715:

Sensor voltage	Less than 0.1 V or more than 1.9 V
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P0717:

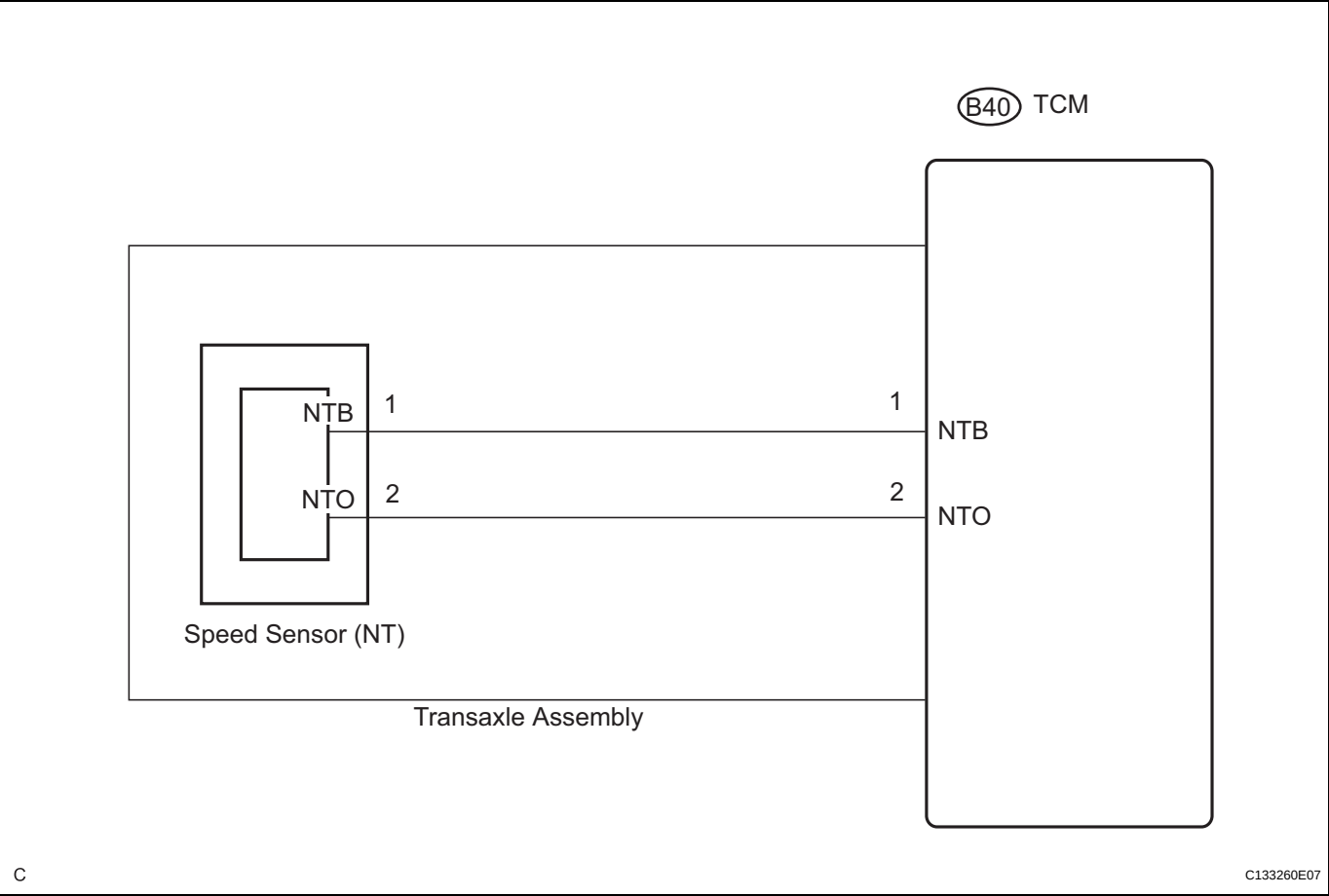
Sensor signal rpm	Less than 300 rpm
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AX

COMPONENT OPERATING RANGE

Speed sensor (NT)	Turbine speed is equal to engine speed with lock-up ON
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WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

HINT:

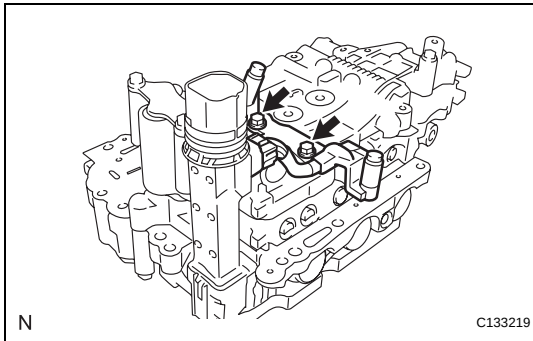
According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / OBD / MOBD / ECT / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NT)	Input Turbine Speed/display: 50 r/min	HINT: - Lock-up ON (after warming up the engine); input turbine speed (NT) is equal to the engine speed. - Lock-up OFF (idling at N position); input turbine speed (NT) is nearly equal to the engine speed.

HINT:

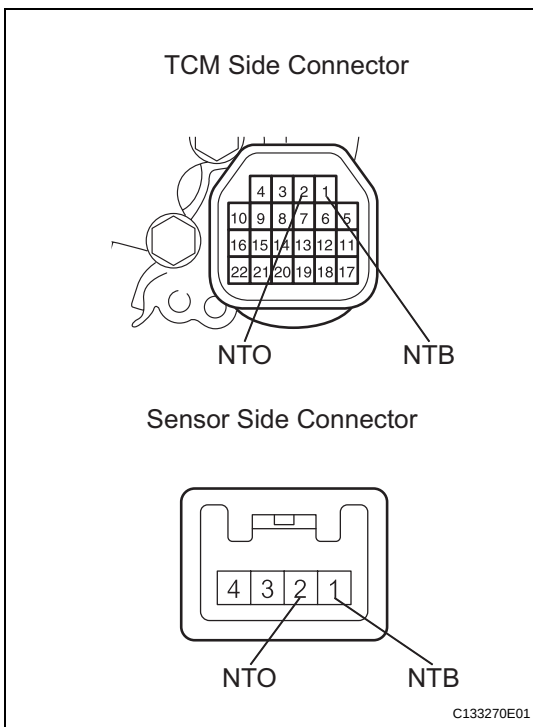
- SPD (NT) is always 0 while driving: Open or short in the sensor or circuit.
- SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 31 mph (50 km/h) or more: Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1 INSPECT SPEED SENSOR (SENSOR INSTALLATION)

- (a) Make sure that the connector is properly connected, and check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG**REPAIR OR REPLACE SPEED SENSOR****OK****2 CHECK TRANSMISSION WIRE**

- (a) Remove the TCM.
 (b) Disconnect the speed sensor connector from the transmission wire.
 (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
NTO - NTO	Below 1 Ω
NTB - NTB	Below 1 Ω
NTO - NTB	10 k Ω or higher

NG**REPLACE TRANSMISSION WIRE****OK****3 REPLACE SPEED SENSOR****NEXT****AX**

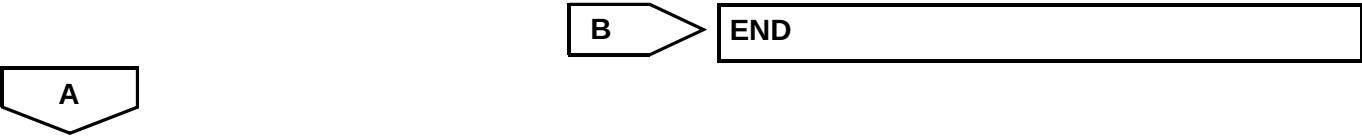
4

CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0715 AND/OR P0717 IS OUTPUT AGAIN)

- (a) Connect the intelligent tester to the DLC3.
- (b) Start the engine and turn the intelligent tester main switch ON.
- (c) Perform the monitor drive pattern (See page AX-26).
- (d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD / MOBD / ECT / DTC INFO / CURRENT CODES".
- (e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0715 or P0717" is output	A
No output	B

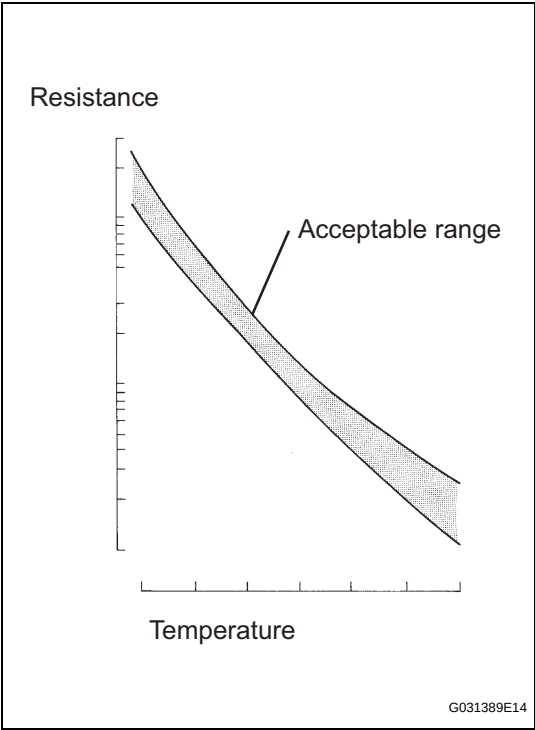


REPLACE TCM

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance
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DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM. The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases. One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher. The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected (2-trip detection logic): (a) Intake air and engine coolant temps. are more than -10°C (14°F) at engine start. (b) After normal driving for over 16 min. and 40 sec. and 5 mile (8 km) or more, ATF temp. is less than 20°C (68°F).	• Transmission wire (ATF temperature sensor) • TCM

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output signals from the automatic transmission fluid (ATF) temperature sensor (TFT sensor) and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault of the ATF temperature sensor. After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the TCM interprets this as a fault, and turns on the MIL.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
TFT (Transmission fluid temperature) sensor circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
IAT (Intake air temperature) sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
Time after engine start	16 min. and 40 sec. or more
ECT (Engine coolant temperature)	Above -15°C (5°F)

Condition A:

Time after engine start	18 min. and 20 sec.
Driving distance after engine start	5 miles (8 km) or more
IAT (12 sec. after engine start)	Above -10°C (14°F)
ECT (12 sec. after engine start)	Above -10°C (14°F)
Accumulated driving time *1	200 sec. or more
*1: Following conditions are met	
Engine speed - Turbine speed	50 rpm or more
Output speed	400 rpm or more
Throttle valve opening angle	3% or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Shift position	Not "N" or "P"

Condition B:

Time after engine start	30 min.
Driving distance after engine start	9.3 miles (15 km)
IAT (12 sec. after engine start)	-15°C (5°F) or more
ECT (12 sec. after engine start)	-15°C (5°F) or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Accumulated driving time *1	400 sec. or more

Condition C:

Time after engine start	40 min.
Driving distance after engine start	12.4 miles (20 km)
TFT (Transmission fluid temperature)	Less than 20°C (68°F)

Accumulated driving time *1	550 sec. or more
-----------------------------	------------------

Condition D:

Time after ECT reaches 60°C (140°F)	10 sec. or more
TFT (12 sec. after engine start)	110°C (230°F) or more
ECT (12 sec. after engine start)	35°C (95°F) or less

TYPICAL MALFUNCTION THRESHOLDS

Condition A, B and C:

TFT	Less than 20°C (68°F) (THO = -10°C (14°F) at engine start) (Conditions vary with THO at engine)
-----	---

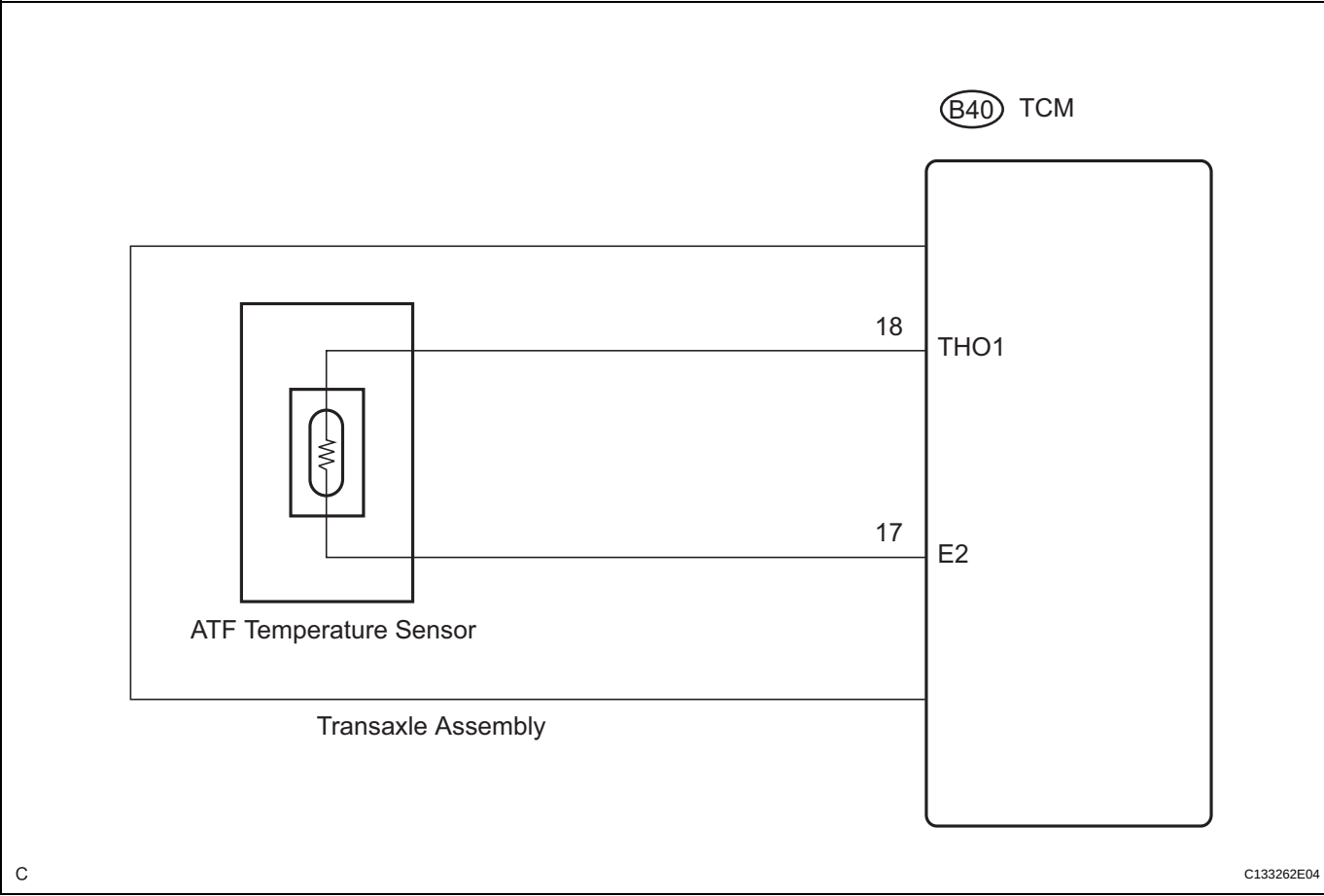
Condition D:

TFT	110°C (230°F) or more
-----	-----------------------

COMPONENT OPERATING RANGE

TFT	ATF temperature - approx. 130°C (266°F)
-----	---

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / OBD / MOBD / ECT / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	- After Stall Test; Approx. 80°C (176°F) - Equal to ambient temperature when cold soak

HINT:

When DTC P0712 is output and the intelligent tester indicates 150°C (302°F) or more, there is a short circuit.

When DTC P0713 is output and the intelligent tester indicates -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal THO1 (OT) and body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 seconds). When P0713 is set, P0711 cannot be detected.

It is not necessary to inspect the circuit when P0711 is set.

1

CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0711)

- (a) Connect the the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG) and turn the the intelligent tester on.
- (c) Select the items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
- (d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0711" is output	A
"P0711" and other DTCs	B

HINT:

If any other codes besides "P0711" are output, perform troubleshooting for those DTCs first.

B

GO TO DTC CHART

A

2

CHECK TRANSMISSION FLUID LEVEL

(a) Check the transmission fluid level.

OK:

Automatic transmission fluid level is correct.

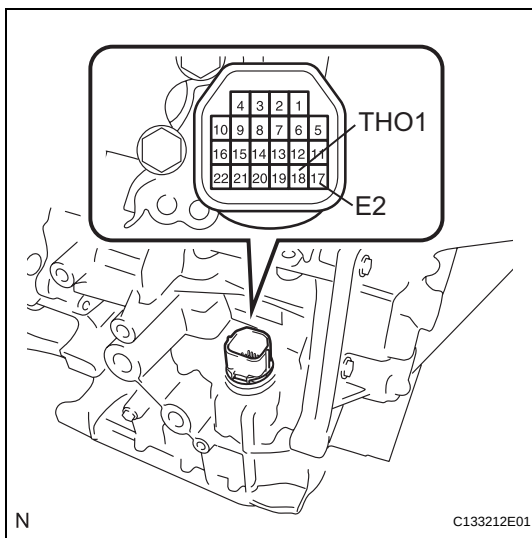
NG

ADD FLUID

OK

3

INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Remove the TCM from the transaxle.

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

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 k Ω
17 (E2) - Body ground	10 k Ω or higher
18 (THO1) - Body ground	10 k Ω or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

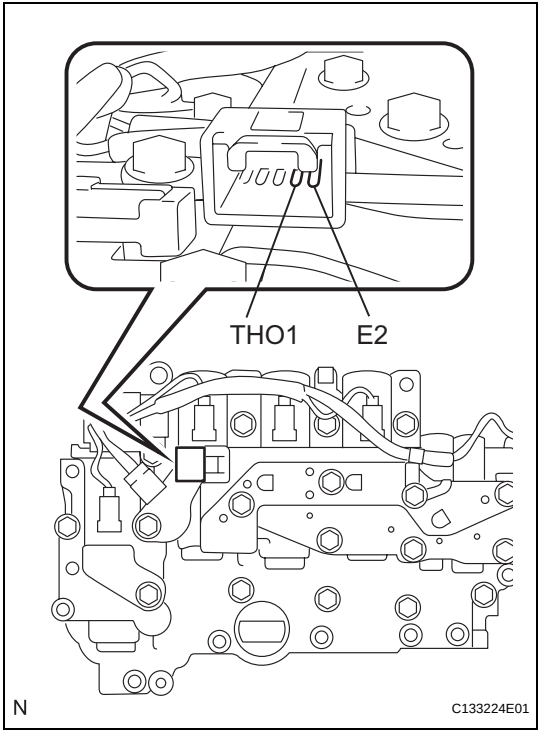
ATF Temperature	Specified Condition
10°C (50°F)	5.8 to 7.1 k Ω
110°C (230°F)	0.23 to 0.26 k Ω

OK

REPLACE TCM

NG

4 CHECK ATF TEMPERATURE SENSOR



- (a) Disconnect the ATF temperature sensor connector from the transmission wire.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10°C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

NG

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

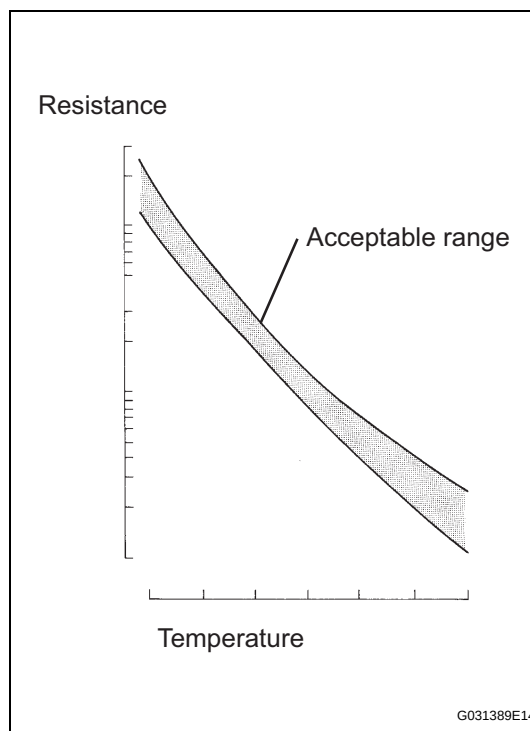
OK

REPLACE TRANSMISSION WIRE

DTC	P0710	Transmission Fluid Temperature Sensor "A" Circuit
DTC	P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input
DTC	P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM. The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.

One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.

The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily (within 0.5 sec.) when neither P0712 nor P0713 is detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	• Open or short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM

DTC No.	DTC Detection Condition	Trouble Area
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic)	- Short in ATF temperature sensor circuit - Transmission wire (ATF temperature sensor) - TCM
P0713	ATF temperature sensor resistance is more than 156 k Ω when 15 minutes or more have elapsed after the engine starts DTC is detected for 0.5 sec. or more (1-trip detection logic)	- Open in ATF temperature sensor circuit - Transmission wire (ATF temperature sensor) - TCM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor (TFT sensor) circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature, and the TCM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω ^{*1} or more than 156 k Ω ^{*2}, the TCM interprets this as a fault in the ATF sensor or wiring. The TCM will turn on the MIL and store the DTC.

*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.

*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.

HINT:

The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediately
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

P0710:

Range check (Chattering)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0712:

Range check (Low resistance)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0713:

Range check (High resistance)

The monitor will run whenever this DTC is not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710:

Range check (Chattering)

TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω or more than 156 k Ω
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P0712:

Range check (Low resistance)

TFT sensor resistance	Less than 79 Ω
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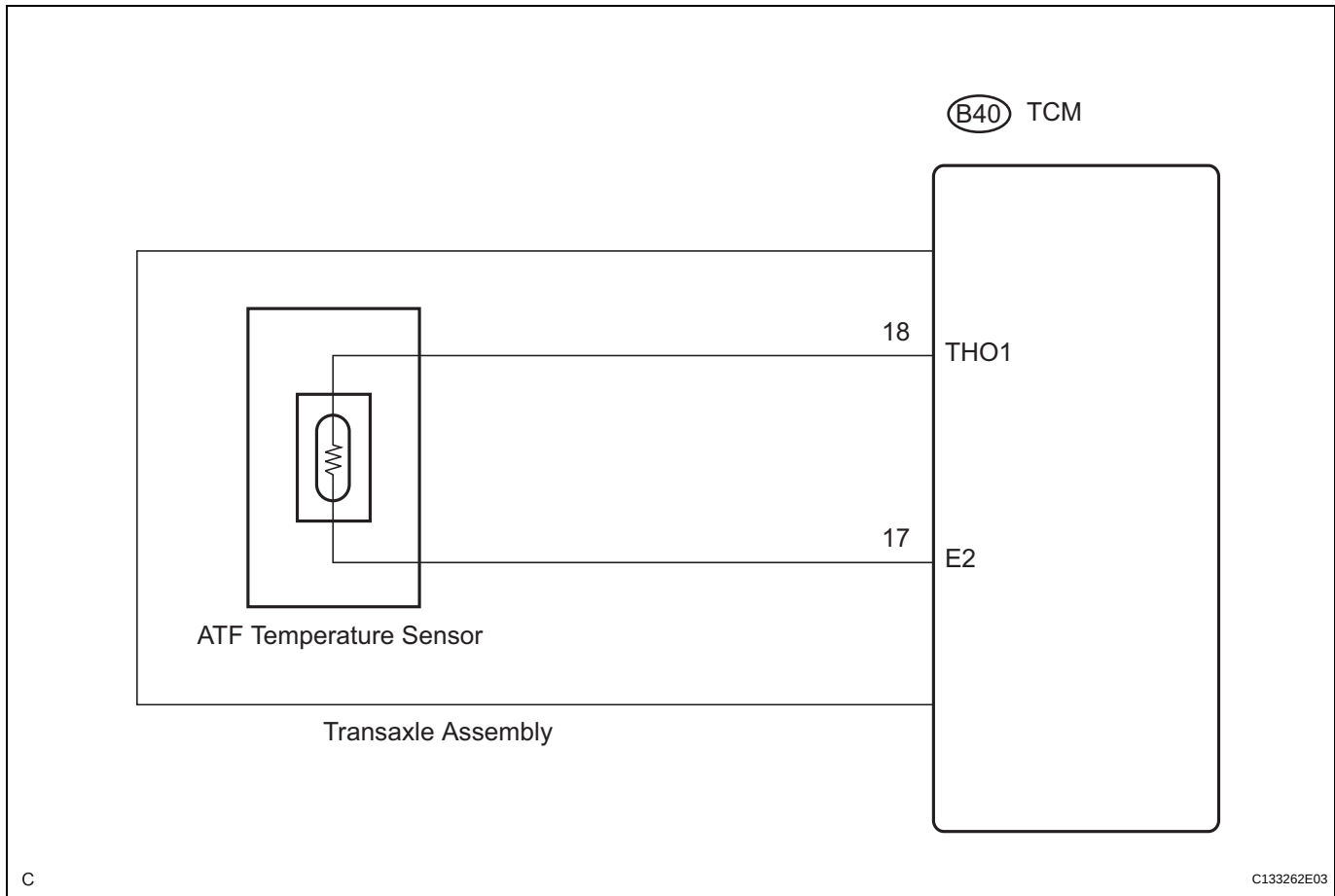
P0713:

Range check (High resistance)

TFT sensor resistance	More than 156 k Ω
-----------------------	--------------------------

COMPONENT OPERATING RANGE

TFT sensor	Atmospheric temperature to approx. 130°C (266°F)
------------	--

WIRING DIAGRAM

AX

INSPECTION PROCEDURE**1. DATA LIST****HINT:**

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

- (a) Warm up the engine.
- (b) Turn the engine switch off.

- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn on the tester.
- (f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	- After Stall Test; Approx. 80°C (176°F) - Equal to ambient temperature when cold soak

HINT:

When DTC P0712 is output and the intelligent tester indicates 150°C (302°F) or more, there is a short circuit.

When DTC P0713 is output and the intelligent tester indicates -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal OIL and body ground.

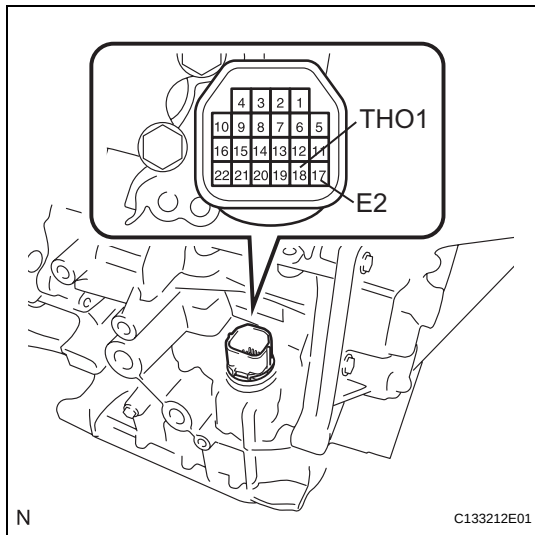
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If the circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 seconds). When P0713 is set, P0711 cannot be detected.

It is not necessary to inspect the circuit when P0711 is set.

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



- (a) Remove the TCM from the transaxle.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 kΩ
17 (E2) - Body ground	10 kΩ or higher
18 (THO1) - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

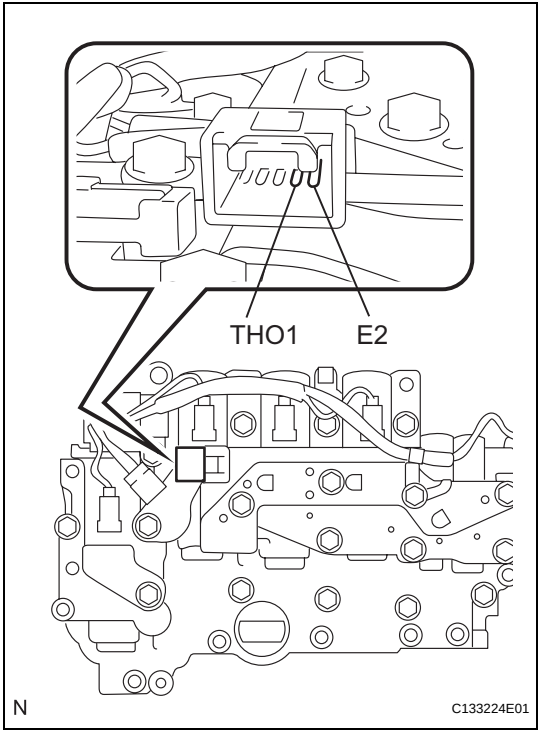
ATF Temperature	Specified Condition
10°C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

OK

REPLACE TCM

NG

2 INSPECT ATF TEMPERATURE SENSOR



- (a) Disconnect the ATF temperature sensor connector from the transmission wire.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10°C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

OK

REPLACE TRANSMISSION WIRE

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)
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DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more of the following conditions are met simultaneously (2-trip detection logic) • NSW input signal is ON. • R input signal is ON. • D input signal is ON. (B) All switches are OFF simultaneously for NSW, R and D.	• Short in park/neutral position switch circuit • Park/neutral position switch • TCM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.

The park/neutral position switch detects the shift lever position and sends a signal to the TCM.

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

The park/neutral position switch sends a signal to the TCM according to the shift position (R or D). The TCM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The TCM will turn on the MIL and store the DTC.

MONITOR STRATEGY

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

AX**TYPICAL ENABLING CONDITIONS****All:**

The monitor will run whenever this DTC is not present.	None
Engine switch	ON
Battery voltage	10.5 V or more

Condition (C):

One of the following conditions is met:	Condition (a) or (b)
(a) Park Neutral position switch	ON
(b) R range position switch	ON

TYPICAL MALFUNCTION THRESHOLDS**1. One of the following conditions is met: Condition (A), (B) and (C)****Condition (A):**

Number of the following signal input at the same time	2 or more
R range position switch	ON
D range position switch	ON

Condition (B):

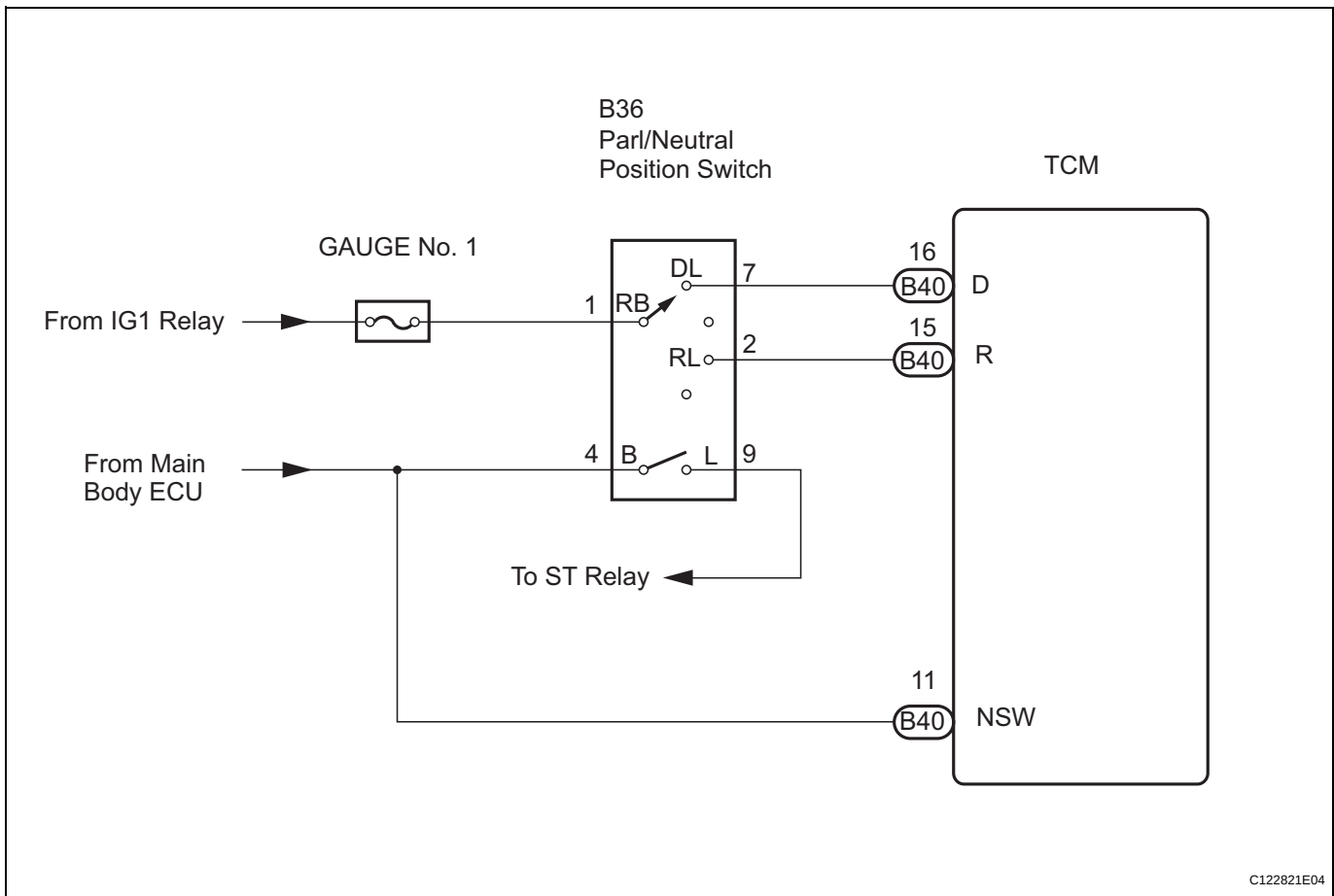
Number of the following signal input at the same time	2 or more
Park neutral position switch	ON
R range switch	ON
D range switch	ON

Condition (C):

Park neutral position switch	OFF
R range switch	OFF
D range switch	OFF

COMPONENT OPERATING RANGE

Park/neutral Position switch	The park/neutral position switch sends only one signal to the TCM.
------------------------------	--

WIRING DIAGRAM**INSPECTION PROCEDURE****HINT:**

According to the DATA LIST displayed by the intelligent 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.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

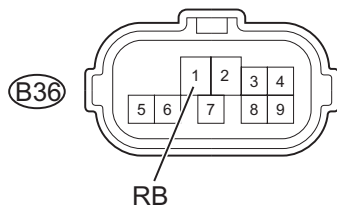
1. READ DATA LIST

- Turn the engine switch off.
- Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
- Turn the engine switch on (IG).
- Turn on the tester.
- Select the item "DIAGNOSIS / OBD / MOBD / ECT / DATA LIST".
- According to the display on the tester, read the "DATA LIST".

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status / ON or OFF	Shift lever position is; P and N: ON Except P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
REVERSE	PNP SW Status / ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
DRIVE	PNP SW Status / ON or OFF	Shift lever position is; D and S: ON Except D or S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.

1**CHECK HARNESS AND CONNECTOR (D, R POSITION CIRCUIT)****Wire Harness Side:**

Park / Neutral Position SW



Y

C117645E16

- Disconnect the park / neutral position switch connector.
- Turn the engine switch on (IG).
- Measure the voltage according to the value(s) in the table below.

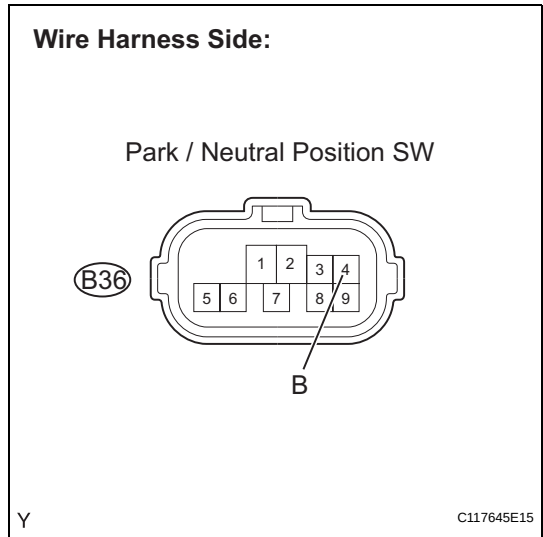
Standard voltage

Tester Connection	Specified Condition
RB (B36-1) - Body ground	10 to 14 V

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****AX**

2

CHECK HARNESS AND CONNECTOR (NSW CIRCUIT)



OK

- (a) Turn the engine switch on (IG).
- (b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
B (B36-4) - Body ground	Below 3 V

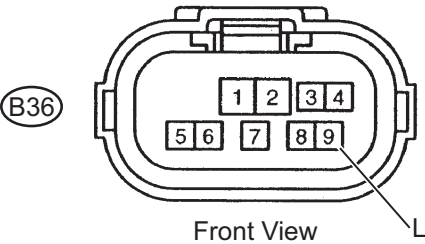
NG

Go to step 8

3 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ST RELAY)

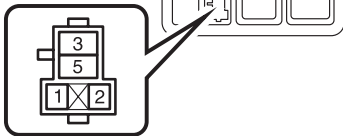
Wire Harness Side:

Park/Neutral Position Switch



Engine Room Relay Block

ST Relay



A137047E09

- (a) Disconnect the park / neutral position switch connector.
- (b) Remove the ST relay from the engine room relay block.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
L (B36-9) - Body ground	Below 1 Ω

- (d) Install the ST relay.
- (e) Reconnect the park/neutral position switch connector.

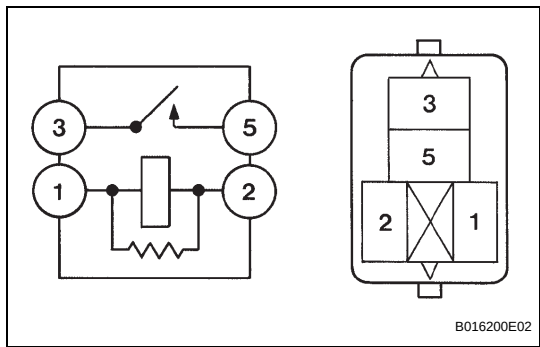
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4

INSPECT STARTER RELAY ASSEMBLY



- (a) Remove the ST relay from the engine room relay block.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω or higher

- (c) Install the ST relay.

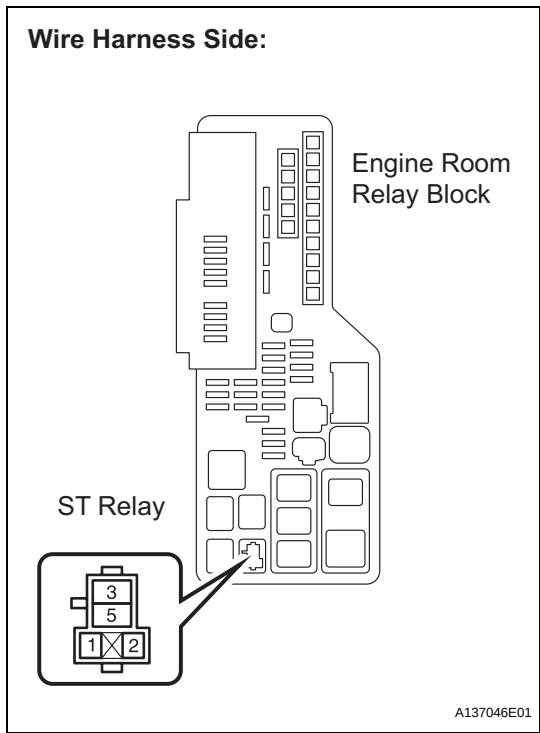
NG

REPLACE STARTER RELAY ASSEMBLY

OK

5

CHECK HARNESS AND CONNECTOR (ST RELAY - BODY GROUND)



- (a) Remove the ST relay from the engine room relay block.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
ST relay terminal 2 - Body ground	10 kΩ or higher

- (c) Install the ST relay.

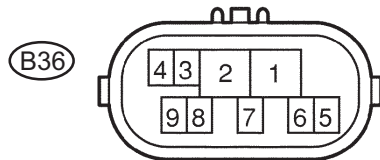
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

Component Side:
(Connector Front View):



C110340E49

- (a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
P	1 - 3 and 4 - 9	Below 1 Ω
Except P		10 k Ω or higher
R	1 - 2	Below 1 Ω
Except R		10 k Ω or higher
N	1 - 8 and 4 - 9	Below 1 Ω
Except N		10 k Ω or higher
D, S, "+" and "-"	1 - 7	Below 1 Ω
Except D, S, "+" and "-"		10 k Ω or higher

NG

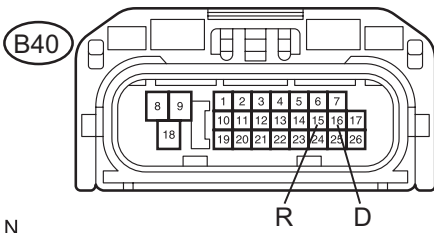
REPLACE PARK/NEUTRAL POSITION SWITCH (See page [AX-184](#))

OK

7 CHECK HARNESS AND CONNECTOR

Wire Harness Side:

TCM Connector (Front View)



C133210E19

- (a) Connect the park / neutral position switch connector.
(b) Disconnect the TCM connectors.
(c) Turn the engine switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
R	R (B40-15) - Body ground	10 to 14 V *
Except R		Below 1 V
D	D (B40-16) - Body ground	10 to 14 V
Except D		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

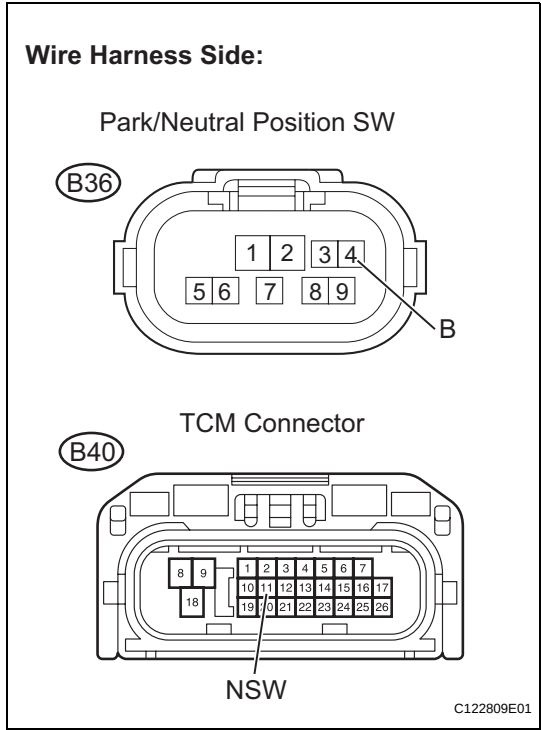
OK

REPLACE TCM (See page [AX-251](#))

AX

8

CHECK HARNESS AND CONNECTOR (PARK / NEUTRAL POSITION SWITCH - TCM)



- (a) Disconnect the TCM connectors.
- (b) Turn the engine switch off.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
B (B36-4) - NSW (B40-11)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
B (B36-4) or NSW (B40-11) - Body ground	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TCM (See page [AX-251](#))

DTC**P0617****Starter Relay Circuit High****DESCRIPTION**

While the engine is being cranked, the positive battery voltage is applied to terminal STA of the TCM. If the TCM detects the Starter Control (STA) signal while the vehicle is being driven, it determines that there is a malfunction in the STA circuit. The TCM then illuminates the MIL and sets the DTC. This monitor runs when the vehicle is driven at 12.4 mph (20 km/h) for over 20 seconds.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When conditions (a), (b) and (c) are met, positive (+B) battery voltage of 10.5 V or more is applied to TCM for 20 seconds (1 trip detection logic): (a) Vehicle speed more than 12.4 mph (20 km/h) (b) Engine speed more than 1,000 rpm (c) STA signal ON	• Park/Neutral Position switch • Starter relay circuit • Cranking holding function circuit • TCM

MONITOR STRATEGY

Related DTCs	P0617: Starter signal
Required Sensors/Components (Main)	STARTER relay, PMP switch, Engine switch
Required Sensors/Components (Sub)	Vehicle speed sensor (VSS), Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	20 seconds
MIL Operation	Immediate
Sequence of Operation	None

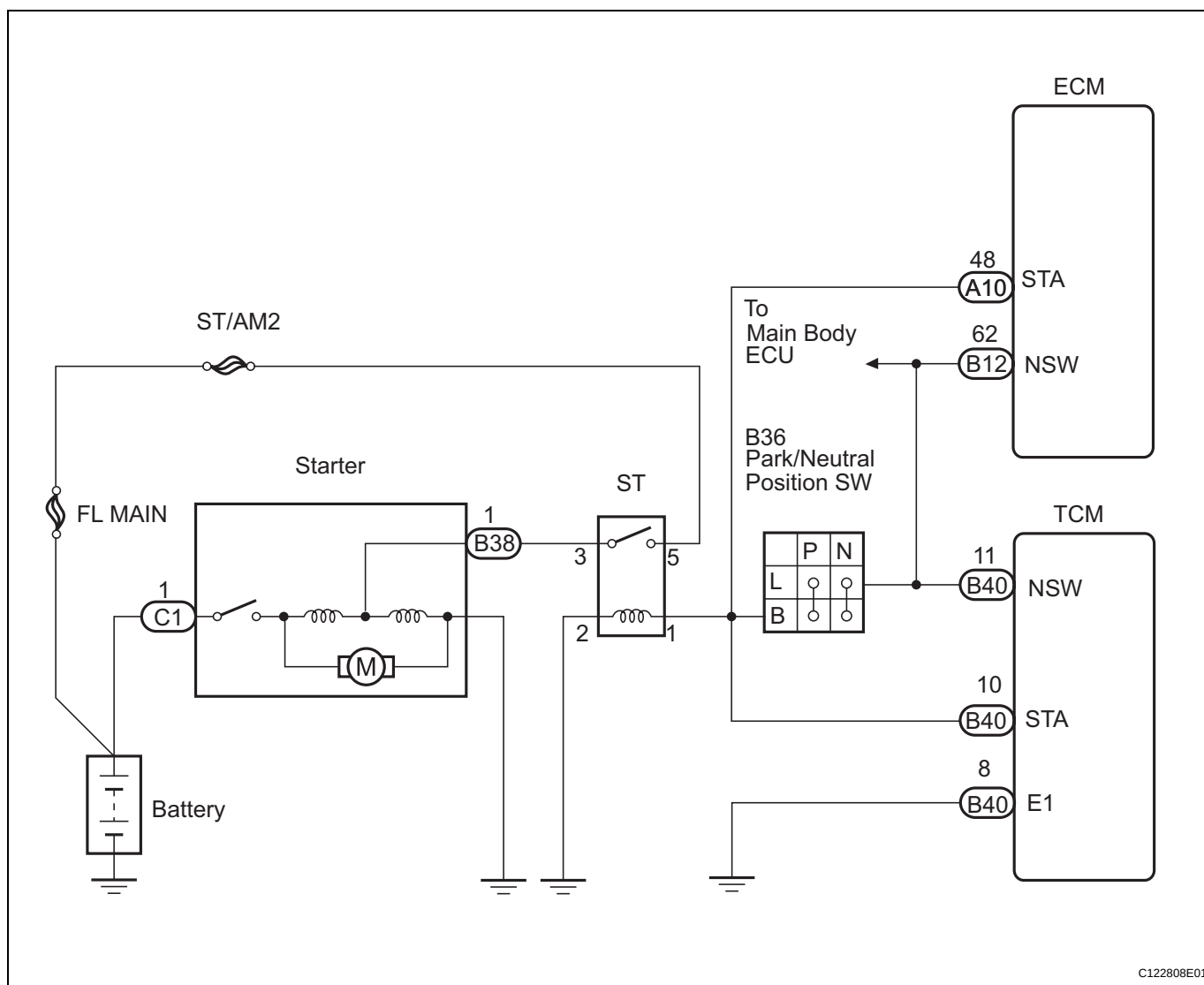
TYPICAL ENABLING CONDITIONS

Monitor runs whenever these DTCs are not present:	None
Battery voltage	10.5 V or more
Vehicle speed	12.43 mph (20 km/h) or more
Engine speed	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Starter signal	ON
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WIRING DIAGRAM



C122808E01

AX

INSPECTION PROCEDURE

HINT:

- The following troubleshooting flowchart is based on the premise that the engine is cranked normally. If the engine does not crank, proceed to the problem symptoms table (See page [AX-251](#)).
- Read freeze frame data using the intelligent tester. The TCM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page [ES-41](#)).

1

READ VALUE OF INTELLIGENT TESTER (STARTER SIGNAL)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG) and turn the tester on.
- Enter the following menus: DIAGNOSIS / OBD / MOBD / ECT / DATA LIST.
- Check the value displayed on the tester when the engine switch is turned on (IG) and the engine is started.

OK

Engine Switch Condition	ON (IG)	ENGINE START
STARTER SIG	OFF	ON

OK

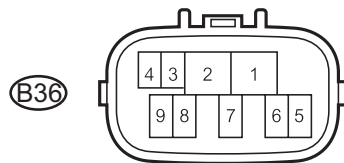
Go to step 3

NG

2

INSPECT PARK / NEUTRAL POSITION SWITCH ASSEMBLY

Component Side:



Park/Neutral Position Switch

A107908E08

- (a) Inspect the Park / Neutral Position (PNP) switch.
- (1) Disconnect the B36 switch connector.
 - (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Gear Selector Lever Position	Tester Connection	Specified Condition
P	4 - 5	Below 1 Ω
N	4 - 5	Below 1 Ω

- (3) Reconnect the PNP switch connector.

NG

REPLACE PARK / NEUTRAL POSITION SWITCH (See page [AX-184](#))

OK

CHECK CRANKING HOLDING FUNCTION CIRCUIT (See page [ES-449](#))

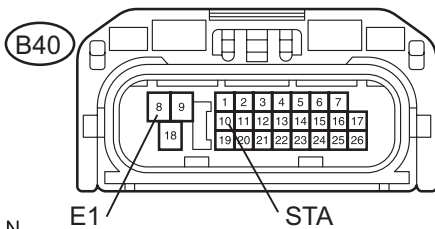
AX

3

CHECK HARNESS AND CONNECTOR

Wire Harness Side:

TCM Connector (Front View)



C133210E22

- (a) Disconnect the B40 switch connector.
- (b) Measure the voltage according to the value(s) in the table below when the shift lever is P or N position.

Standard voltage

Tester Connection	Specified Condition
8 - 10	Below 2 V

- (c) Connect the B40 switch connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TCM (See page [AX-251](#))

DTC**P0560****System Voltage****DESCRIPTION**

The battery supplies electricity to the TCM even when the engine switch is off. This power allows the TCM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, these memories are cleared and the TCM determines that there is a malfunction in the power supply circuit. When the engine is next started, the TCM will illuminate the MIL and set the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in TCM back-up power source circuit (1 trip detection logic)	- Open in TCM back-up power source circuit - TCM

HINT:

If DTC P0560 is set, the TCM does not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: TCM system voltage
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

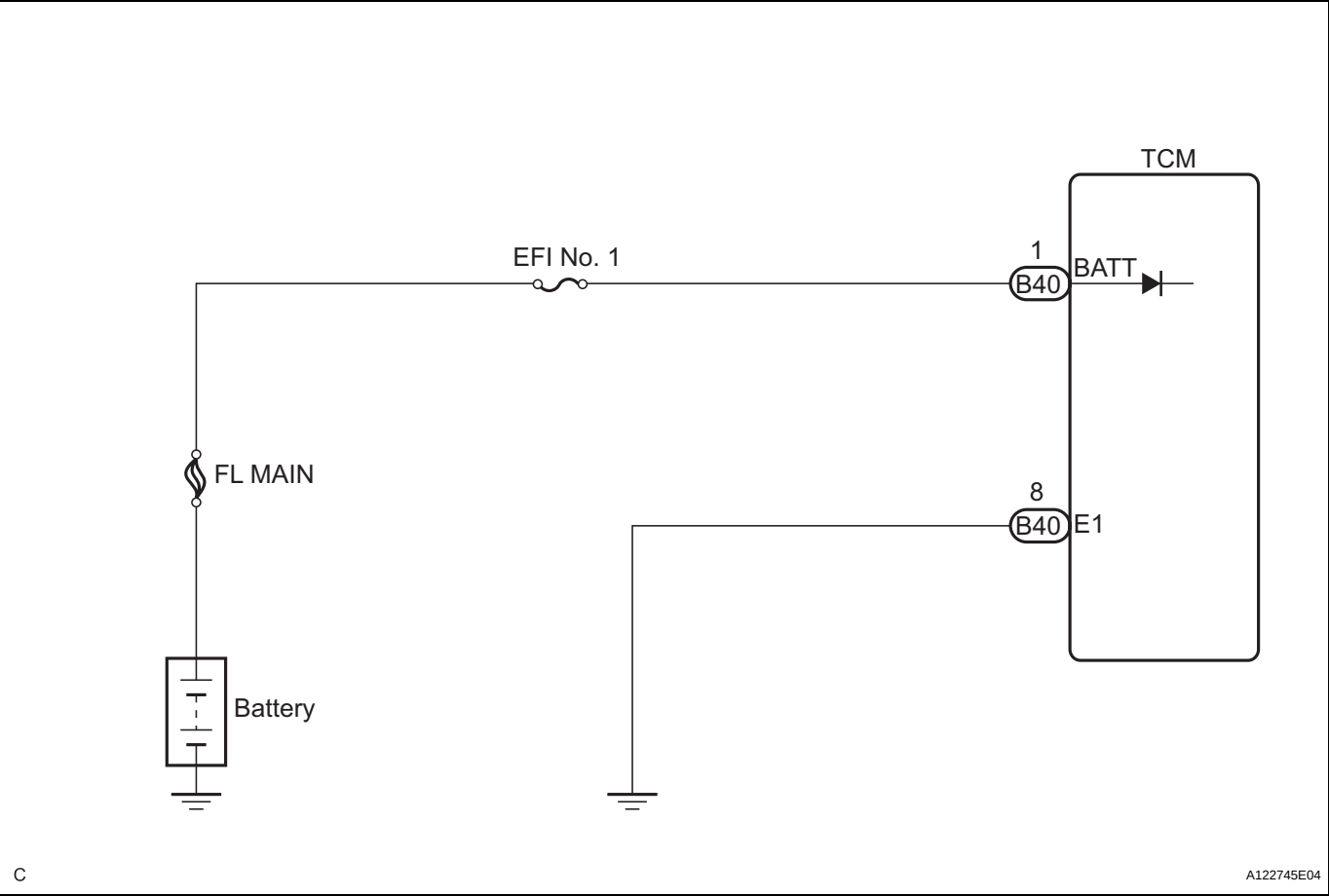
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present:	None
Stand-by RAM	Initialized

TYPICAL MALFUNCTION THRESHOLDS

TCM power source	Less than 3.5 V
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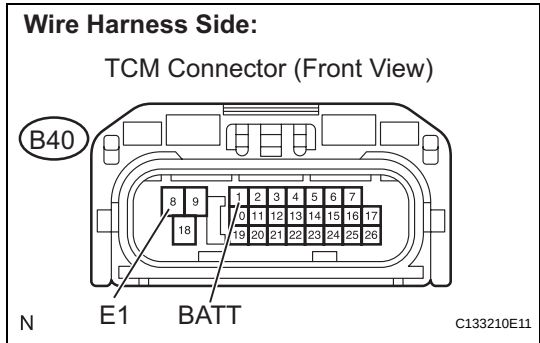
WIRING DIAGRAM



INSPECTION PROCEDURE

AX

1 INSPECT TERMINAL VOLTAGE (BATT VOLTAGE OF TCM)



- (a) Disconnect the TCM connector.
- (b) Turn the engine switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
BATT (B40-1) - E1 (B40-8)	10 to 14 V

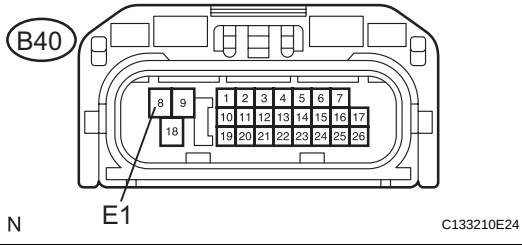
NG REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI NO. 1 FUSE - TCM)

OK

2 CHECK HARNESS AND CONNECTOR

Wire Harness Side:

TCM Connector (Front View)



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

Standard resistance

Tester Connection	Specified Condition
E1 (B40-8) - Body ground	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - BODY GROUND)

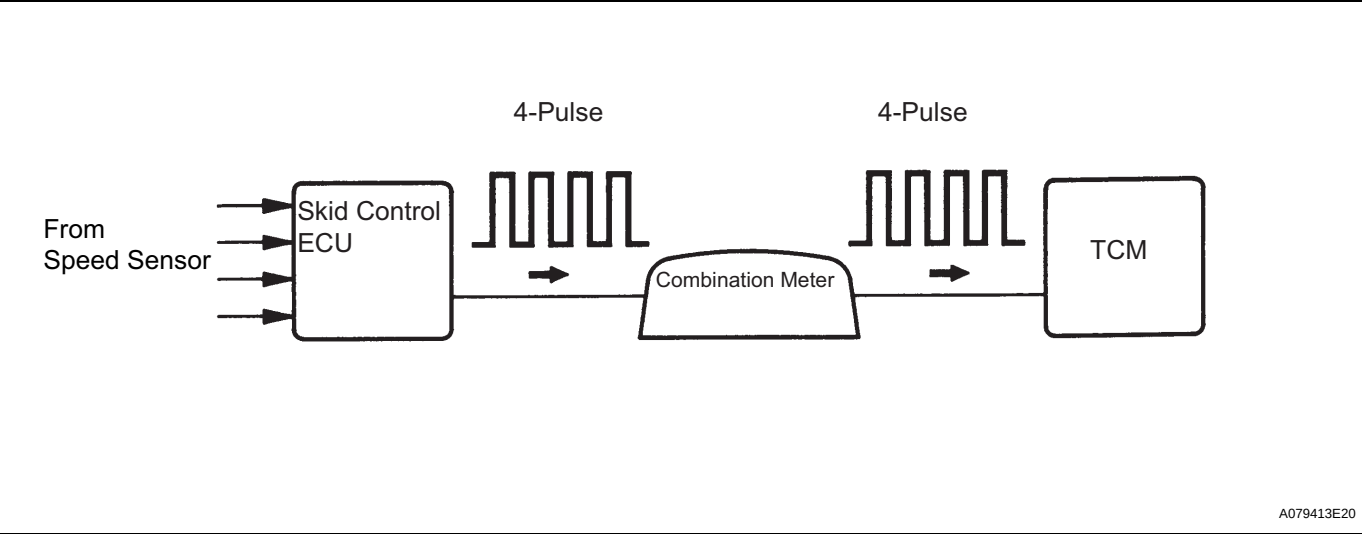
OK

REPLACE TCM

DTC	P0500	Vehicle Speed Sensor "A"
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DESCRIPTION

The speed sensors detect the wheel speed and send the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the TCM via the combination meter. The TCM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	When the ECT sensor is normal and the counter gear speed is 300 rpm or more, the vehicle speed signal is not input for 2 seconds or more.	- Vehicle speed sensor - Vehicle speed sensor signal circuit - Combination meter - TCM

MONITOR DESCRIPTION

AX

The TCM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the park/neutral position switch was turned off. If there is no signal from the vehicle speed sensor with these conditions satisfied, the TCM concludes that the vehicle speed sensor is malfunctioning. The TCM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle Speed Sensor Circuit
Required sensors/components (Main)	Vehicle speed sensor, Combination meter, Skid control ECU
Required sensors/components (Sub)	Counter gear Speed (CS) sensor, ECT sensor
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediately
Sequence operation	None

TYPICAL ENABLING CONDITIONS

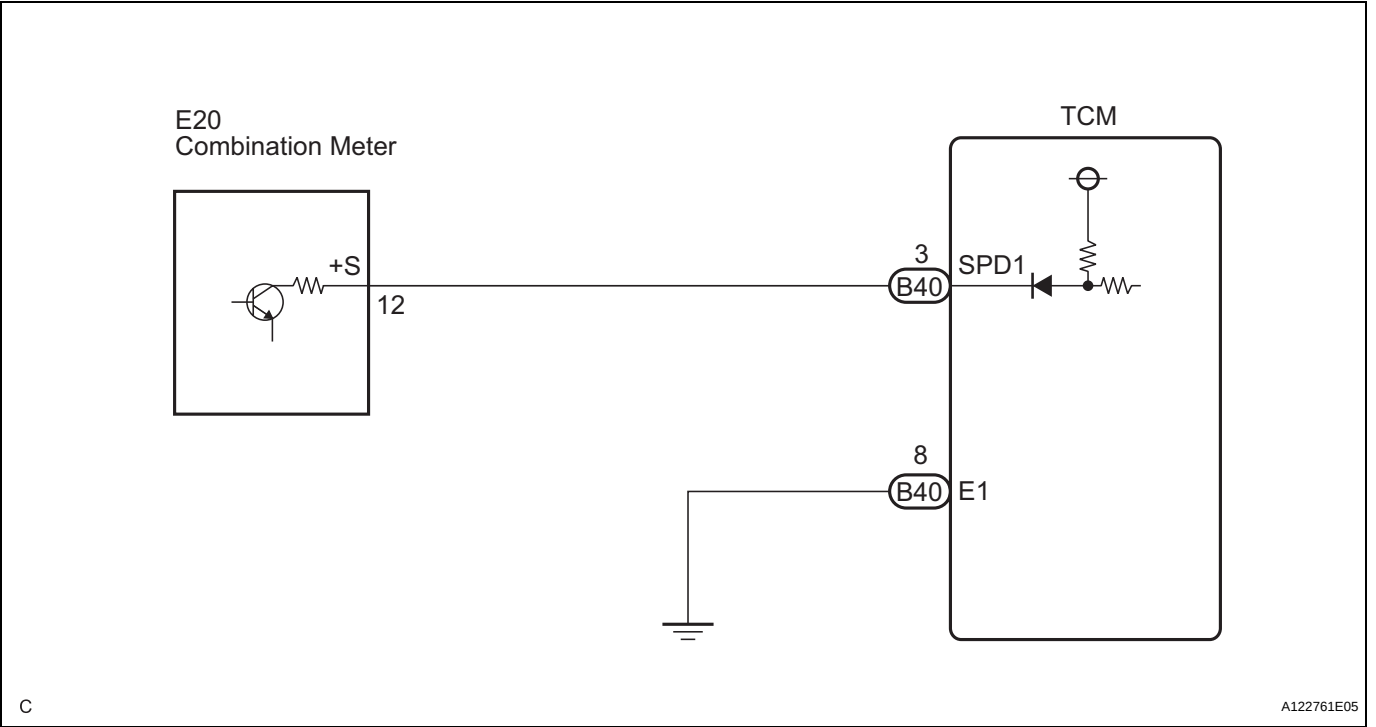
Engine	Running
Transmission counter gear revolution	300 rpm or more
Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

Either a or b is met (See below)	
a. All of the following conditions are met	
ECT	20°C (68°F) or more
ECT sensor fail	Not detected
Time after PNP switch ON to OFF	2 sec. or more
b. All of the following conditions are met	
ECT	Less than 20°C (68°F)
ECT sensor fail	Detected
Time after PNP switch ON to OFF	30 sec. or more

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input
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WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEEDOMETER (METER OPERATION)
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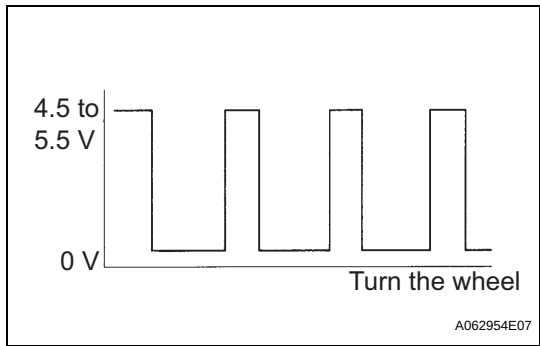
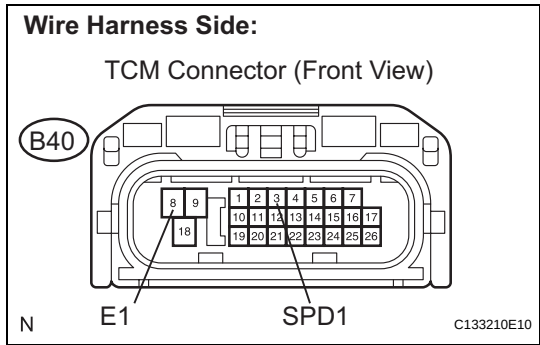
- (a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

OK

NG CHECK SPEEDOMETER CIRCUIT

2

INSPECT TCM



- (a) Shift the lever to the neutral position.
- (b) Jack up the vehicle.
- (c) Disconnect the TCM connector.
- (d) Turn the engine switch on (IG).

- (e) Measure the voltage according to the value(s) in the table below as the wheel is turned slowly.

Standard

Tester Connection	Specified Condition
B40-3 (SPD1) - B40-8 (E1)	Voltage is generated intermittently

HINT:
The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TCM

DIAGNOSTIC TROUBLE CODE CHART

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

HINT:

- *1: MIL (Malfunction Indicator Lamp) comes on.
- *2: "DTC stored" mark means TCM memorizes the trouble code if the TCM detects that the DTC detection condition is satisfied.
- A DTC may be output when the clutch, brake and gear components, etc. inside the automatic transaxle are damaged.

DTC Code	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0500	Vehicle Speed Sensor "A"	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. Combination meter 4. TCM	Comes on	DTC stored	AX-50
P0560	System Voltage	1. Open in TCM back-up power source circuit 2. TCM	Comes on	DTC stored	AX-53
P0617	Starter Relay Circuit High	1. Park/neutral Position (PNP) switch 2. Starter relay circuit 3. Cranking holding function circuit 4. TCM	Comes on	DTC stored	AX-56
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	1. Short in park/neutral position switch circuit 2. Park/neutral Position switch 3. TCM	Comes on	DTC stored	AX-59
P0710	Transmission Fluid Temperature Sensor "A" Circuit	1. Open or short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-67
P0711	Transmission Fluid Temperature Sensor "A" Performance	Transmission wire (ATF temperature sensor) Temperature	Comes on	DTC stored	AX-72
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	1. Short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-67
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	1. Open in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-67

DTC Code	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0715	Input / Turbine Speed Sensor Circuit Malfunction	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-78
P0717	Input Speed Sensor Circuit No Signal	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-78
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch signal circuit 2. Stop light switch 3. TCM	Comes on	DTC stored	AX-83
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	1. Shift solenoid valve SL remains closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-86
P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	1. Shift solenoid valve SL1 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-91
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	1. Open or short in shift solenoid valve SL1 circuit 2. Shift solenoid valve SL1 3. TCM	Comes on	DTC stored	AX-96
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	1. Shift solenoid valve SL2 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-99
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	1. Open or short in shift solenoid valve SL2 circuit 2. Shift solenoid valve SL2 3. TCM	Comes on	DTC stored	AX-104
P0791	Intermediate Shaft Speed Sensor "A" Circuit	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-107
P0793	Intermediate Shaft Speed Sensor "A"	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-107

DTC Code	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	1. Shift solenoid valve SL3 remains open or closed. 2. Valve body is blocked. 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-112
P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	1. Open or short in shift solenoid valve SL3 circuit 2. Shift solenoid valve SL3 3. TCM	Comes on	DTC stored	AX-117
P0872	Transmission Fluid Pressure Switch No.1 Circuit Low	1. ATF temperature sensor assembly (ATF pressure switch No. 1) 2. Transmission wire 3. TCM	-	DTC stored	AX-120
P0873	Transmission Fluid Pressure Switch No.1 Circuit High	1. ATF temperature sensor assembly (ATF pressure switch No. 1) 2. Transmission wire 3. TCM	-	DTC stored	AX-120
P0877	Transmission Fluid Pressure Switch No.2 Circuit Low	1. ATF temperature sensor assembly (ATF pressure switch No. 2) 2. Transmission wire 3. TCM	-	DTC stored	AX-124
P0878	Transmission Fluid Pressure Switch No.2 Circuit High	1. ATF temperature sensor assembly (ATF pressure switch No. 2) 2. Transmission wire 3. TCM	-	DTC stored	AX-124
P0989	Transmission Fluid Pressure Switch No.3 Circuit Low	1. ATF temperature sensor assembly (ATF pressure switch No. 3) 2. Transmission wire 3. TCM	Comes on	DTC stored	AX-128
P0990	Transmission Fluid Pressure Switch No.3 Circuit High	1. ATF temperature sensor assembly (ATF pressure switch No. 3) 2. Transmission wire 3. TCM	Comes on	DTC stored	AX-128
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	1. Shift solenoid valve SLT remains open 2. Shift solenoid valve SL1, SL2, SL3 or SL4 remains open or closed 3. Valve body is blocked 4. Automatic transaxle (clutch, brake or gear, etc.)	Comes on	DTC stored	AX-133

DTC Code	Detection Item	Trouble Area	MIL*1	Memory*2	See page
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	1. Open or short in shift solenoid valve SLT circuit 2. Shift solenoid valve SLT 3. TCM	Comes on	DTC stored	AX-140
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	1. Shift solenoid valve SLU remains open or closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear, etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-143
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	1. Open or short in shift solenoid valve SLU circuit 2. Shift solenoid valve SLU 3. TCM	Comes on	DTC stored	AX-148
P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Short in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-151
P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Open in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-151
P2808	Pressure Control Solenoid "G" Performance or Stuck OFF (Shift Solenoid Valve SL4)	1. Shift solenoid valve SL4 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-154
P2810	Pressure Control Solenoid "G" Electrical (Shift Solenoid Valve SL4)	1. Open or short in shift solenoid valve SL4 circuit 2. Shift solenoid valve SL4 3. TCM	Comes on	DTC stored	AX-160
U0100	Lost Communication with ECM/PCM "A"	TCM	Comes on	DTC stored	AX-163