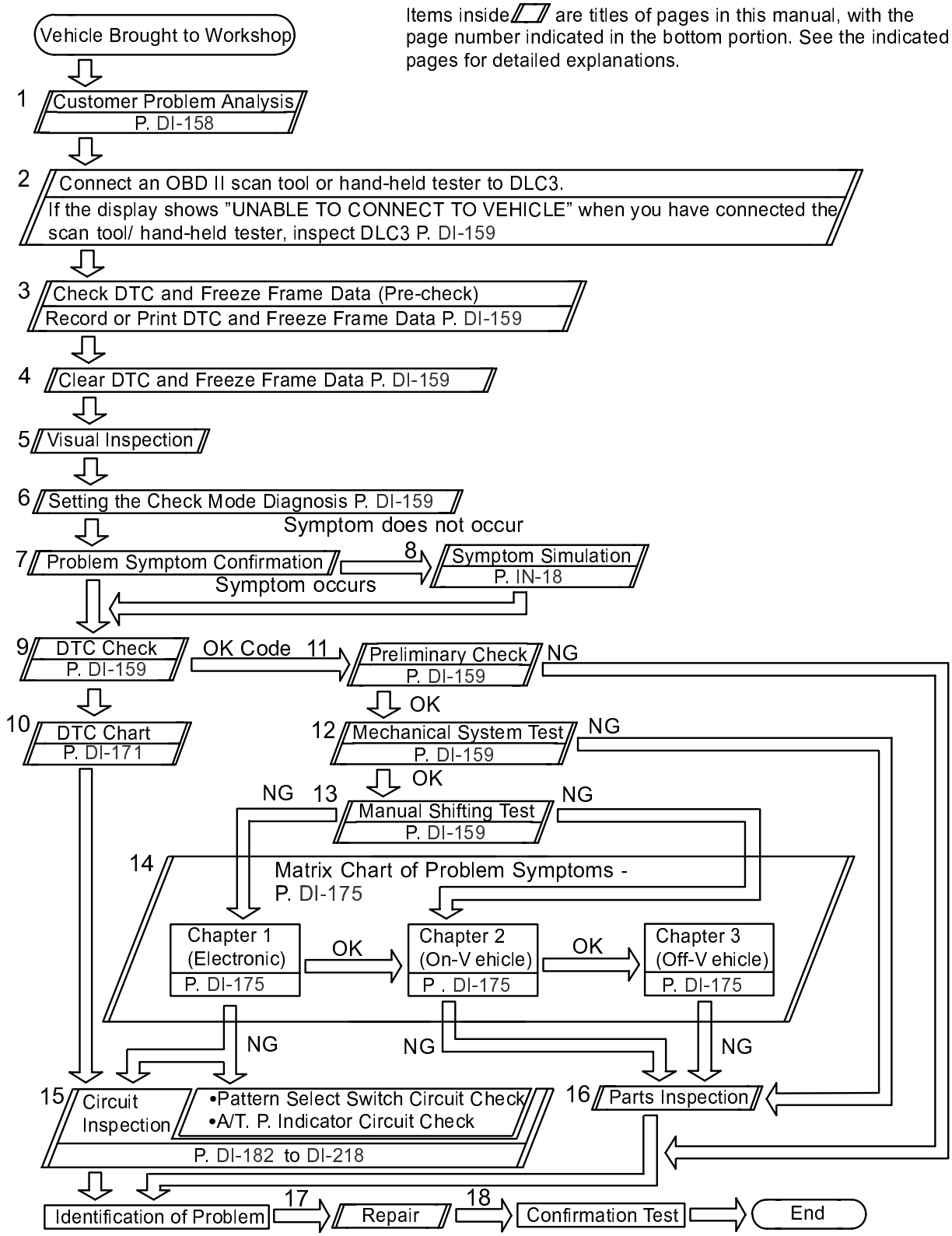
AUTOMATIC TRANSMISSION

HOW TO PROCEED WITH TROUBLESHOOTING

DJ0SL-29

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI0SM-03

CUSTOMER PROBLEM ANALYSIS CHECK

Transmission Control System Check Sheet	Inspector's Name :

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

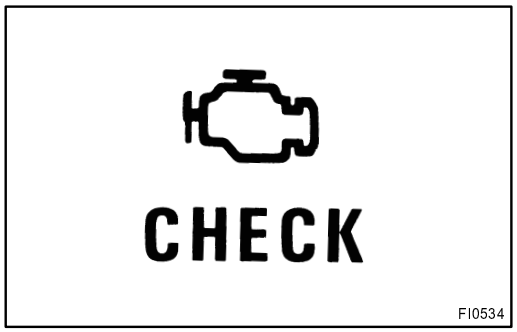
Date Problem Occurred	/ /
How Often Problem Occurs?	☐ Continuous ☐ Intermittent (times a day)

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

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code	☐ Malfunction code (Code)
	2nd Time	☐ Normal code	☐ Malfunction code (Code)

DJ8WD-02



PRE-CHECK

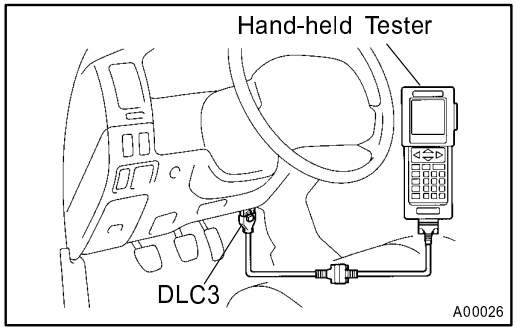
1. DIAGNOSIS SYSTEM

(a) Description

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

  OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI-13).

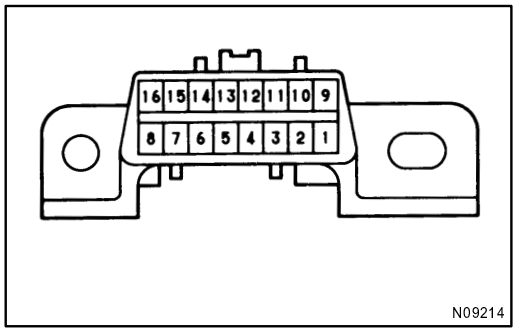
  If the malfunction only occurs in 3 trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



- To check the DTCs, connect an OBD II scan tool or hand-held tester to DLC3 on the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book). DTCs include SAE controlled codes and Manufacturer controlled codes.

  SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI-171).

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up and for a malfunction that is only detected once or momentarily.
  (hand-held tester) (See page DI-159)
- *2 trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up.

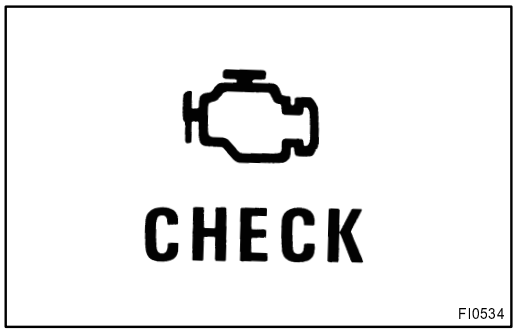


(b) Inspect the DLC3.
The vehicle's ECM uses the V.P.W. (Variable Pulse Width) for communication to comply with SAE J1850. The terminal arrangement of DLC3 complies with SAE J1962 and matches the V.P.W. format.

Terminal No.	Connection / Voltage or Resistance	Condition
2	Bus (+) Line / Pulse generation	During communication
4	Chassis Ground ↔ Body / 1 Ω or less	Always
5	Signal Ground ↔ Body / 1 Ω or less	Always
16	Battery Positive ↔ Body / 9 ~ 14 V	Always

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

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the MIL.

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

HINT:

If the MIL does not light up, troubleshoot the combination meter (See page BE-2).

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

(b) Check the DTC.

NOTICE:

hand-held tester only: When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.

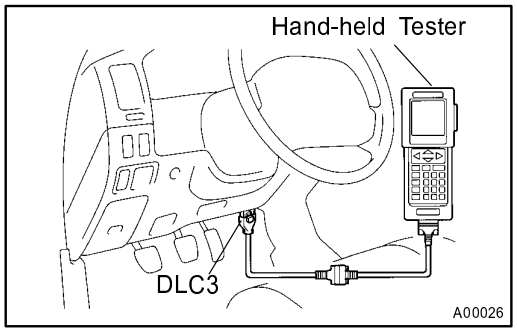
(1) Prepare an OBD II scan tool (complying with SAE J1978) or hand-held tester.

(2) Connect the OBD II scan tool or hand-held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or hand-held tester switch ON.

(4) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

(5) See page DI-159 to confirm the details of the DTCs.



NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptoms have been simulated the 1st time. Then repeat the simulation process again. When the program has DTCs, they are recorded in the ECM.

3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

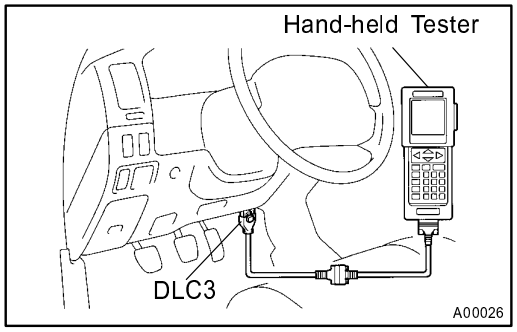
hand-held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

(a) Check the DTC.

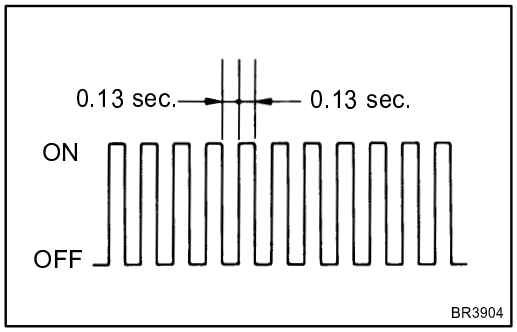
(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transmission in P position.
- Air conditioning switched OFF.

(2) Turn the ignition switch OFF.
(3) Prepare a hand-held tester.



(4) Connect the hand-held tester to DLC3 at the lower portion of the instrument panel.
(5) Turn the ignition switch ON and switch the hand-held tester ON.



(6) Switch the hand-held tester from Normal mode to Check mode (Check that the MIL flashes).
(7) Start the engine (MIL goes out after the engine starts).
(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:
Leave the ignition switch ON until you have checked the DTCs, etc.

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

HINT:
Take care not to turn the ignition switch OFF, as turning it off the diagnosis system switches Check mode to Normal mode, so all DTCs, etc. are erased.

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

(b) Clear the DTC.
The following operation will erase the DTC and freeze frame data. Operating an OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes (See the OBD II scan tool's instruction book for operating instructions.).

4. ROAD TEST

NOTICE:

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

(a) D position test (NORM and PWR pattern):

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

(1) Check up-shift operation.

1 → 2, 2 → 3 and 3 → O/D up-shift takes place, at the shift point shown in the automatic shift schedule (See page SS-23).

HINT:

- O/D Gear Up-shift Prohibition Control (1. Coolant temp. is 60 °C (140 °F) or less.)
- O/D Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 °C (140 °F) or less.)

(2) Check for shift shock and slip.

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

(3) Check for abnormal noises and vibration.

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

HINT:

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

(4) Check kick-down operation.

While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated on the automatic shift schedule (See page SS-23).

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

(6) Check the lock-up mechanism.

- Drive in D position, O/D gear, at a steady speed (lock-up ON) of about 70 km/h (43 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, lock-up mechanism is not functioning.

(b) 2 position test:

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

(1) Check up-shift operation.

Check to see that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

HINT:

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

(2) Check engine braking.

While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) L position test:

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

(1) Check no up-shift.

While running in the L position, check that no up-shift occurs to 2nd gear.

(2) Check engine braking.

While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(d) R position test:
Shift into the R position and fully depress the accelerator pedal and check for slipping.

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

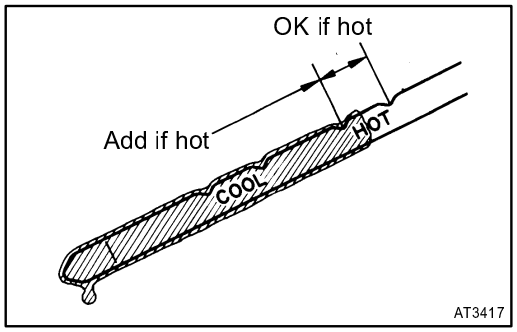
(e) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check to see that the parking lock pawl holds the vehicle in place.

5. BASIC INSPECTION

(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transmission are at normal operating temperature.
  Fluid temp.: 70 - 80 °C (158 - 176 °F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.



(1) Park the vehicle on a level surface and set the parking brake.
(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.
(5) Pull it out and check that the fluid level is in the HOT range.

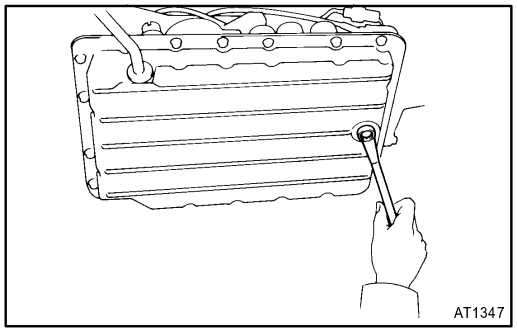
If the level is not within the HOT range, add new fluid.

Fluid type: ATF D-II or DEXRON®III (DEXRON®II)

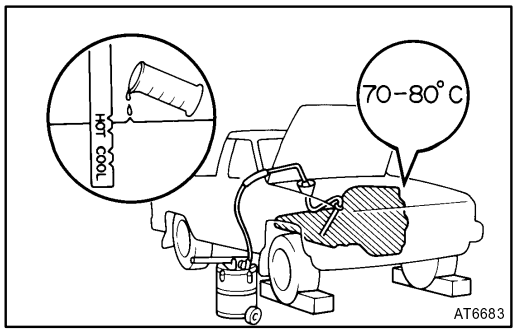
NOTICE:
Do not overfill.

(b) Check the fluid condition.

If the fluid smells burnt or is black, replace it.



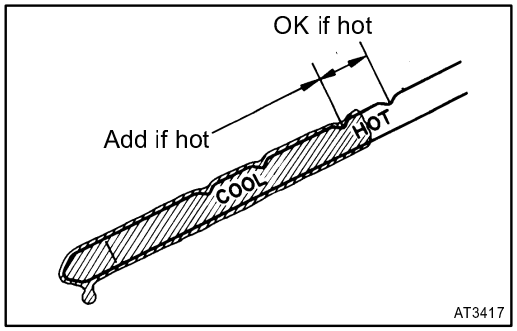
(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.



(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF D-II or DEXRON®III (DEXRON®II)
Capacity:
A340E: 1.6 liters (1.7 US qts, 1.4 Imp. qts)
A340F: 2.0 liters (2.1 US qts, 1.8 Imp. qts)

(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.



(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.

(6) Check the fluid level at the normal operating temperature, 70 - 80 °C (158 - 176 °F), and add as necessary.

NOTICE:
Do not overfill.

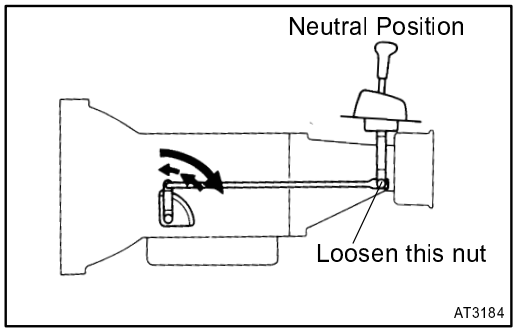
(d) Check the fluid leaks.
Check for leaks in the transmission.

If leaks occurs, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs or other parts.

(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is not aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

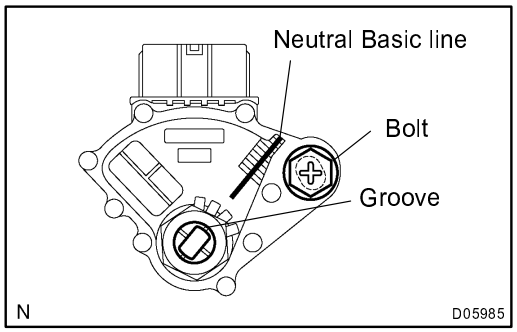
(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully rearward.
(3) Return the control shaft lever 2 notches to N position.



(4) Set the shift lever to N position.
(5) While holding the shift lever lightly toward the R position side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

(6) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



(f) Inspect and adjust the park/neutral position.
Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

(1) Loosen the park/neutral position switch bolt and set the shift lever to the N position.
(2) Align the groove with neutral basic line.
(3) Hold in position and tighten the bolt.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

HINT:

For continuity inspection of the park/neutral position switch, See page DI-203 .

(g) Check the idle speed.

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm

6. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

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

NOTICE:

- **Do the test at normal operating fluid temperature 50 - 80 °C (122 - 176 °F).**
- **Do not continuously run this test longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect an OBD II scan tool or hand-held tester to DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressing firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Depress all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed:

2,250 ± 150 rpm

(7) Do the same test in R position.

Stall speed:

2,250 ± 150 rpm

Evaluation:

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

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

NOTICE:

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

(1) Fully apply the parking brake.
(2) Start the engine and check idle speed.
Idle speed (In N position and air conditioner OFF):
700 ± 50 rpm
(3) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.
Time lag: N → D Less than 1.2 seconds
(4) In the same manner, measure the time lag for N → R.
Time lag: N → R Less than 1.5 seconds

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

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

7. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

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

(1) Warm up the ATF.
(2) Remove the test plug on the transmission case front left side and connect SST (See page AT-18 for the location to connect SST).

SST 09992-00095, 09992-00151, 09992-00271

(3) Fully apply the parking brake and chock the 4 wheels.
(4) Start the engine and check idling speed.
(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.
(6) Measure the line pressure when the engine is idling.
(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
(8) In the same manner, do the test in R position.

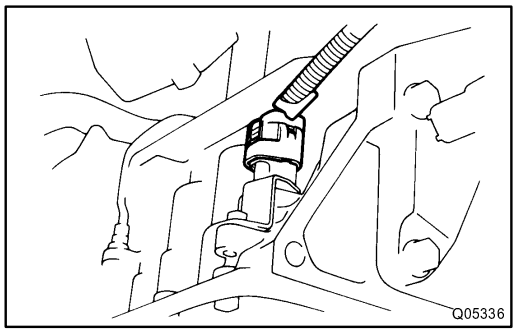
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	382 - 441 (3.9 - 4.5, 55 - 64)	598 - 696 (6.1 - 7.1, 87 - 101)
Stall	1,196 - 1,334 (12.2 - 13.6, 174 - 193)	1,598 - 1,942 (16.3 - 19.8, 232 - 282)

If the measured pressures are not up to the specified values, recheck the throttle cable adjustment and re-test.

Evaluation

Problem	Possible cause
If the measured values at all positions are higher	• Shift solenoid valve SLT • Throttle valve defective • Regulator valve defective
If the measured values at all positions are lower	• Shift solenoid valve SLT • Throttle valve defective • Regulator valve defective • Oil pump defective • O/D direct clutch defective
If pressure is low in the D position only	• D position circuit fluid leaks • Forward clutch defective
If pressure is low in the R position only	• R position circuit fluid leakage • Direct clutch defective • 1st & reverse brake defective



8. MANUAL SHIFTING TEST

HINT:

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

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond with the table below.

While driving, shift through the L, 2 and D positions. Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	O/D
2	3rd
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the L, 2 and D position gear positions are difficult to distinguish, do the above read test.

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

(c) Connect the solenoid wire.

(d) Cancel out the DTC (See page DI-159).

DI0SO-19

DIAGNOSTIC TROUBLE CODE CHART

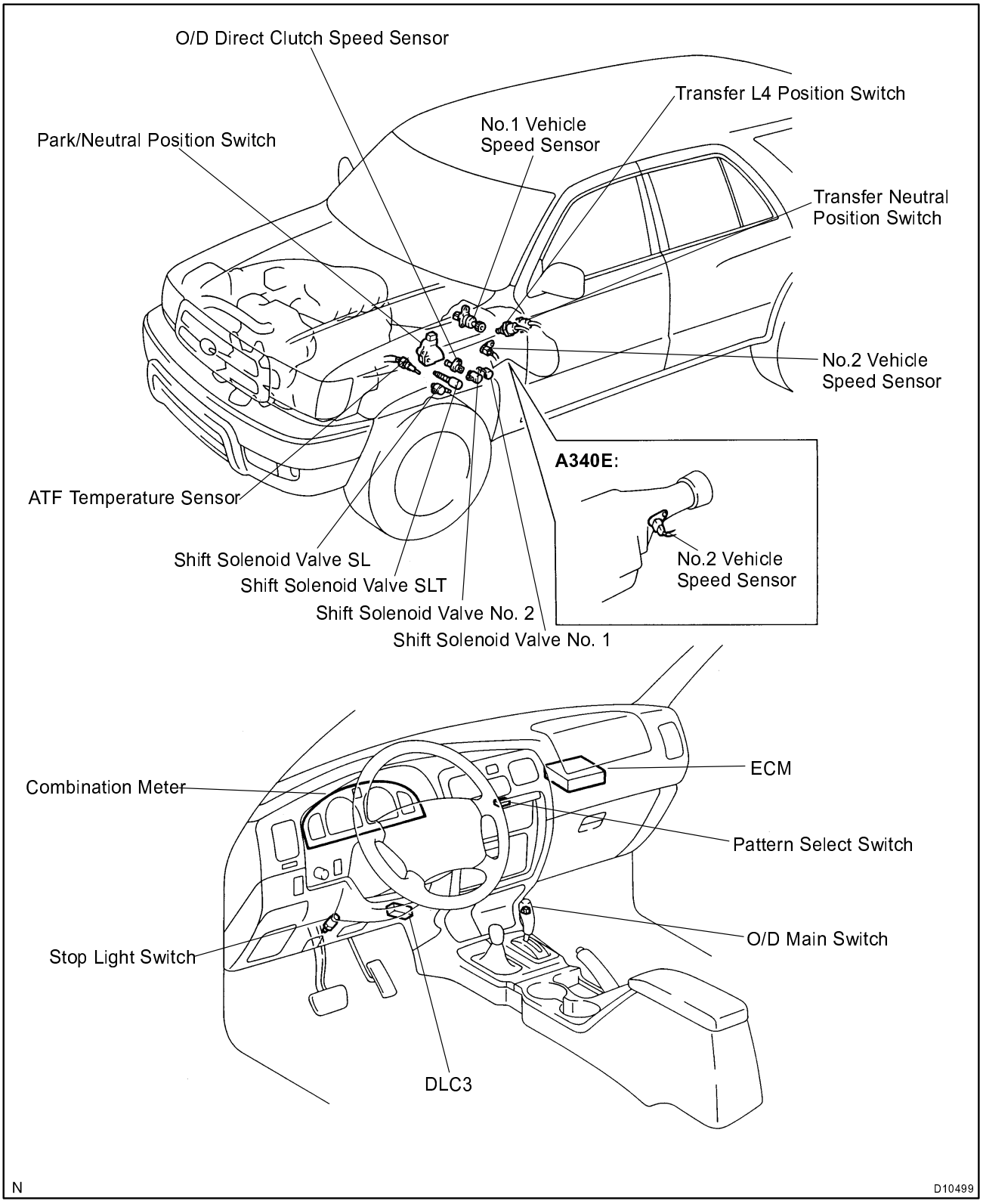
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory
P0500 (DI-179)	Vehicle Speed Sensor Malfunction	• Open or short in No. 1 vehicle speed sensor circuit • No. 1 vehicle speed sensor • Combination meter • ECM • Automatic transmission (clutch, bracket or gear etc.)	●	○
P0710 (DI-182)	Transmission Fluid Temperature Sensor Malfunction	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • ECM	●	○
P0750 (DI-184)	Shift Solenoid "A" Malfunction	• Shift solenoid valve No. 1 is stuck open or closed • Valve body is blocked up or stuck	●	○
P0753 (DI-186)	Shift Solenoid "A" Electrical	• Open or short in shift solenoid valve No. 1 circuit • Shift solenoid valve No. 1 • ECM	●	○
P0755 (DI-184)	Shift Solenoid "B" Malfunction	• Shift solenoid valve No. 2 is stuck open or closed • Valve body is blocked up or stuck	●	○
P0758 (DI-186)	Shift Solenoid "B" Electrical	• Open or short in shift solenoid valve No. 2 circuit • Shift solenoid valve No. 2 • ECM	●	○
P0770 (DI-190)	Shift Solenoid "E" Malfunction	• Shift solenoid valve SL is stuck open or closed • Valve body is blocked up or stuck • Lock-up clutch	●	○
P0773 (DI-192)	Shift Solenoid "E" Electrical	• Open or short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM	●	○
P1520 (DI-195)	Stop Light Switch Circuit Malfunction	• Short in stop light switch signal circuit • Stop light switch • ECM	●	○
P1700 (DI-196)	Speed Sensor No. 2 Malfunction	• Open or short in No. 2 vehicle speed sensor circuit • No. 2 vehicle speed sensor • ECM	●	○
P01760 (DI-200)	Linear Solenoid for Line Pressure Control Circuit Malfunction	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM	●	○
P1780 (DI-203)	Park/Neutral Position Switch Malfunction	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM	●	○
P1782 *2 (DI-208)	Transfer L4 SW Circuit Malfunction	• Transfer L4 position switch • Transfer L4 position switch circuit • ECM	●	○
P1783 *2 (DI-211)	Transfer N SW Circuit Malfunction	• Transfer neutral position switch • Transfer neutral position switch circuit • ECM	●	○

* 1: ●...MIL lights up.
* 2: 4WD only.

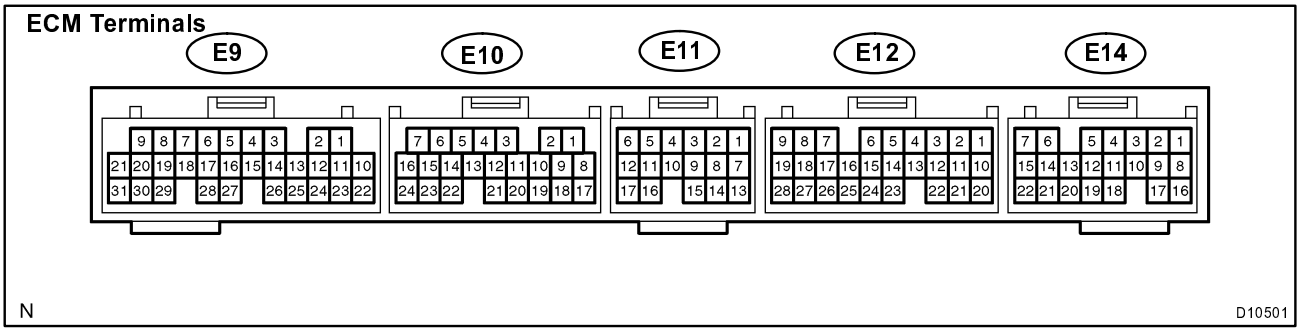
DI8WE-01

PARTS LOCATION



DJ8WF-02

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 - E1 (E9-3 - E10-17)	P-L ↔ BR	IG ON	9 - 14
		1st or 2nd gear	9 - 14
		3rd or O/D gear	Below 1.5
S2 - E1 (E9-2 - E10-17)	L-W ↔ BR	IG ON	Below 1.5
		2nd or 3rd gear	9 - 14
		1st or O/D gear	Below 1.5
SL - E1 (E9-1 - E10-17)	LG ↔ BR	IG ON	Below 1.5
		Vehicle driving under lock-up position	9 - 14
SLT + (E11-5) - SLT - (E11-11)	R-Y ↔ Y-B	IG ON	Below 3
		Engine is idling	Pulse signal is output Below 1.5 ↔ 10 - 12
SP1 (E14-6) - E1 (E10-17)	G-O ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation
SP2 + - SP2 - (E10-23 - E10-22)	Y-R ↔ W-R	Vehicle driving	Pulse signal is output Below 1.5 ↔ 4 - 6
ODLP - E1 (E12-20 - E10-17)	G-Y ↔ BR	O/D main switch ON (O/D OFF)	Below 3
		O/D main switch OFF (O/D ON)	9 - 14
THOC - E2 (E9-19 - E9-11)	L-R ↔ L-B	ATF temperature: 115°C (239°F) or more	Below 1.5
D (E12 - 25) - E1 (E10 - 17)	*1 W-R ↔ BR *2 GR-B ↔ BR	IG ON and Shift lever D position	9 - 14
		IG ON and Shift lever other than D position	Below 1.5
L - E1 (E12-4 - E10-17)	LG ↔ BR	IG ON and Shift lever L position	9 - 14
		IG ON and Shift lever other than L position	Below 1.5
2 - E1 (E12-5 - E10-17)	V ↔ BR	IG ON and Shift lever 2 position	9 - 14
		IG ON and Shift lever other than 2 position	Below 1.5
R - E1 (E12-6 - E10-17)	W-L ↔ BR	IG ON and Shift lever R position	9 - 14
		IG ON and Shift lever other than R position	Below 1.5
NSW - E1 (E12-3 - E10-17)	B ↔ BR	IG ON and Shift lever P or N position	Below 1.5
		IG ON and Shift lever other than P or N position	9 - 14
TFN *2 - E1 (E12-11 - E10-17)	B-R ↔ BR	IG ON and Transfer shift position H2 or H4 or L4	9 - 14
		IG ON and Transfer shift position N	Below 1.5
PWR - E1 (E12-1 - E10-17)	G-R ↔ BR	IG ON and Pattern select switch "NORM"	Below 1.5
		IG ON and Pattern select switch "PWR"	9 - 14
L4 *2 - E1 (E12-2 - E10-17)	L-R ↔ BR	IG ON and Transfer shift position L4	Below 1.5
		IG ON and Transfer shift position H2 or H4	9 - 14

OILW*2 - E1 (E12-21 - E10-17)	Y ↔ BR	ATF temperature: 149°C (300°F) or more	Below 1.5
ODMS - E1 (E12-14 - E10-17)	L-R ↔ BR	IG ON	9 - 14
		IG ON and Press continuously O/D main switch	Below 1.5

*1: 2WD
*2: 4WD

DI0SR-12

PROBLEM SYMPTOMS TABLE

HINT:

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

The Matrix Chart is divided into 3 chapters.

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

CHAPTER 1: ELECTRONIC CIRCUIT MATRIX CHART

Symptom	Suspect Area	See page
No up-shift (A particular gear from 1st to 3rd gear is not up-shifted)	1. ECM	IN-28
No up-shift (3rd → O/D)	3. O/D main switch & O/D OFF indicator light circuit 4. ECM	DI-218 IN-28
No down-shift (O/D → 3rd)	1. ECM	IN-28
No down-shift (A particular gear from 1st to 3rd gear is not down-shifted)	1. ECM	IN-28
No lock-up	1. ECM	IN-28
No lock-up off	1. ECM	IN-28
Shift point too high or too low	1. Pattern select switch circuit 2. ECM	DI-214 IN-28
Up-shift to O/D from 3rd while main switch is off	1. O/D main switch & O/D OFF indicator light circuit 2. ECM	DI-218 IN-28
Up-shift to O/D from 3rd while engine is cold	1. ECM	IN-28
Poor acceleration	1. ECM	IN-28
No pattern select	1. Pattern select switch 2. ECM	DI-214 IN-28
Large shift shock or engine stalls when starting off or stopping	1. ECM	IN-28

CHAPTER 2: ON-VEHICLE REPAIR
(★: A340E, A340F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM391U)
(★: A340F, A343F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM479U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off-vehicle repair matrix chart	DI-159 ★ ★ DI-175
Vehicle does not move in R position	1. Off-vehicle repair matrix chart	DI-175
Vehicle does not move in particular position or positions (except R position)	1. Off-vehicle repair matrix chart	DI-175
No up-shift (1st → 2nd)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No up-shift (2nd → 3rd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No up-shift (3rd → O/D)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No down-shift (O/D → 3rd)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No down-shift (3rd → 2nd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No down-shift (2nd → 1st)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	★ DI-175
No lock-up or No lock-up off	1. Lock-up control valve 2. Lock-up relay valve 3. Off-vehicle repair matrix chart	★ ★ DI-175
Harsh engagement (N → D)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_1 accumulator 4. Orifice control valve 5. Off-vehicle repair matrix chart	★ ★ ★ ★ DI-175
Harsh engagement (Lock-up)	1. Lock-up control valve 2. Lock-up relay valve 3. Solenoid relay valve 4. Off-vehicle repair matrix chart	★ ★ ★ DI-175
Harsh engagement (N → R)	1. Accumulator control valve 2. C_2 accumulator 3. Solenoid modulator valve 4. Off-vehicle repair matrix chart	★ ★ ★ DI-175
Harsh engagement (N → L)	1. Low coast modulator valve	★
Harsh engagement (1st → 2nd → 3rd → O/D)	1. Accumulator control valve 2. Solenoid modulator valve	★ ★
Harsh engagement (2nd → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_2 accumulator 4. Off-vehicle repair matrix chart	★ ★ ★ DI-175
Harsh engagement (3rd → O/D)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_0 accumulator 4. Off-vehicle repair matrix chart	★ ★ ★ DI-175

Symptom	Suspect Area	See page
Harsh engagement (O/D → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_0 accumulator 4. Off-vehicle repair matrix chart	★ ★ ★ DI-175
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Oil strainer 3. Pressure relief valve 4. Off-vehicle repair matrix chart	DI-159 ★ ★ DI-175
Slip or shudder (Particular position)	1. Transmission control rod 2. Off-vehicle repair matrix chart	DI-159 DI-175
No engine braking (1st: L position)	1. Low coast modulator valve 2. Off-vehicle repair matrix chart	★ DI-175
No engine braking (2nd: 2 position)	1. 2nd coast modulator valve 2. Off-vehicle repair matrix chart	★ DI-175
No kick-down	1. 1-2 shift valve 2. 2-3 shift valve	★ ★

CHAPTER 3: OFF-VEHICLE REPAIR
(★: A340E, A340F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM391U)
(★: A340F, A343F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM479U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. O/D one-way clutch (F_0) 2. O/D direct clutch (C_0) 3. O/D planetary gear unit 4. Torque converter clutch	★ ★ ★ ★
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. Direct clutch (C_2) 3. 1st and reverse brake (B_3) 4. O/D direct clutch (C_0)	★ ★ ★ ★
No up-shift (1st → 2nd)	1. 2nd brake (B_2) 2. No. 1 one-way clutch (F_1)	★ ★
No up-shift (2nd → 3rd)	1. Direct clutch (C_2)	★
No up-shift (3rd → O/D)	1. O/D brake (B_0)	★
No lock-up or No lock-up off	1. Torque converter clutch	★
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one-way clutch (F_0) 3. No. 2 one-way clutch (F_2)	★ ★ ★
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3) 3. O/D one-way clutch (F_0)	★ ★ ★
Harsh engagement (N → 2)	1. Forward clutch (C_1) 2. O/D one-way clutch (F_0) 3. No. 2 one-way clutch (F_2)	★ ★ ★
Harsh engagement (N → L)	1. Forward clutch (C_1) 2. 1st and reverse brake (B_3) 3. O/D one-way clutch (F_0) 4. No. 2 one-way clutch (F_2)	★ ★ ★ ★
Harsh engagement (Lock-up)	1. Torque converter clutch	★
Slip or shudder (Forward and reverse: After warm-up)	1. Torque converter clutch 2. O/D one-way clutch (F_0) 3. O/D direct clutch (C_0)	★ ★ ★
Slip or shudder (Particular position: Just after engine starts)	1. Torque converter clutch	★
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	★ ★
Slip or shudder (1st)	1. Forward clutch (C_1) 2. No. 2 one-way clutch (F_2)	★ ★
Slip or shudder (2nd)	1. 2nd brake (B_2) 2. 2nd coast brake (B_1) 3. No. 1 one-way clutch (F_1)	★ ★ ★
Slip or shudder (3rd)	1. Direct clutch (C_2)	★
Slip or shudder (O/D)	1. O/D brake (B_0)	★
No engine braking (1st - 3rd: D position)	1. 2nd brake (B_2)	★
No engine braking (1st: L position)	1. 1st and reverse brake (B_3)	★
No engine braking (2nd: 2 position)	1. 2nd coast brake (B_1)	★
Poor acceleration (All position)	1. Torque converter clutch	★
Poor acceleration (O/D)	1. O/D direct clutch (C_0) 2. O/D planetary gear unit	★ ★
Engine stalls when starting off or stopping	1. Torque converter clutch	★

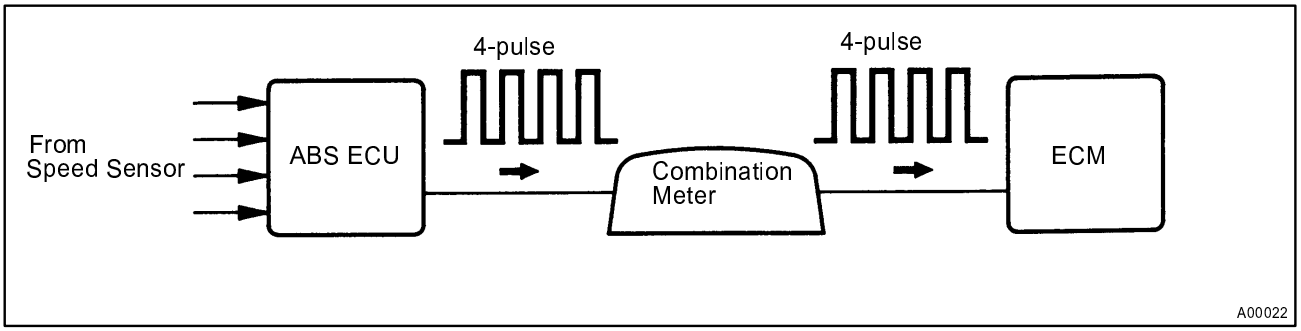
D3BU-10

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction

CIRCUIT DESCRIPTION

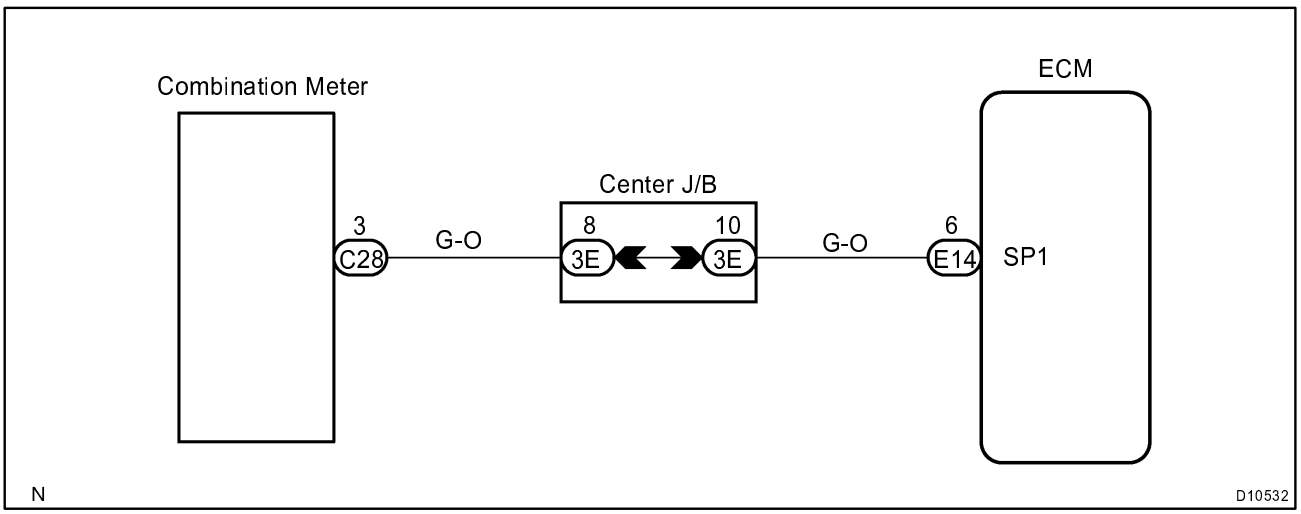
The speed sensor for ABS detects the wheel speed and sends the appropriate signals to the ABS ECU. The ECU converts these signals into a 4-pulse signal and outputs it to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under conditions 1. and 2. (2-trip detection logic). 1. Park/neutral position switch is OFF. 2. Vehicle is being driven.	• Open or short in No. 1 vehicle speed sensor circuit • No. 1 vehicle speed sensor • Combination meter • ECM • Automatic transmission (clutch, brake or gear etc.)
	Clutch or brake slips or gear is broken	

HINT:
Check the No. 1 vehicle speed sensor when DTC P0500 (Vehicle Speed Sensor Malfunction) is output.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

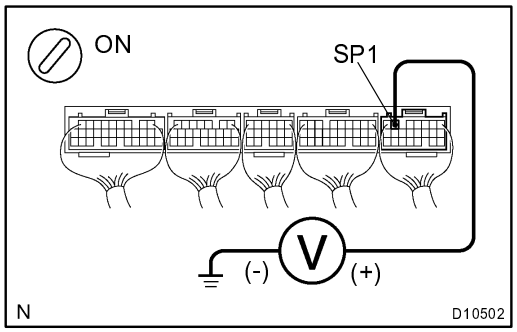
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit (See page BE-40).**

OK

2	**Check voltage between terminal SP1 of ECM connector and body ground.**



PREPARATION:

(a) Shift the shift lever to neutral.

(b) Jack up a rear wheels on one side.

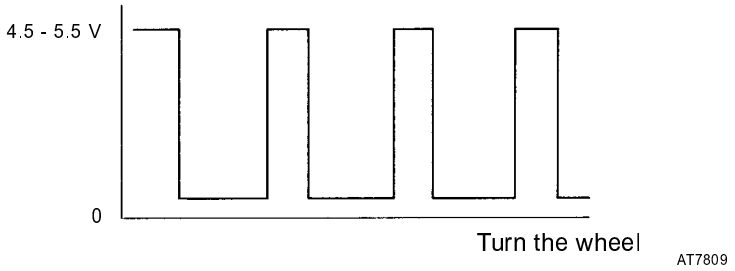
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal SP1 of ECM connector and body ground when the wheel is turned slowly.

OK:

Voltage is generated intermittently.



NG → **Check and repair harness and connector between combination meter and ECM (See page IN-28).**

OK

3	Check ECM (See page IN-28).

NG → Replace the ECM.

OK

Check and repair the transmission (clutch, brake or gear etc.).

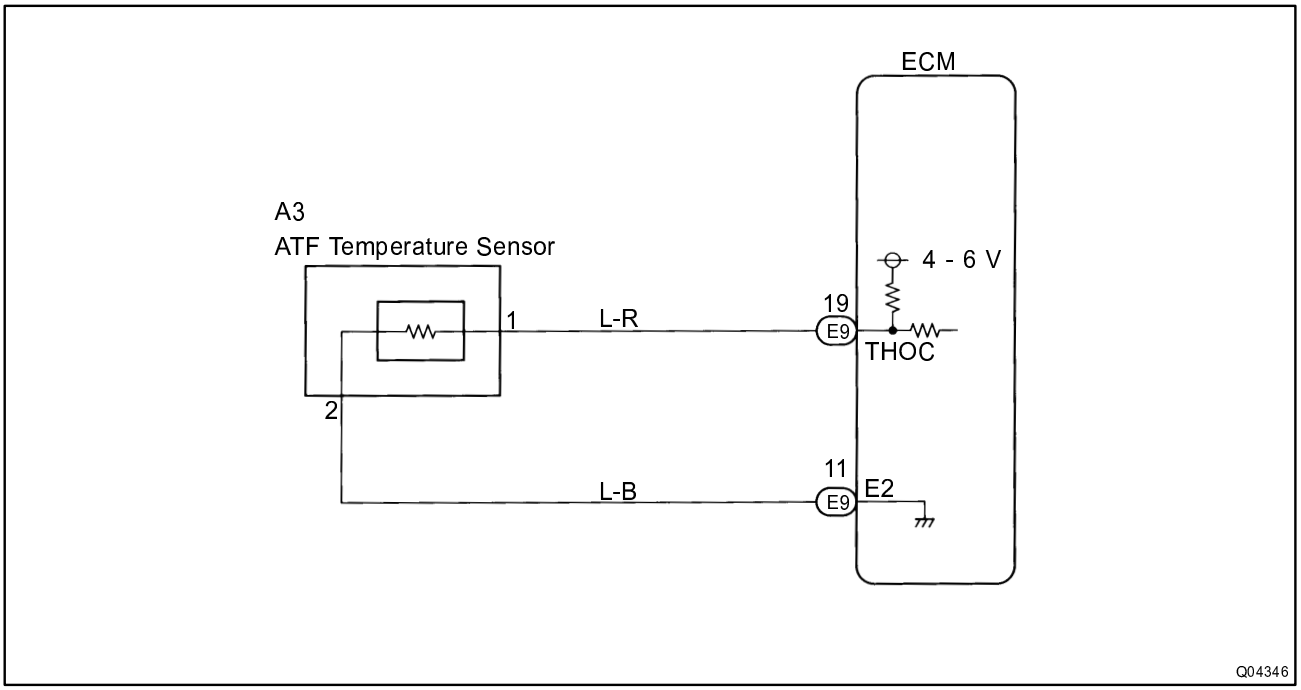
DTC	P0710	Transmission Fluid Temperature Sensor Malfunction

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

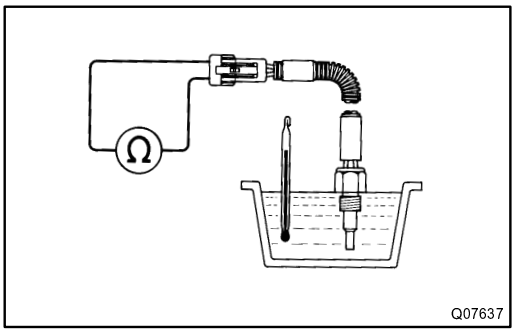
DTC No.	DTC Detecting Condition	Trouble Area
P0710	Either 1. or 2. is detected for 0.5 sec. or more (2 trip detection logic). 1. Temp. sensor resistance is less than 79 Ω 2. After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 kΩ	• Open or short in ATF temp. sensor • ATF temp. sensor • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ATF temperature sensor.**



PREPARATION:
Remove the ATF temperature sensor.
CHECK:
Measure resistance between terminals of ATF temperature sensor at 20 °C (68 °F) and 110 °C (230 °F).
OK:

Resistance (Approx.):
20 °C (68 °F): 4.29 kΩ
110 °C (230 °F): 690 Ω

NG → **Replace the ATF temperature sensor.**

OK

2	**Check harness and connector between ATF temperature sensor and ECM (See page IN-28).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM.

DI0SU-14

DTC	P0750	Shift Solenoid "A" Malfunction

DTC	P0755	Shift Solenoid "B" Malfunction

SYSTEM DESCRIPTION

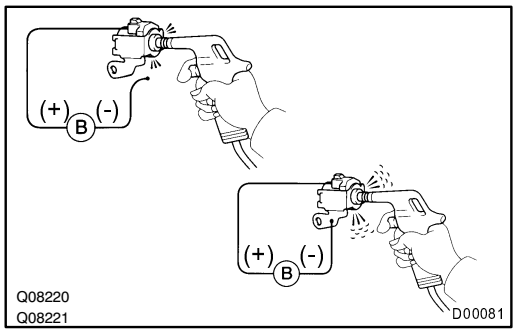
The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755	During normal driving, the gear required by the ECM does not match the actual gear (2 trip detection logic).	• Shift solenoid valve No. 1/No. 2 is stuck open or closed • Valve body is blocked up or stuck

HINT:
Check the shift solenoid valve No. 1 when DTC P0750 (Shift Solenoid "A" Malfunction) is output and check shift solenoid valve No. 2 when DTC P0755 (Shift Solenoid "B" Malfunction) is output.

INSPECTION PROCEDURE

1	Check shift solenoid valve No. 1 or No. 2 operation.



PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve No. 1 or No. 2.

CHECK:
(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.
(b) When battery positive voltage is supplied to the shift solenoid valve, check that the solenoid valve opens.

OK:

(a) Solenoid valve does not leak air.
(b) Solenoid valve opens.

NG → **Replace the shift solenoid valve No. 1 or No. 2.**

OK

2	Check the valve body (See page DI-175).

NG → Repair or replace the valve body.

OK

Repair or replace the transmission (See page AT-18 and AT-22).

DI0SV-22

DTC	P0753	Shift Solenoid ”A” Electrical

DTC	P0758	Shift Solenoid ”B” Electrical

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with status (ON and OFF) of the shift solenoid valves No. 1 and No. 2 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

Position	NORMAL			SHIFT SOLENOID No. 1 MALFUNCTIONING			SHIFT SOLENOID No. 2 MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No. 1	No. 2		No. 1	No. 2		No. 1	No. 2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	3rd
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	3rd
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

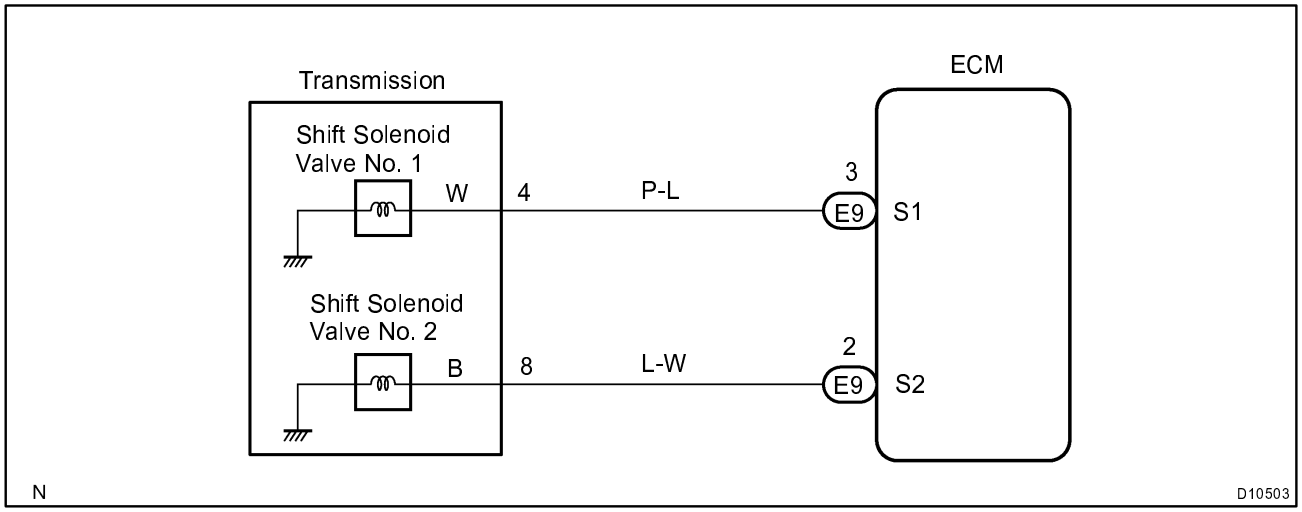
HINT:

Check the shift solenoid valve No. 1 when DTC P0753 (Shift Solenoid ”A” Electrical) is output and check the shift solenoid valve No. 2 when DTC P0758 (Shift Solenoid ”B” Electrial) is output.

DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The ECM checks for an open or short circuit in the shift solenoid valve No. 1 or No. 2 circuit when it changes. The ECM records DTC P0753 or P0758 if condition 1. or 2. is detected once, but it does not light up MIL. After ECM detects condition 1. or 2. continuously 8 times or more in one-trip, it causes the MIL light up until condition 1. or 2. disappears. After that, if the ECM detects condition 1. or 2. once, it starts lighting up MIL again. 1. Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. 2. Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in shift solenoid valve No. 1/No. 2 circuit • Shift solenoid valve No. 1/No. 2 • ECM

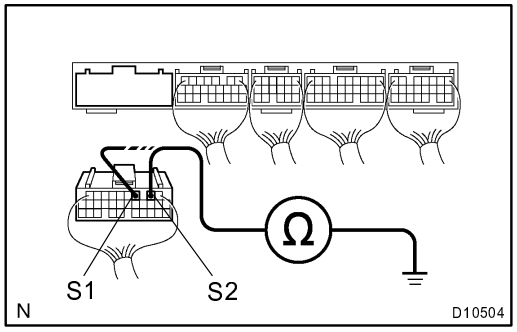
Fail safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table above. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunctioning, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the table above must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal S1 or S2 of ECM and body ground.**

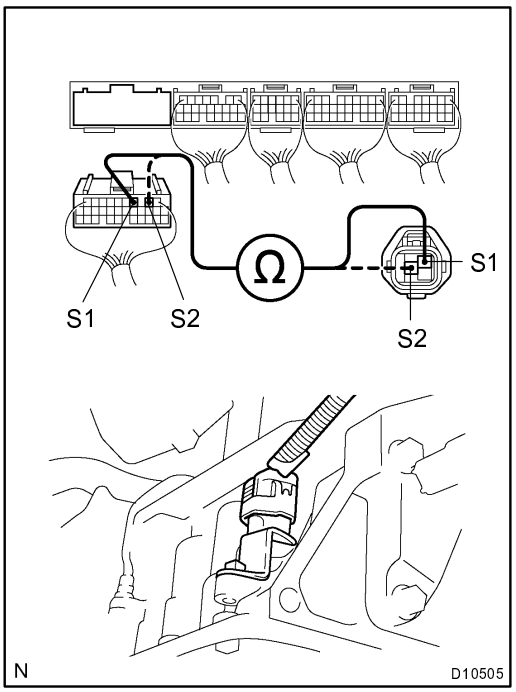


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal S1 or S2 of ECM and body ground.
OK:
Resistance: 11 - 15 Ω at 20°C (68°F)

OK	**Check and replace the ECM (See page IN-28).**

NG

2	Check harness and connector between ECM and automatic transmission solenoid connector.

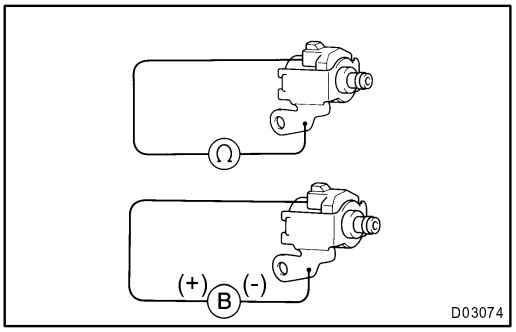


PREPARATION:
Disconnect the solenoid connector from the automatic transmission.
CHECK:
Check the harness and connector between terminal S1 or S2 of ECM and terminal S1 or S2 of solenoid connector.
OK:
There is no open and no short circuit.

NG → **Repair or replace the harness or connector.**

OK

3	Check shift solenoid valve No. 1 or No. 2.



PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve No. 1 or No. 2.
CHECK:
(a) Measure resistance between solenoid connector and body ground.
(b) Connect positive (+) lead to terminal of solenoid connector, negative (-) lead to solenoid body.
OK:
(a) Resistance: 11 - 15 Ω at 20°C (68°F)
(b) The solenoid makes an operation noise.

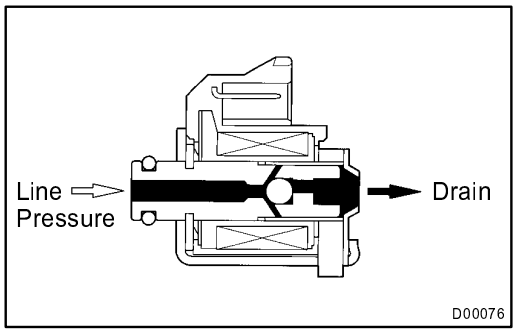
NG → **Replace the solenoid valve.**

OK

Repair or replace the solenoid wire.

DI0SW-15

DTC	P0770	Shift Solenoid "E" Malfunction



SYSTEM DESCRIPTION

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

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

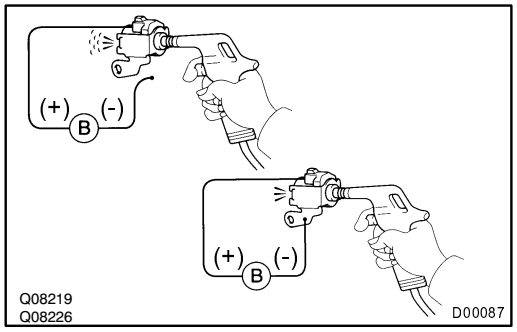
DTC No.	DTC Detecting Condition	Trouble Area
P0770	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in the lock-up OFF range (2 trip detection logic).	• Shift solenoid valve SL is stuck open or closed • Valve body blocked up or stuck • Lock-up clutch

HINT:

Check the shift solenoid valve SL when DTC P0770 (Shift Solenoid "E" Malfunction) is output.

INSPECTION PROCEDURE

1	Check solenoid valve SL operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SL.

CHECK:

(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.

(b) When battery voltage is supplied to the shift solenoid valve, check that the solenoid valve opens.

OK:

(a) Solenoid valve does not leak air.

(b) Solenoid valve opens.

NG	Replace the solenoid valve SL.

OK

2	Check valve body (See page DI-175).

NG → Repair or replace the valve body.

OK

Replace the torque converter clutch (See page AT-18 and AT-22).

DI0SX-20

DTC	P0773	Shift Solenoid ”E” Electrical

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either 1. or 2. is detected for 1 time (2 - trip detection logic). 1. Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. 2. Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in shift solenoid valve SL circuit • Shift solenoid valve SL • ECM

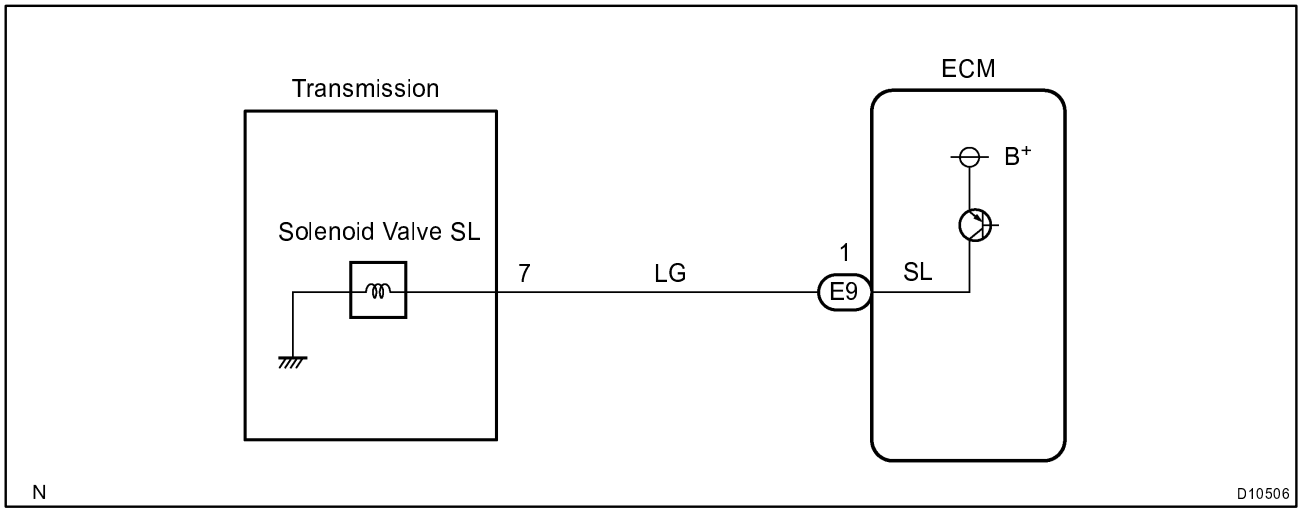
Fail safe function

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

HINT:

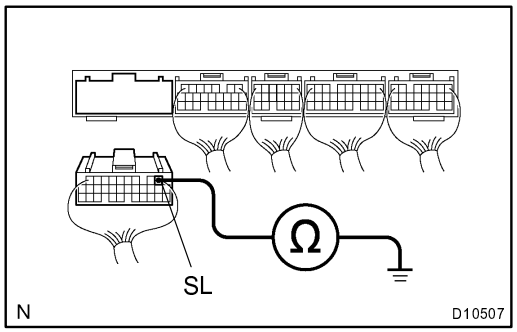
Check the shift solenoid valve SL when DTC P0773 (Shift Solenoid ”E” Electrical) is output.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal SL of ECM and body ground.**

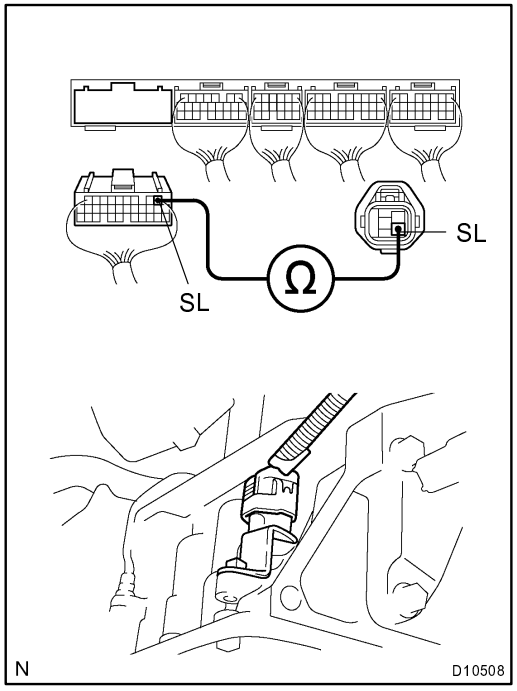


PREPARATION:
Disconnect the connector from the ECM.
CHECK:
Measure resistance between terminal SL of ECM and body ground.
OK:
Resistance: 11 - 15 Ω at 20°C (68°F)

OK → **Check and replace the ECM (See page IN-28).**

NG

2	**Check harness and connector between ECM and automatic transmission solenoid connector.**

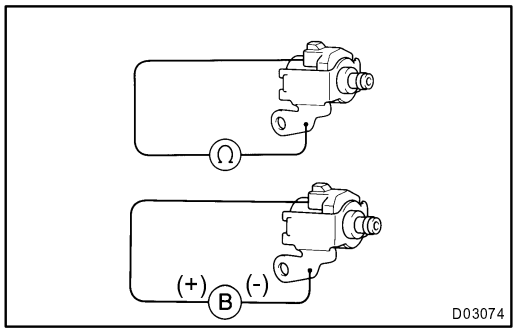


PREPARATION:
Disconnect the solenoid connector from the transmission.
CHECK:
Check the harness between terminal SL of ECM and terminal SL of transmission solenoid connector.
OK:
There is no open or short circuit.

NG → **Repair or replace the harness or connector.**

OK

3	Check shift solenoid valve SL.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SL.

CHECK:

(a) Measure resistance between terminal SL of shift solenoid valve and solenoid body.

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

OK:

(a) Resistance: 11 - 15 Ω at 20°C (68°F)

(b) The shift solenoid valve SL makes operation noise.

NG → **Replace the shift solenoid valve SL.**

OK

Repair or replace the solenoid wire.

DI0SY-07

DTC	P1520	Stop Light Switch Circuit Malfunction

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is operated, this switch sends a signals to ECM. Then the ECM cancels operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P1520	The stop light switch does not turn off even once the vehicle is driven (2 trip detection logic).	• Short in stop light switch signal circuit • Stop light switch • ECM

WIRING DIAGRAM

See page DI-144 .

INSPECTION PROCEDURE

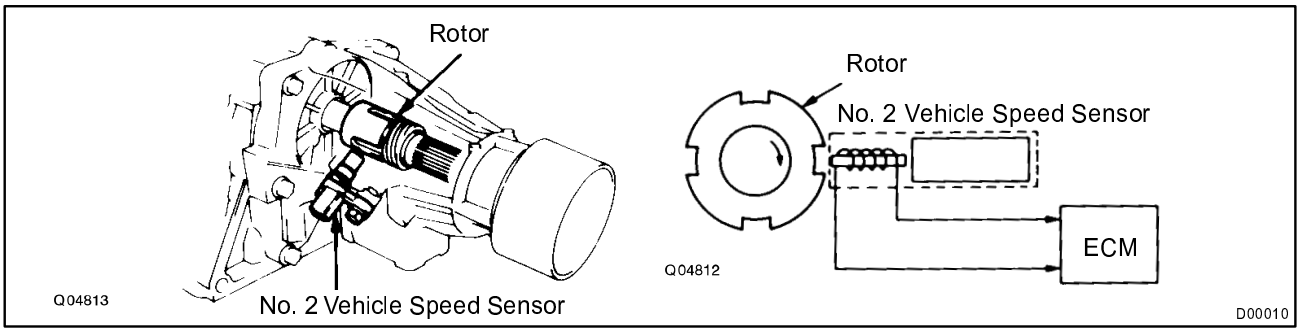
See page DI-144 .

DI0SZ-27

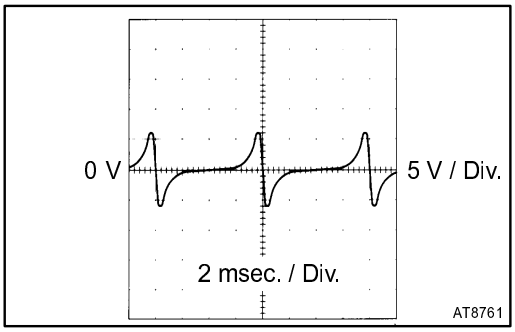
DTC	P1700	Speed Sensor No. 2 Malfunction

CIRCUIT DESCRIPTION

The No. 2 vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals.
An AC voltage is generated in the No. 2 vehicle speed sensor coil as the rotor mounted on the output shaft rotates, and this voltage is sent to the ECM.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.
If the No. 2 vehicle speed sensor malfunctions, the ECM uses input signals from the No. 1 vehicle speed sensor as a back-up signal.

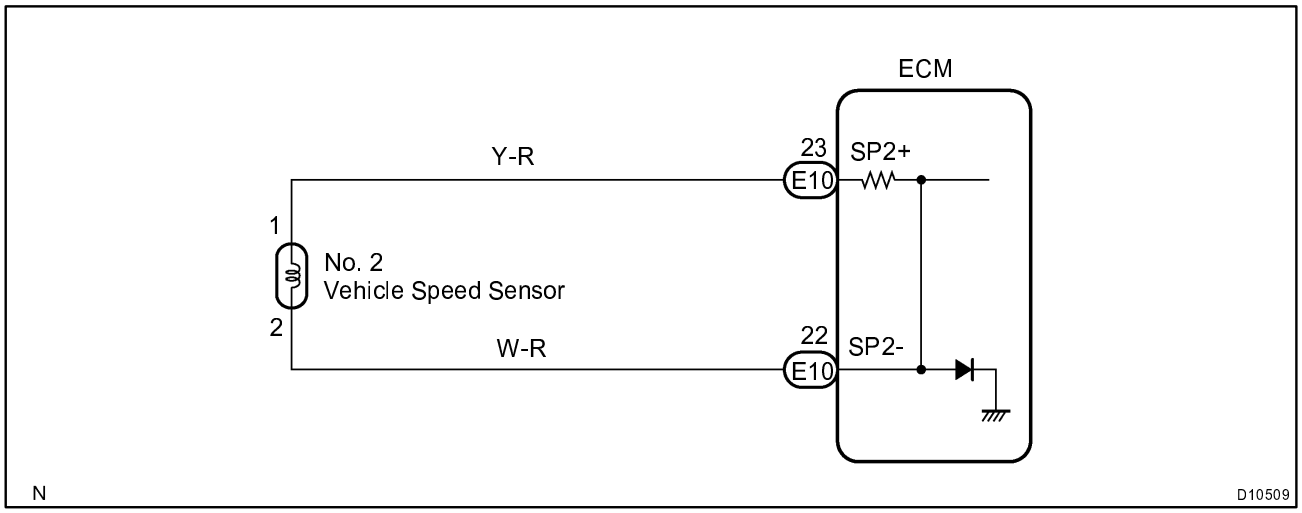


DTC No.	DTC Detecting Condition	Trouble Area
P1700	All conditions below are detected 500 times or more continuously (2 - trip detection logic). 1. No signal from No. 2 vehicle speed sensor is input to ECM while 4 pulses of No. 1 vehicle speed sensor signal are sent. 2. Vehicle speed: 9 km/h (5.6 mph) or more for at least 4 seconds. 3. Park/neutral position switch: OFF (Other than P or N) 4. Transfer position: Other than N position (A340F only)	• Open or short in No. 2 vehicle speed sensor circuit • No. 2 vehicle speed sensor • ECM



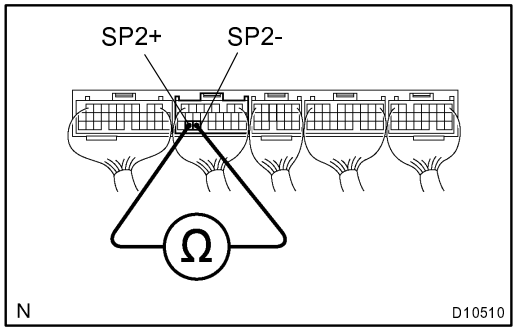
HINT:
Wave from between terminals $SP2^+$ and $SP2^-$ when vehicle speed is approx. 60 km/h (37 mph).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check vehicle speed value or resistance between terminals SP2+ and SP2- of ECM.**



When using OBD II scan tool or hand-held tester:

PREPARATION:

(a) Remove the DLC3 cover.

(b) Connect an OBD II scan tool or hand-held tester to the DLC3.

(c) Start the engine and turn OBD II scan tool or hand-held tester main switch ON.

CHECK:

Drive the vehicle and read vehicle speed value.

OK:

Vehicle speed matches tester speed value.

When not using OBD II scan tool or hand-held tester:

PREPARATION:

Disconnect the connector from the ECM.

CHECK:

Check resistance between terminals $SP2^+$ and $SP2^-$ of ECM.

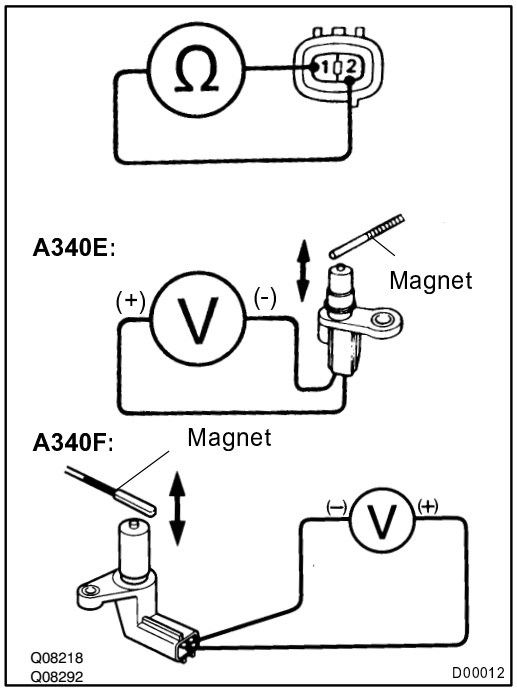
OK:

Resistance: 560 - 680 Ω at 20°C (68°F)

OK → **Check and replace the ECM (See page IN-28).**

NG

2	Check No. 2 vehicle speed sensor.



PREPARATION:

Remove the No. 2 vehicle speed sensor from the transmission.

CHECK:

(a) Measure resistance between terminals 1 and 2 of vehicle speed sensor.

(b) Check voltage between terminals 1 and 2 of vehicle speed sensor when a magnet is put close to the front end of the vehicle speed sensor then taken away quickly.

OK:

(a) Resistance: 560 - 680 Ω at 20°C (68°F)

(b) Voltage is generated intermittently.

HINT:

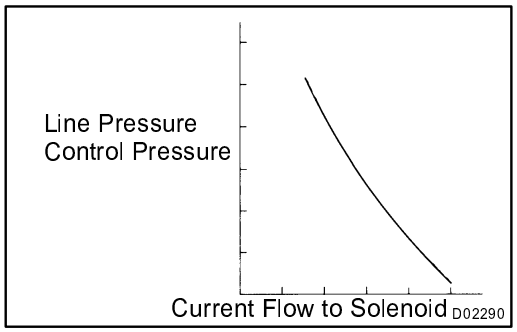
The voltage generated is extremely low.

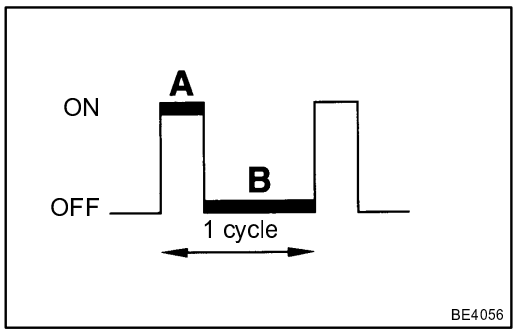
NG → **Replace the No. 2 vehicle speed sensor.**

OK

Check and repair the harness and connector between ECM and No. 2 vehicle speed sensor (See page IN-28).

DTC	P1760	Linear Solenoid for Line Pressure Control Circuit Malfunction



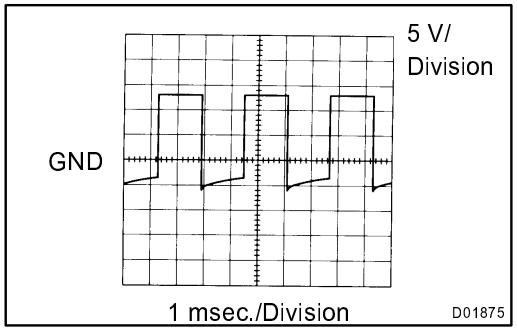


CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate line pressure according to the accelerator pedal effort, or the detected engine power output.
This reduces the function of line pressure and provides smooth shifting characteristics.
Upon receiving the throttle valve opening angle signal, ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, and generating throttle pressure.
(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle.
For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

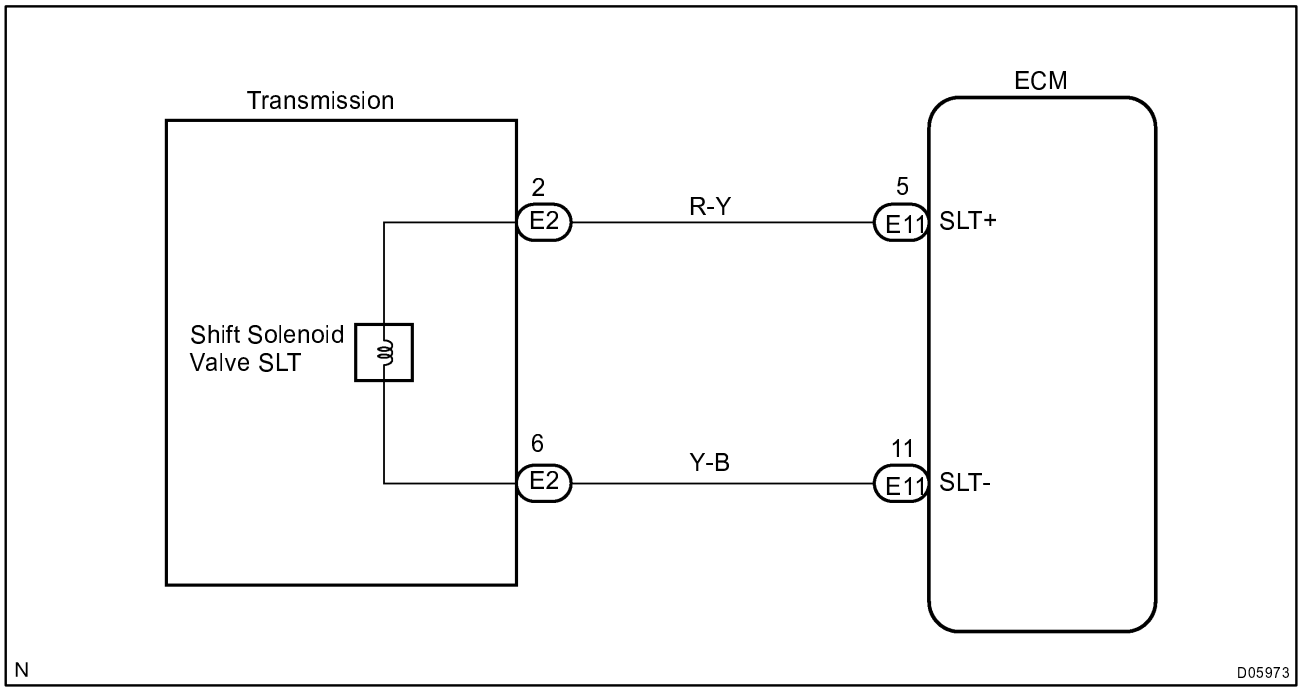
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760	1. or 2. condition below is detected for 1 second or more. 1. SLT^- terminal: 0 V 2. SLT^- terminal: 12 V	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM



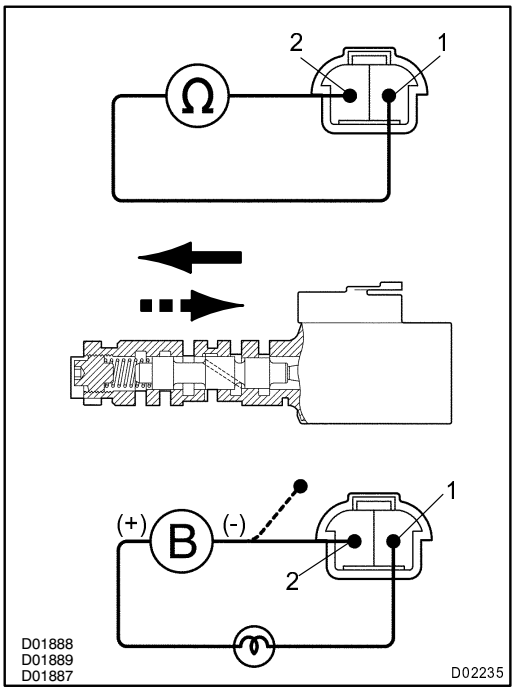
HINT:
Waveform between terminals SLT^+ and SLT^- during engine idling is shown at left.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift solenoid valve SLT.**



PREPARATION:

(a) Remove the oil pan.

(b) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 - 5.6 Ω at 20 °C (68 °F)

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 - 10W bulb to terminal 1 of solenoid connector and negative (-) lead to terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in ◄ direction in illustration at left.
When battery positive voltage is cut off.	Valve moves in ■■► direction in illustration at left.

NG → **Replace shift solenoid valve SLT.**

OK ↓

2	**Check harness and connector between shift solenoid valve SLT and ECM (See page IN-28).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM (See page IN-28).

DI6AH-03

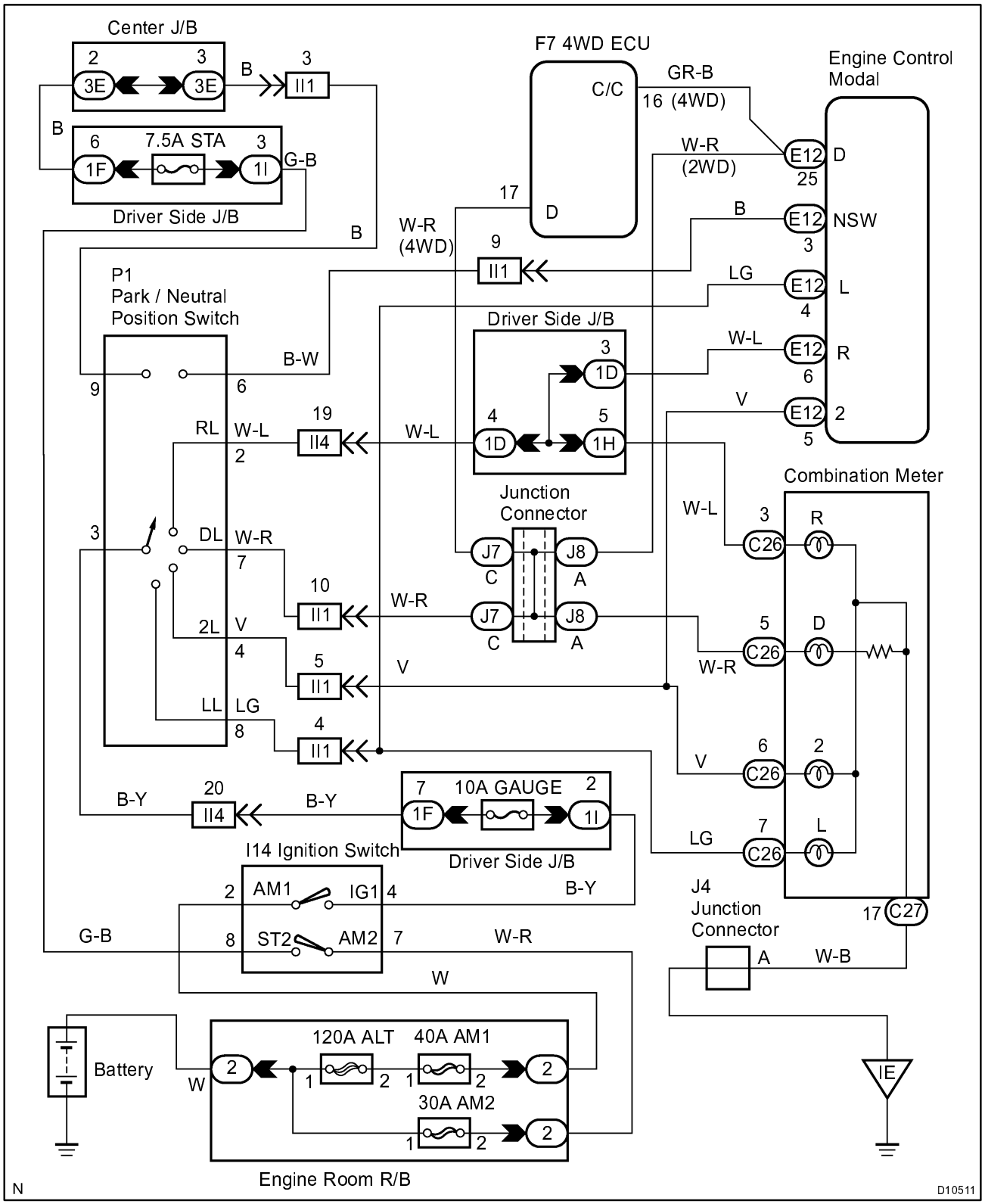
DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (NSW, R, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in D position.

DTC No.	DTC Detection Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for R, N, 2 and L positions (2 - trip detection logic).	• Short in park/neutral position switch circuit • Park/neutral position switch • ECM
	When driving under conditions 1. and 2. for 30 seconds or more, the park/neutral position switch is ON (N position) (2 trip detection logic). 1. Vehicle speed: 70 km/h (44 mph) or more 2. Engine speed: 1,500 - 2,500 rpm	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Read PNP, REVERSE, 2ND and LOW signals.**

When using hand-held tester:

PREPARATION:

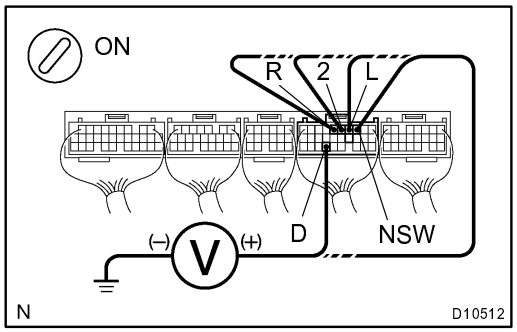
(a) Remove the DLC3 cover.
(b) Connect a hand-held tester to the DLC3.
(c) Turn the ignition switch ON and hand-held tester main switch ON.

CHECK:

Shift lever into the P, R, D, N, 2 and L positions, and read the PNP, REVERSE, 4TH/DRIVE 2ND and LOW signals on the TOYOTA hand-held tester.

OK:

Shift position	Signal
2	2ND OFF → ON
L	LOW OFF → ON
D	4TH / DRIVE OFF → ON
R	REVERSE OFF → ON
P, N	PNP OFF → ON



When not using hand-held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals NSW, 2, L and R of ECM and body ground when the shift lever is shifted to the following positions.

OK:

Position	NSW-Body ground	R-Body ground	D-Body ground	2-Body ground	L-Body ground
P, N	0 V	0 V	0 V	0 V	0 V
R	9 - 14 V*	7.5 - 14 V*	0 V	0 V	0 V
D	9 - 14 V	0 V	7.5 - 14 V	0 V	0 V
2	9 - 14 V	0 V	0 V	7.5 - 14 V	0 V
L	9 - 14 V	0 V	0 V	0 V	7.5 - 14 V

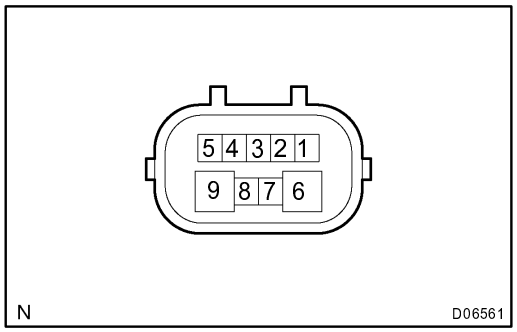
HINT:

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

OK → **Check and replace the ECM (See page IN-28).**

NG

2	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Disconnect the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

OK:

Shift Position	Terminal No. to continuity	Terminal No. to continuity
P	6 - 9	1 - 3
R	2 - 3	-
N	6 - 9	3 - 5
D	3 - 7	-
2	3 - 4	-
L	3 - 8	-

NG → **Replace the park/neutral position switch.**

OK →

Repair or replace harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN-28).

DI9OB-01

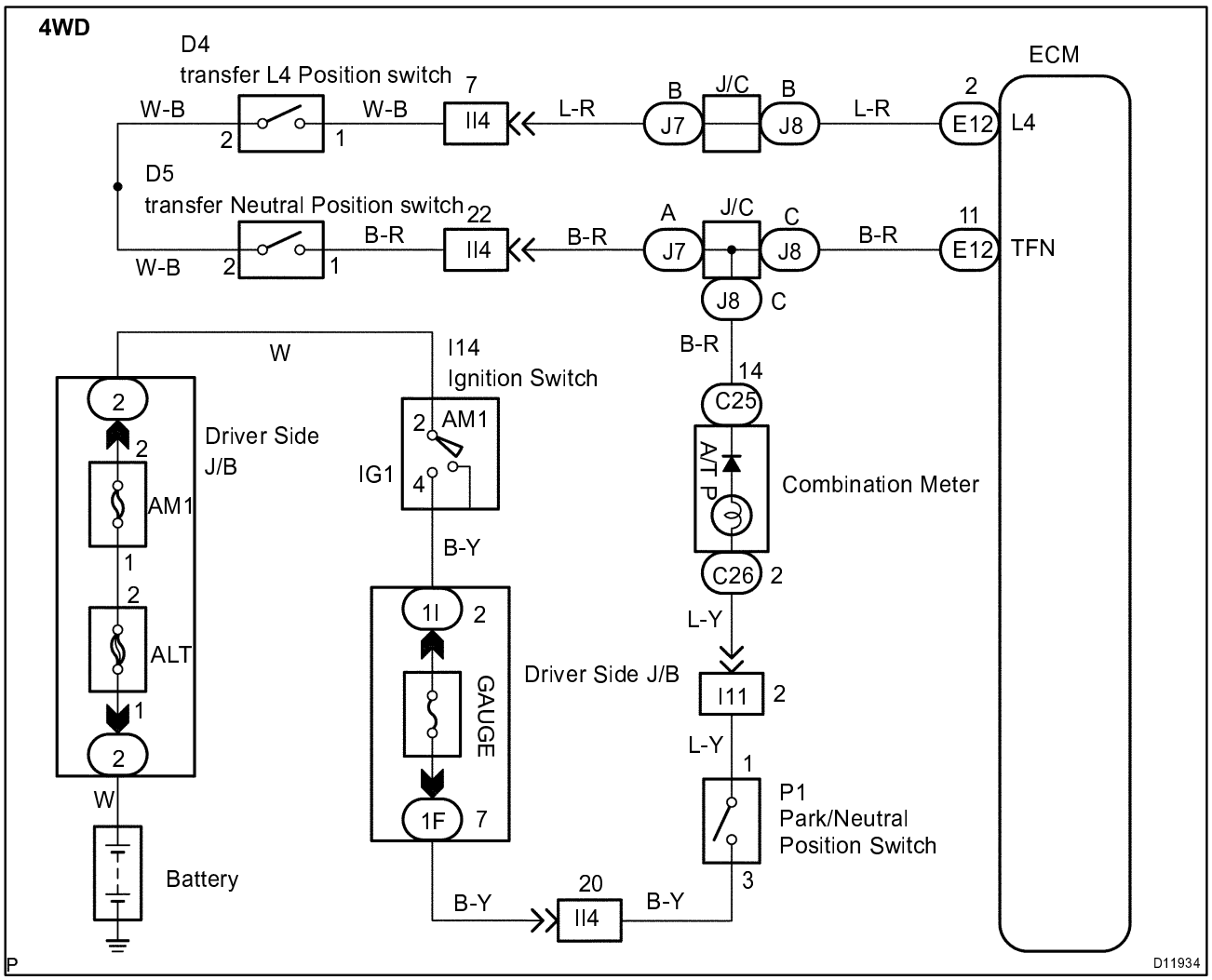
DTC	P1782	Transfer L4 SW Circuit Malfunction

CIRCUIT DESCRIPTION

The ECM receive signal L4 from the indicator switch (LOW switch).

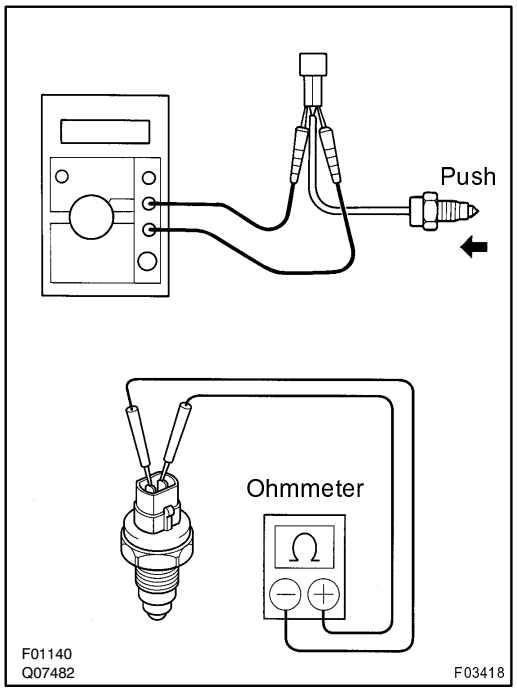
DTC No.	DTC Detecting Condition	Trouble Area
P1782	When driving under conditions (a) and (b) for 1.8 seconds or more, the indicator switch (LOW switch) is ON . (1-trip detection logic) (a) Output shaft speed 3000 rpm or less (b) Transfer shift position is H	• Short in transfer L4 position switch (LOW switch) signal circuit • transfer L4 position switch (LOW switch) • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transfer L4 position switch (See page TR-11).**



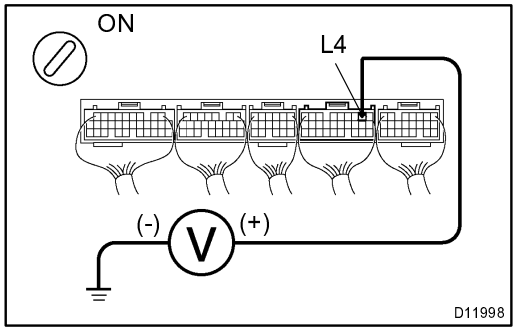
PREPARATION:
Remove the transfer L4 position switch (See page TR-9).
CHECK:
Check that there is continuity between terminals, as shown.
OK:

Switch position	Specified condition
Push	Continuity
Free	No continuity

NG → **Replace transfer L4 position switch.**

OK

2	**Check voltage between terminal L4 of ECM and body ground.**



PREPARATION:
Remove the ECM with connectors still connected.
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminal L4 of ECM and body ground when transfer in L4 position.
OK:

Transfer shift position	Voltage (V)
L	Below 1.5
Except L	9 - 14

OK → Proceed to next circuit inspection shown in problem symptoms chart (See page DI-175).

NG

3	Check for open or short circuit in harness and connector between transfer L4 position switch and ECM (See page IN-28).

NG → Repair or replace harness or connector.

OK

Check and replace ECM.

DI9OC-01

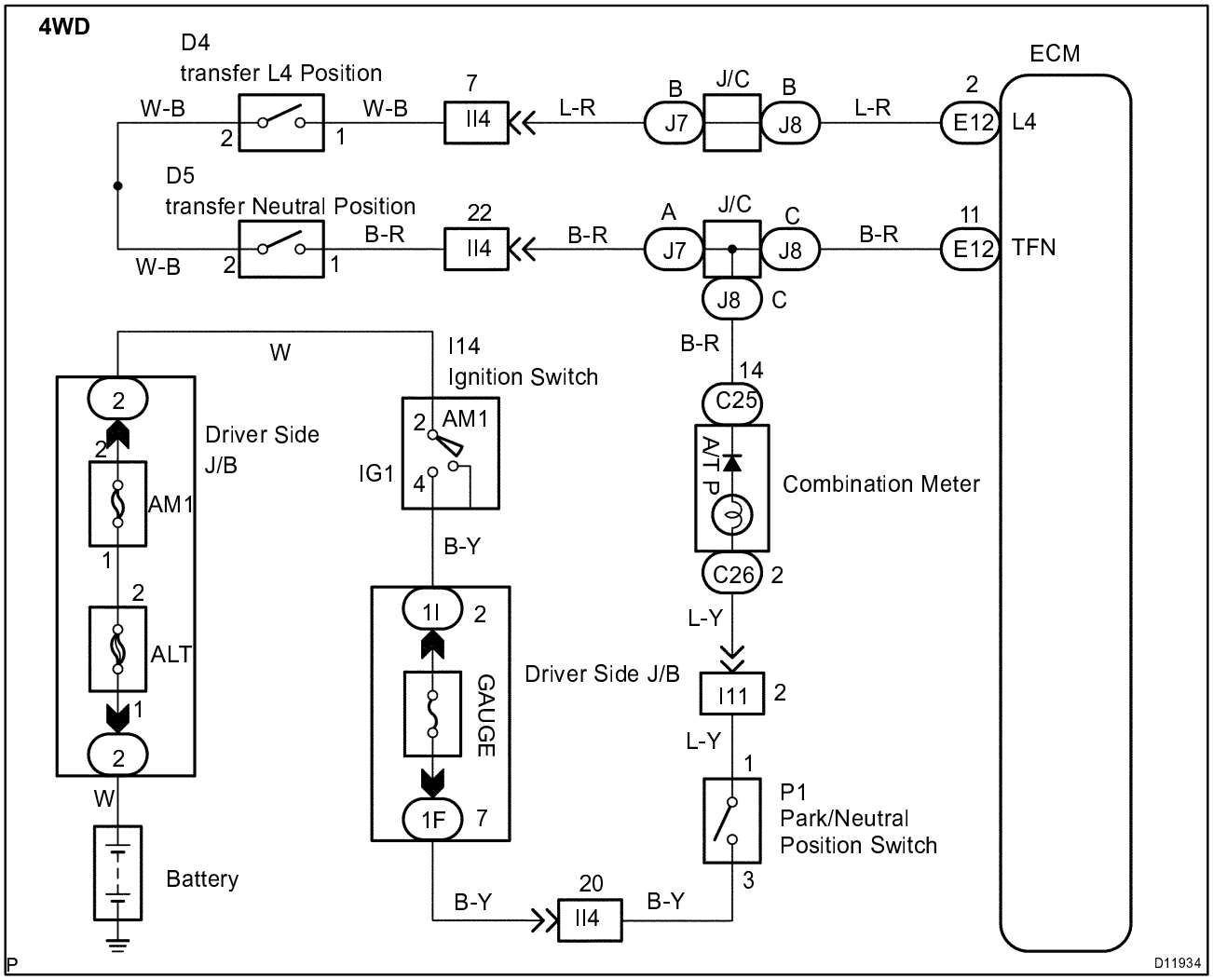
DTC	P1783	Transfer N SW Circuit Malfunction

CIRCUIT DESCRIPTION

The propeller shaft and wheels are free even when the transmission shift lever is set to P as long as the transfer shift lever is in Neutral position. The A/T.P. indicator light lights up to warn the drive that the propeller shaft and wheels are not locked.
If the A/T.P. indicator light goes on, the transfer shift lever should be shifted out of N position.
The ECM receive signal TFN from the indicator switch (neutral position switch).

DTC No.	DTC Detecting Condition	Trouble Area
P1783	While driving under conditions (a) and (b) for 30 seconds or more, the indicator switch(TFN switch) is ON . (2-trip detection logic) (a) Vehicle speed: 25 km/h (16 mph) or more (b) Transfer shift position is H	• Short in transfer neutral position switch signal circuit • Transfer neutral position switch • ECM

WIRING DIAGRAM



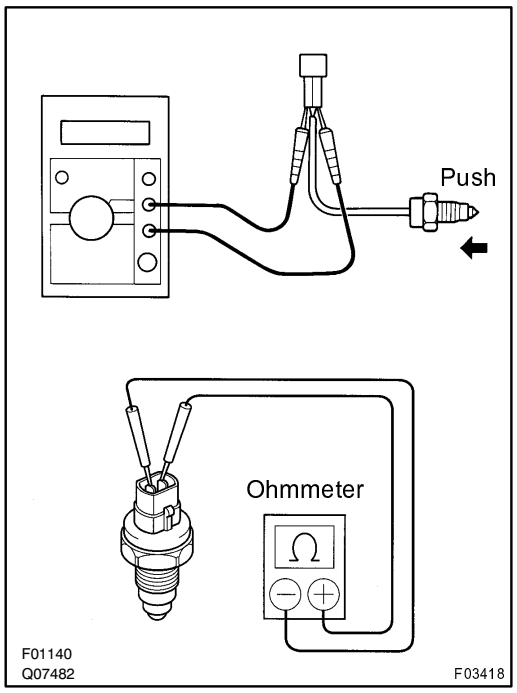
INSPECTION PROCEDURE

1	Check park/neutral position switch (See page DI-203).

NG → Replace the park/neutral position switch.

OK

2	Check transfer neutral position switch.



PREPARATION:
Remove the transfer park/neutral position switch (See page TR-9).

CHECK:
Check that there is continuity between terminals, as shown.

OK:

Switch position	Specified condition
Push	Continuity
Free	No continuity

OK → Replace the transfer neutral position switch.

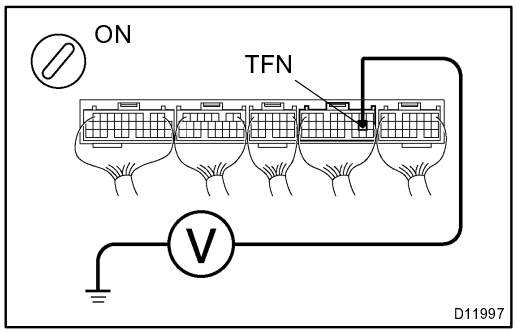
NG

3	Check combination meter (See page BE-45).

NG → Repair or replace the combination meter.

OK

4	Check voltage between terminal TFN of ECM and body ground.



PREPARATION:
Remove the ECM with connectors still connected.
CHECK:
Turn the ignition switch ON, measure voltage between terminal TFN of ECM and body ground when transfer shift lever is shifted to the following position.
OK:

Transfer shift position	Voltage (V)
N	Below 1.5
Except N	9 - 14

OK → Proceed to next circuit inspection shown on problem symptom chart (See page DI-175).

NG

5	Check for open or short circuit in harness and connector between transfer neutral position switch and ECM (See page IN-28).

NG → Repair or replace harness or connector.

OK

Check and replace ECM.

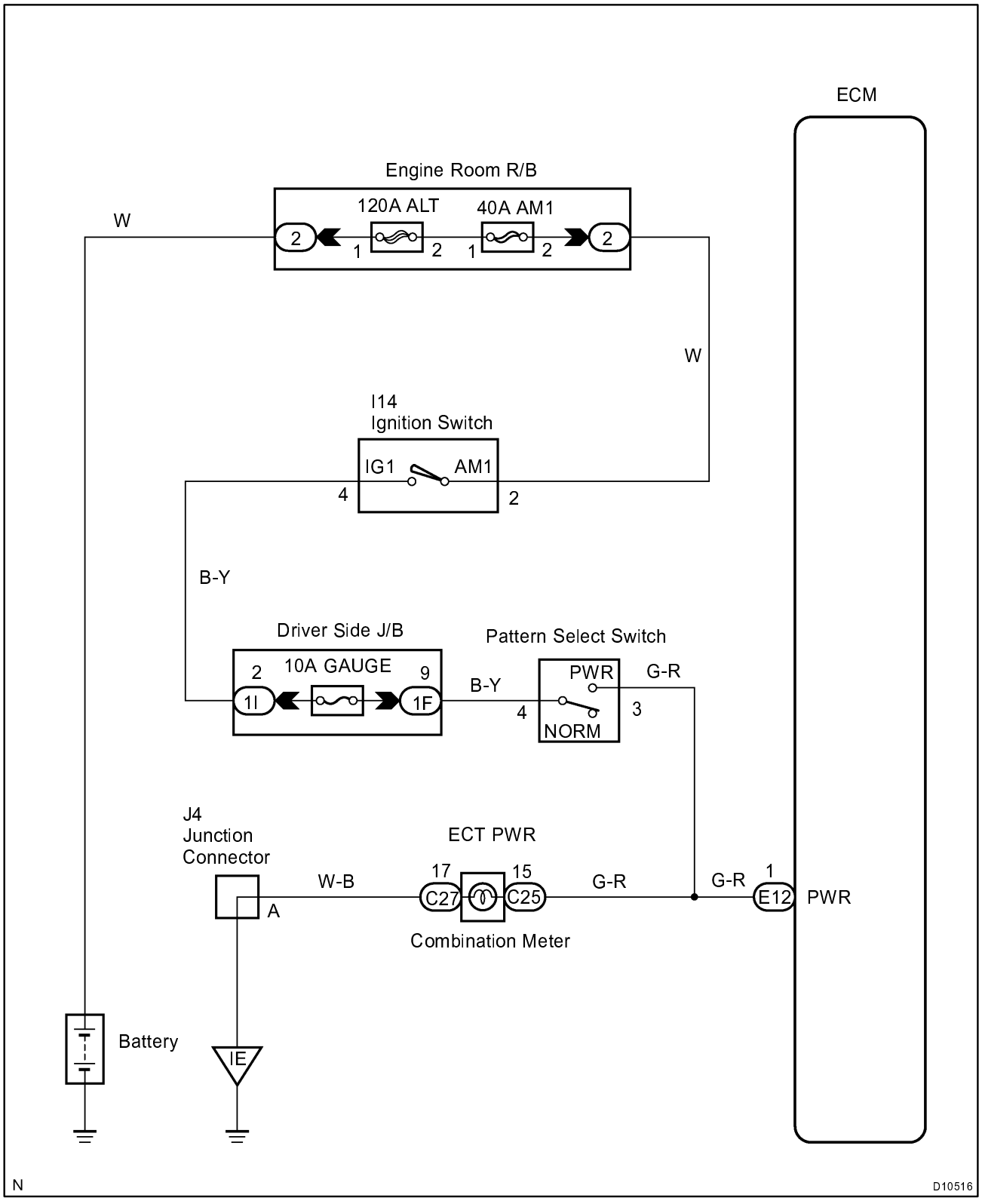
DI0T3-12

Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

The ECM memory contains the shift programs for the NORMAL and POWER patterns, 2 position, L position and the lock-up patterns. Following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check PATTERN SEL SW signal.**

When using TOYOTA hand-held tester:

PREPARATION:

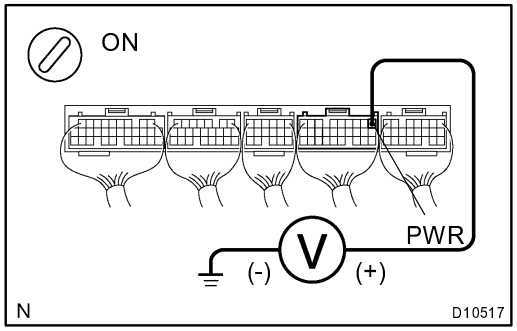
(a) Remove the DLC3 cover.
(b) Connect a TOYOTA hand-held tester to the DLC3.
(c) Turn the ignition switch ON and TOYOTA hand-held tester main switch ON.

CHECK:

Read the PATTERN SEL SW signal on the TOYOTA hand-held tester.

OK:

Pattern select switch	PATTERN SEL SW signal
Pushed in	ON
Pushed out	OFF



When not using TOYOTA hand-held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal PWR of the ECM and body ground when the pattern select switch set to the PWR (POWER) position and NORM (NORMAL) position.

OK:

Pattern select switch	Voltage
PWR	9 - 14 V
NORM	Below 1.5 V

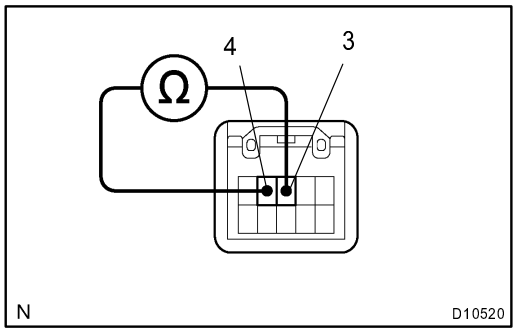
HINT:

The ECM uses the normal pattern signal if the PWR signal is not input.

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI-175).**

NG

2	Check pattern select switch.



PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between terminals 3 and 4 of pattern select switch connector when the select switch is set to PWR and NORM positions.
OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No continuity

NG → **Replace the pattern select switch.**

OK

3	Check harness and connector between battery and pattern select switch, pattern select switch and ECM (See page IN-28).

NG → **Repair or replace the harness or connector.**

OK

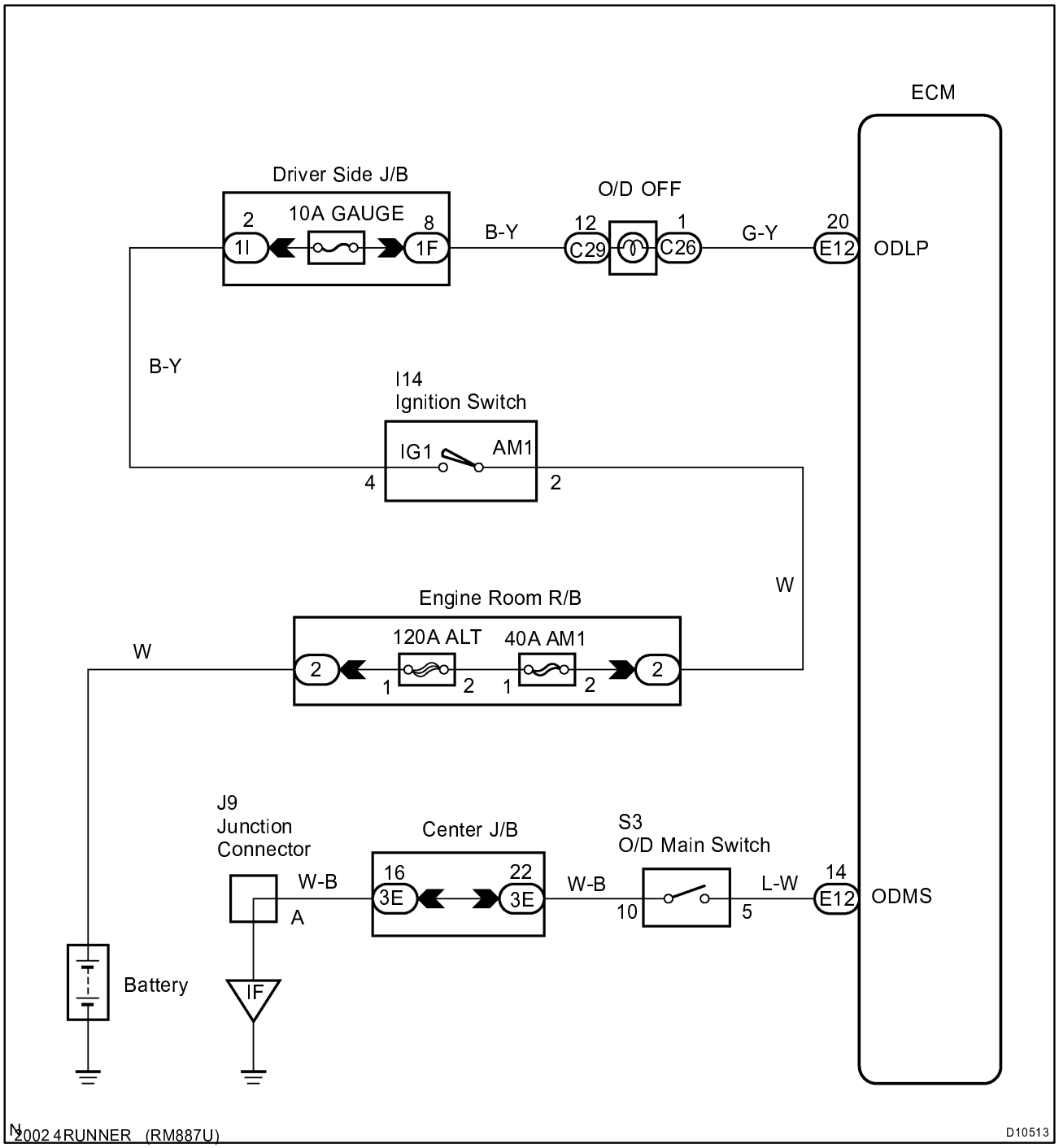
Check and replace the ECM (See page IN-28).

O/D Main Switch & O/D OFF Indicator Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch is a momentary type switch. When pressing the O/D OFF main switch, the O/D OFF indicator light lights up and ECM prohibit shifting to O/D, and when pressing it again, the O/D OFF indicator light goes off and ECM allows shifting to O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of O/D main switch.**

PREPARATION:
Turn the ignition switch ON.
CHECK:
(a) Check O/D OFF indicator light when O/D main switch is pushed in to ON.
(b) Check O/D OFF Indicator light when O/D main switch is pushed again.
OK:
(a) O/D OFF indicator light lights up.
(b) O/D OFF indicator light goes off.

OK → **Proceed to next inspection shown on problem symptoms table (See page DI-175).**

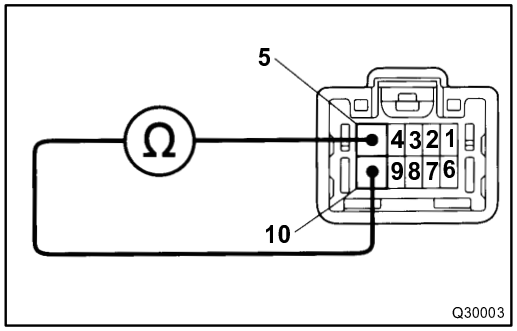
NG

2	**Check and replace combination meter (See page BE-45).**

NG → **Replace the combination meter.**

OK

3	**Check O/D main switch.**



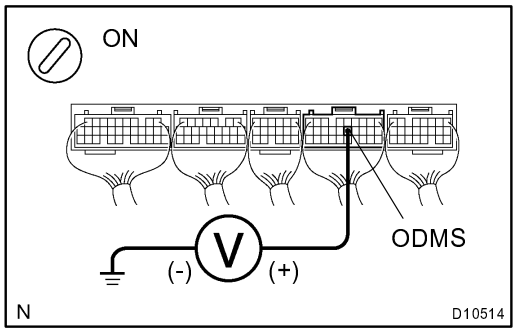
PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between 5 and 10 of the O/D main switch connector.
OK:

O/D main switch condition	Specified condition
Press continuously O/D main switch	Continuity
Release O/D main switch	No continuity

NG → **Replace and repair O/D main switch.**

OK

4	Check voltage between terminal ODMS of ECM and body ground.



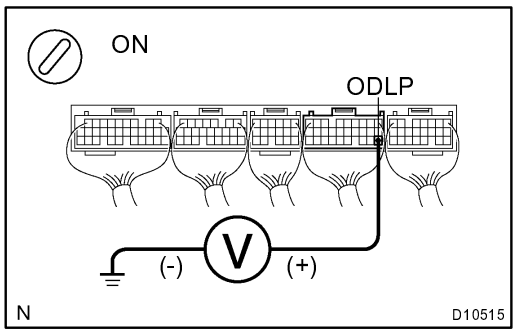
PREPARATION:
Turn the ignition switch ON.
CHECK:
Check voltage between terminal ODMS of the ECM and body ground when O/D main switch is ON and OFF.
OK:

O/D main switch	Specified voltage
Press continuously O/D main switch	Below 1.5 V
Release O/D main switch	9 - 14 V

OK → Check and replace the ECM (See page IN-28).

NG

5	Check voltage between terminal ODLP of ECM and body ground.



PREPARATION:
(a) Disconnect the connector of ECM.
(b) Turn the ignition switch ON.
CHECK:
Check voltage between terminal ODLP of the ECM and body ground.
OK:

O/D main switch	Specified voltage
Press continuously O/D main switch	Below 3 V
Release O/D main switch	9 - 14 V

OK → Check and replace the ECM (See page IN-28).

NG

Check and replace harness and connector between combination meter and ECM, O/D main switch and ECM, O/D main switch and body ground (See page IN-28).