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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
AVENSIS/CORONA Chassis and Body Repair Manual	RM599E
AVENSIS/CORONA Chassis and Body Repair Manual Supplement (Aug., 1999)	RM698E

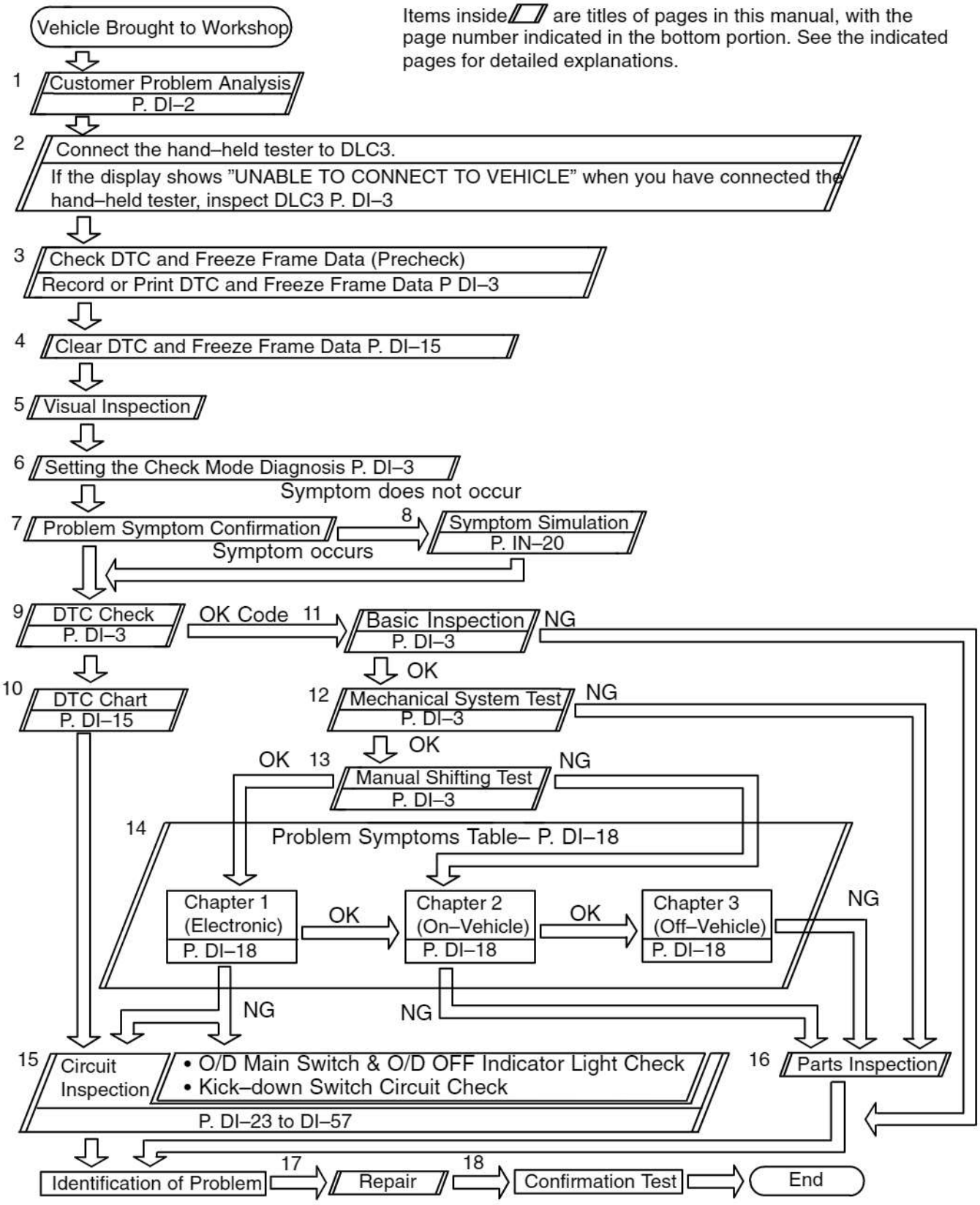
NOTE: The above pages contain only the points which differ from the above listed manuals.

AUTOMATIC TRANSAXLE (A246E)

HOW TO PROCEED WITH TROUBLESHOOTING

DI2L4–10

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.



DI2L5–04

CUSTOMER PROBLEM ANALYSIS CHECK

Transaxle 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 Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any range ☐ Particular range)
	☐ 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 range)
	☐ Slip or shudder
	☐ No kick–down
	☐ Others ( )

Check Item	Malfunction Indicator Light	☐ Normal ☐ Remains ON

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

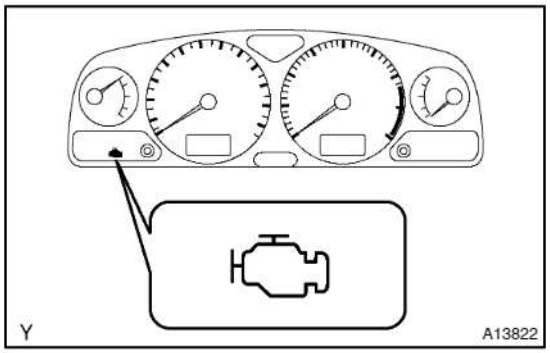
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PRE–CHECK

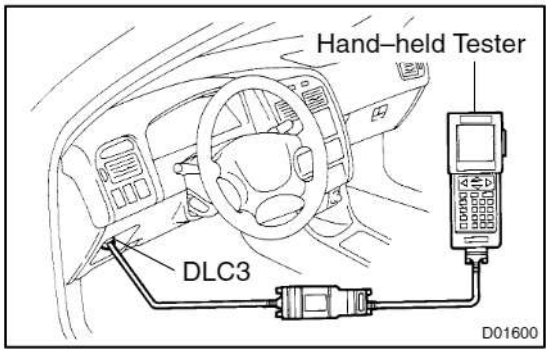
1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect an OBD scan tool complying with ISO15031–4 or hand–held tester to the vehicle, and read off various data output from the vehicle's engine and ECT ECU.

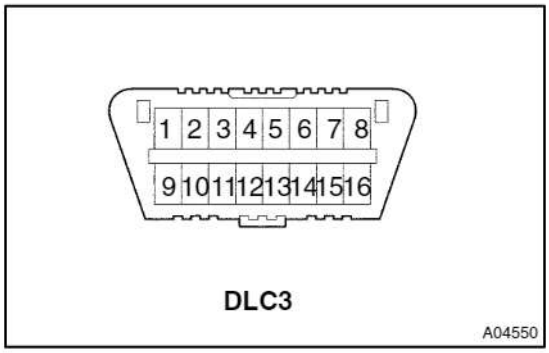


- Euro–OBD regulations require that the vehicle's on–board computer lights up the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the CHK ENG lighting up when a malfunction is detected, the applicable DTCs prescribed by ISO15031–6 are recorded in the engine and ECT ECU memory (See page DI–15).
  If the malfunction only occurs in 3 trips, the CHK ENG goes off but the DTCs remain recorded in the engine and ECT ECU memory.



- To check the DTCs, connect an OBD scan tool or hand–held tester to the Data Link Connector (DLC3) on the vehicle. The OBD 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 ISO controlled codes and manufacturer controlled codes.
  ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–15).

- 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 engine and ECT ECU to check mode when troubleshooting, the technician can cause the CHK ENG to light up and for a malfunction that is only detected once or momentarily. (hand–held tester) (See page DI–3)
- *2 trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the engine and ECT ECU memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the CHK ENG to light up .



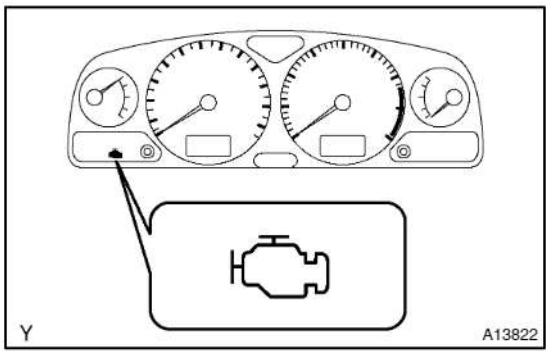
DLC3

(b) Inspect the DLC3.
The vehicle's engine and ECT ECU uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with ISO15031–3 and matches the ISO 9141–2 format.

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

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD scan tool or hand–held tester to the 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 the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected 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)

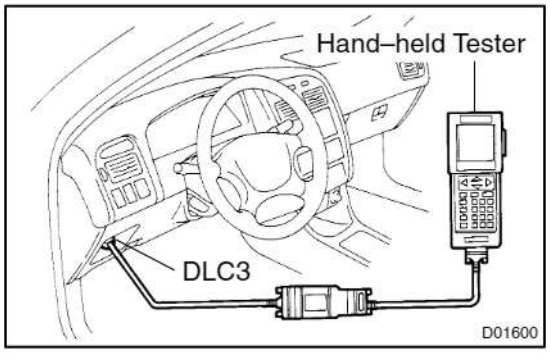
(a) Check the CHK ENG.

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

HINT:

If the CHK ENG does not light up, troubleshoot the combination meter (See page BE–1).

(2) When the engine is started, the CHK ENG 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 the normal mode to the 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 scan tool or hand–held tester.

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

(3) Turn the ignition switch ON and push the OBD scan tool or hand–held tester switch ON.

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

(5) See page DI–15 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD 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 symptom is simulated the 1st time. Then repeat the simulation process again. When the problem has been simulated twice, the CHK ENG is indicated on the instrument panel and DTCs are recorded in the engine and ECT ECU.

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 the check mode.

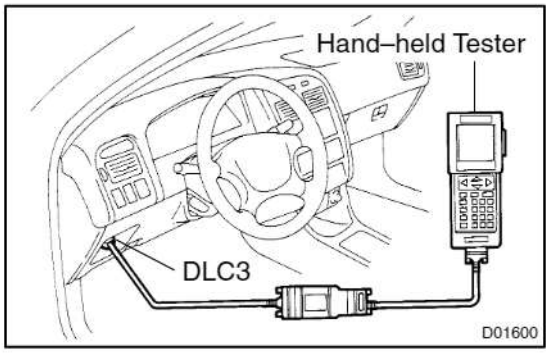
(a) Check the DTC.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transaxle in P position.
- A/C switched off.

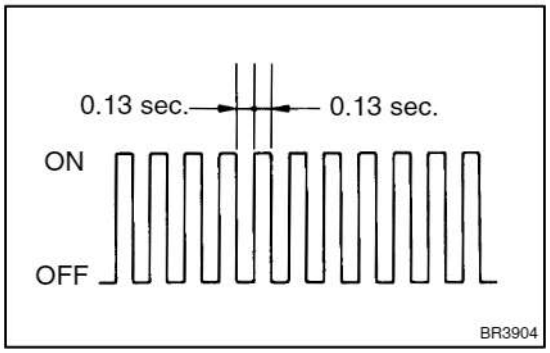
(2) Turn the ignition switch OFF.

(3) Prepare the hand–held tester.



(4) Connect the hand–held tester to DLC3 at the lower 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 CHK ENG flashes).

(7) Start the engine (CHK ENG 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 switches the diagnosis system from 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 actions will erase the DTC and freezed frame data. Operating an OBD scan tool or hand–held tester to erase the codes (See the OBD scan tool's instruction book for operating instructions.).

4. PROBLEM SYMPTOM CONFIRMATION

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

5. ROAD TEST

NOTICE:

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

(a) D range test
Shift into the D range and fully depress the accelerator pedal and check the following points:
(1) Check up–shift operation.
Check to see that 1 → 2, 2 → 3 and 3 → O/D up–shift takes place, and that the shift points conform to the automatic shift schedule (See page SS–19).

HINT:

- O/D Gear Up–shift Prohibition Control (1. Water temp. is 60 °C (140 °F) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Water temp. is 60 °C (140 °F) or lower)

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up–shift.
(3) Check for abnormal noises and vibration.
Run in D range lock–up or O/D gear and check for abnormal noises and vibration.

HINT:

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

(4) Check kick–down operation.
While running in the D range, 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 in the automatic shift schedule (See page SS–19).
(5) Check for abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D range O/D gear, at a steady speed (lock–up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

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

(b) 2 range test
Shift into the 2 range 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–19).

HINT:

There is no O/D up–shift and lock–up in the 2 range.

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

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

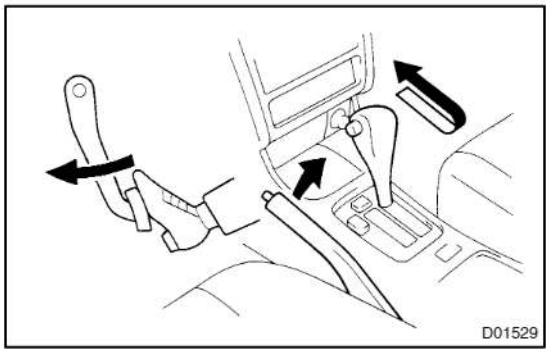
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

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

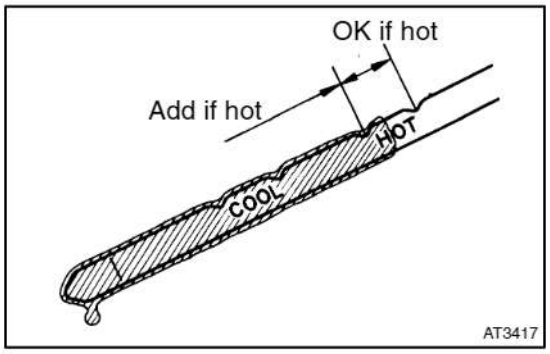
6. BASIC INSPECTION

(a) Check the fluid level.

HINT:
Drive the vehicle so that the engine and transaxle are at normal operating temperature.
Fluid temperature: 70 – 80 °C (158 – 176 °F)



(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 ranges from P to L range and return to P range.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.

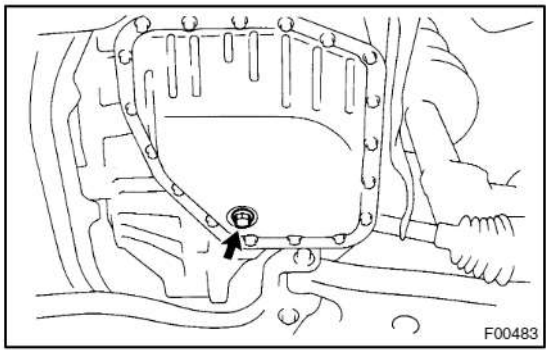


(5) Pull it out and check that the fluid level is in the HOT range.

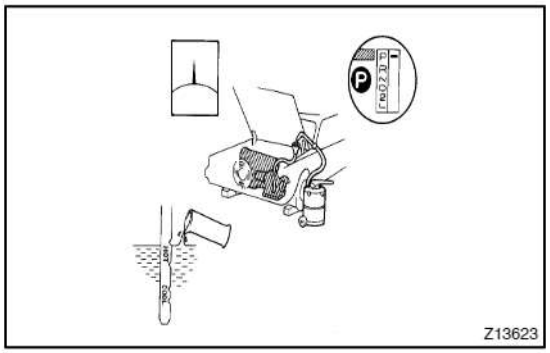
If the level is not within the range, add new fluid.
Fluid type: ATF Type D–II or DEXRON®III (DEXRON®II)

NOTICE:
Do not overfill.

(b) Check the fluid condition.
If the fluid smells burnt or is black, replace it.



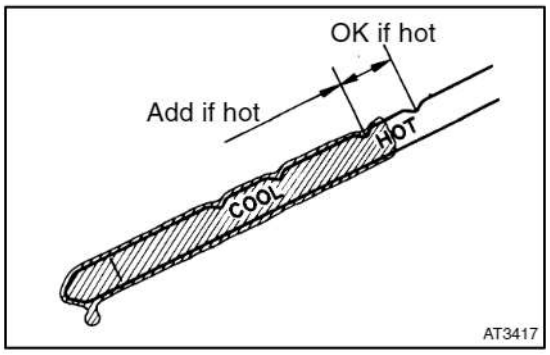
(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.



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

Fluid type: ATF Type D–II or DEXRON®III (DEXRON®II)
Capacity: 3.1 liters (3.3 US qts, 2.7 Imp.qts)

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

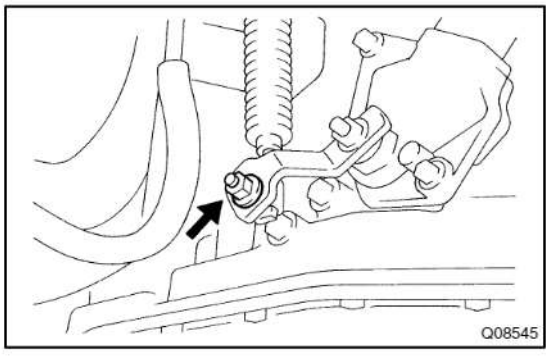


(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
(6) Check the fluid level at the normal operating temperature, 70 – 80 °C (158 – 176 °F), and add as necessary.

NOTICE:
Do not overfill.

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

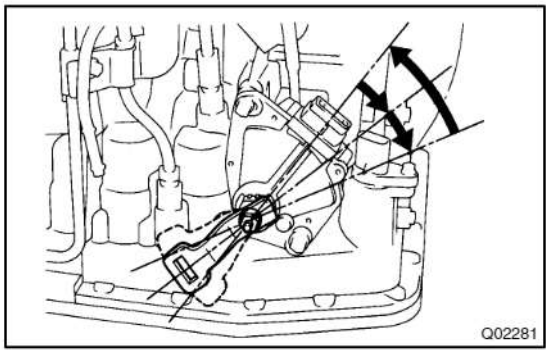
If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other parts.



(e) Inspect and adjust the shift lever range.
When shifting the shift lever from the N range to the other range, check that the lever can be shifted smoothly and accurately to each range and that the range indicator correctly indicates the range.

If the indicator is not aligned with the correct range, carry out the following adjustment procedures:

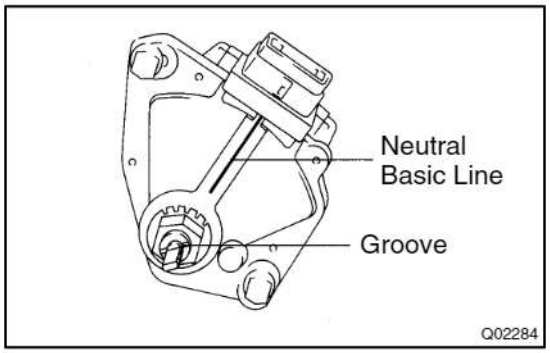
(1) Loosen the nut the control shaft lever.
(2) Push the control shaft lever fully downward.



(3) Return the control shaft lever 2 notches to the N range.
(4) Set the shift lever to N range.
(5) While holding the shift lever lightly toward the R range side, tighten the shift lever nut.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

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



(f) Inspect and adjustment the neutral start switch.
Check that the engine can be started with the shift lever only in the N or P range, but not in other ranges.

If not as started above, carry out the following adjustment procedures:

(1) Loosen the neutral start switch bolt and set the shift lever to the N range.
(2) Align the groove and the neutral basic line.
(3) Holding the shift selector, and tighten the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

HINT:
For continuity inspection of the neutral start switch, see page DI–45.

7. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

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

NOTICE:

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

(1) Chock the 4 wheels.
(2) Connect a 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 range. Press all the way down on the accelerator pedal with your right foot.
(7) Quickly read the stall speed at this time.

Stall speed: 2,500 ± 150 rpm

(8) Do the same test in the R range.

Stall speed: 2,500 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R ranges	• 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 could be faulty.
(b) Stall speed high in D range	• Line pressure too low • Forward clutch slipping • One–way clutch No.2 not operating properly • U/D one–way clutch not operating properly
(c) Stall speed high in R range	• Line pressure too low • Reverse clutch slipping • 1st and reverse brake slipping • U/D brake slipping
(d) Stall speed high in D and R ranges	• Line pressure too low • Improper fluid level • U/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 and reverse brake.

NOTICE:

- **Do the test at normal operating ATF 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) Chock the 4 wheels.
(2) Connect a hand–held tester to DLC3.
(3) Start engine and check idle speed.
Idle speed: 700 ± 50 rpm (In N range and A/C OFF)
(4) Shift the lever from N to D range. 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
(5) In the same way, measure the time lag for N → R.
Time lag: N → R less than 1.5 seconds

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

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

8. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation ATF 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 stopper outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the rear side of the transaxle case and connect SST (See page AX–28 for the location to connect SST).

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

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Connect a hand–held tester to DLC3.

(5) Start the engine and check idling speed.

(6) Keep your left foot pressing firmly on the brake pedal and shift into D range.

(7) Measure the line pressure when the engine is idling.

(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

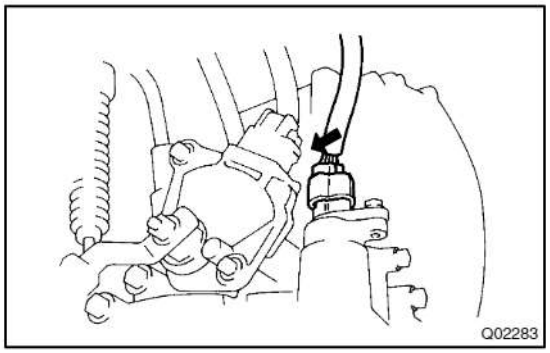
(9) In the same way, do the test in R range.

Specified line pressure:

Condition	D range kPa (kgf / cm^2, psi)	R range kPa (kgf / cm^2, psi)
Idling	372 – 441 (3.8 – 4.5, 54 – 64)	598 – 716 (6.1 – 7.3, 87 – 104)
Stall	981 – 1,138 (10.0 – 11.6, 142 – 165)	1,392 – 1,726 (14.2 – 17.6, 202 – 250)

Evaluation:

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



9. MANUAL SHIFTING TEST

HINT:

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

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

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

While driving, shift through the L, 2 and D ranges.

Check that the gear change corresponds to the shift range.

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

HINT:

If the L, 2 and D range 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 transaxle itself.

(c) Connect the solenoid wire.

(d) Cancel out the DTC.

DI1FQ–05

DIAGNOSTIC TROUBLE CODE CHART

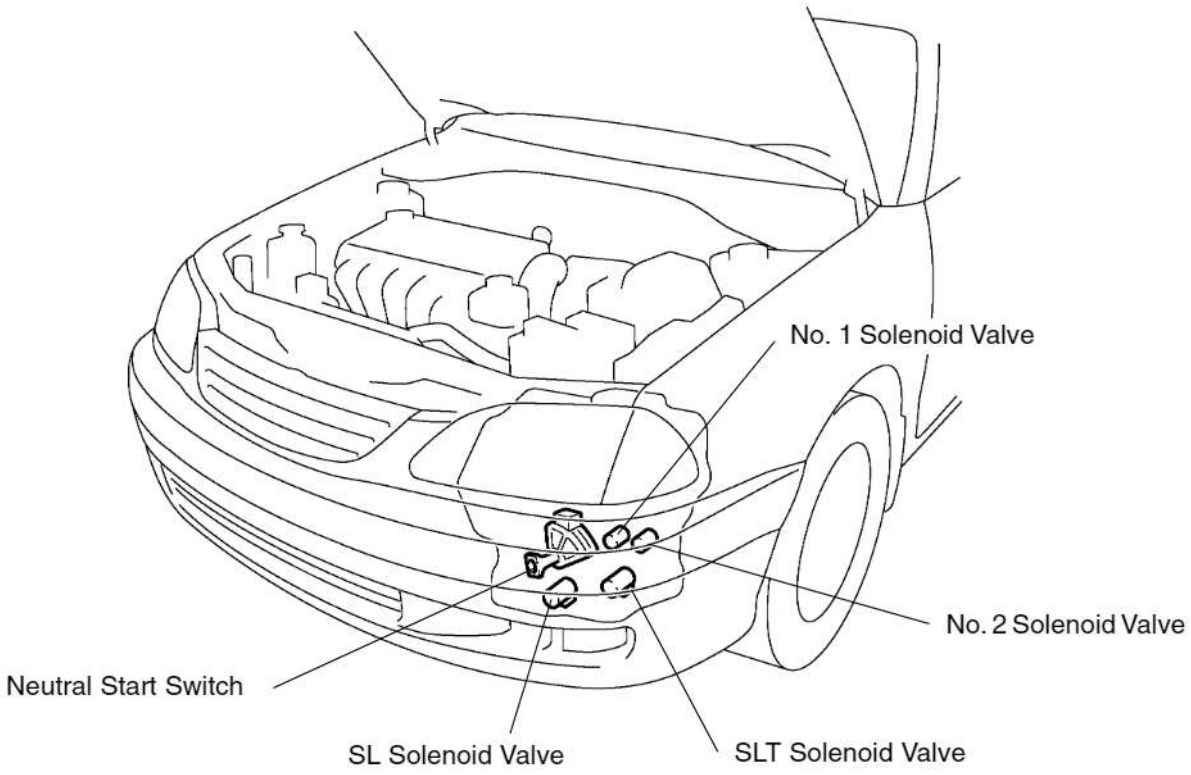
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

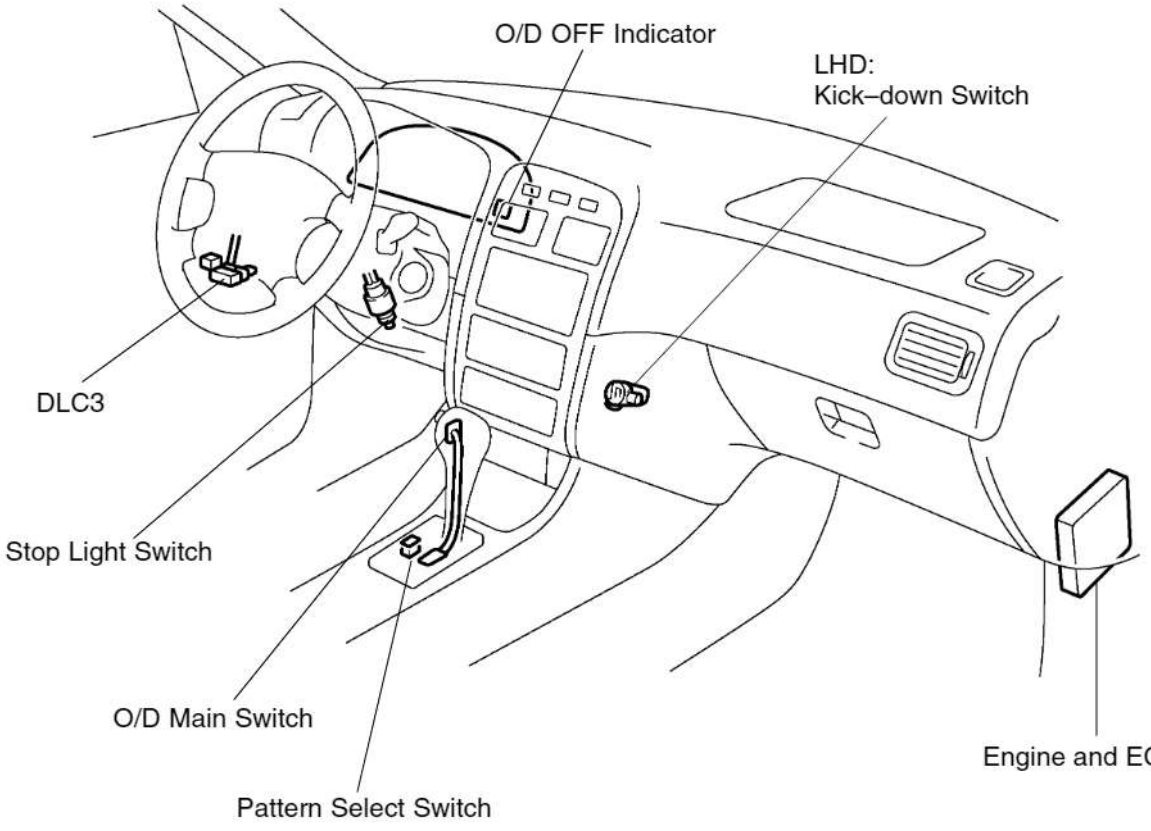
DTC No. (See Page)	Detection Item	Trouble Area	Check engine warning light *1	Memory *2
P0500 (DI–23)	Vehicle speed sensor malfunction	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Combination meter • Engine and ECT ECU • Automatic transaxle (clutch, brake or gear etc.)	○	○
P0750 *3 (DI–26)	Shift solenoid "A" malfunction (No. 1 solenoid valve)	• No. 1 solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Automatic transaxle (clutch, brake or gear etc.)	○	○
P0753 (DI–28)	Shift solenoid "A" electrical malfunction (No. 1 solenoid valve)	• Open or short in No. 1 solenoid valve circuit • No. 1 solenoid valve • Engine and ECT ECU	○	○
P0755 *3 (DI–26)	Shift solenoid "B" malfunction (No. 2 solenoid valve)	• No.2 solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Automatic transaxle (clutch, brake or gear etc.)	○	○
P0758 (DI–28)	Shift solenoid "B" electrical malfunction (No. 2 solenoid valve)	• Open or short in No.2 solenoid valve circuit • No.2 solenoid valve • Engine and ECT ECU	○	○
P0770 *3 (DI–32)	Shift solenoid "E" malfunction (SL solenoid valve)	• SL solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Lock–up clutch • Automatic transaxle (clutch, brake or gear etc.)	○	○
P0773 (DI–34)	Shift solenoid "E" electrical malfunction (SL solenoid valve)	• Open or short in SL solenoid valve circuit • SL solenoid valve • Engine and ECT ECU	○	○
P1520 (DI–37)	Stop light switch signal malfunction	• Open or short in stop light switch signal circuit • Stop light switch • Engine and ECT ECU	○	○
P1760 (DI–42)	Linear solenoid line pressure control circuit malfunction (SLT solenoid valve)	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECU ECU	○	○
P1780 (DI–45)	Neutral start switch malfunction	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU	○	○

*1: "○" mark means Check engine warning light blinks once every 2 seconds.
"X" mark means Check engine warning light never blinks.
*2: "○" mark means Engine and ECT ECU memorizes the malfunction code if the Engine and ECT ECU detects the DTC detection condition.
*3: European spec. only

PARTS LOCATION

DI1FR–05





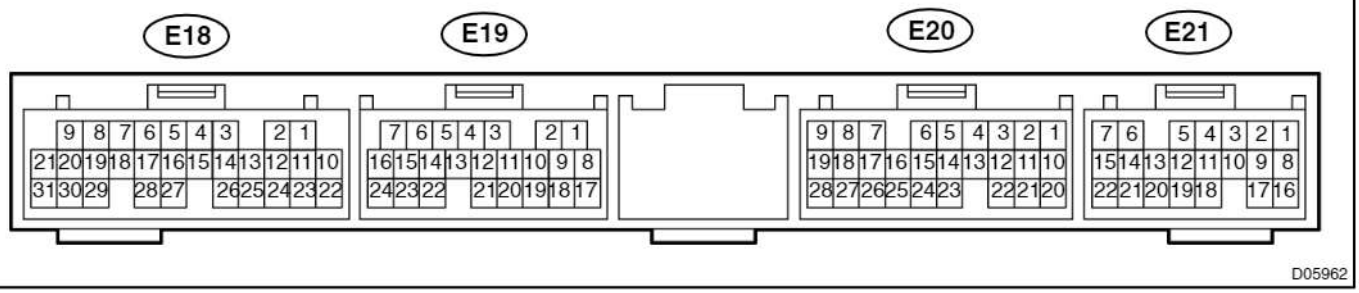
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D09911

DI77O-02

TERMINALS OF ECU

Engine and ECT ECU Terminals



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 (E18–8) – E1 (E19–17)	LG ↔ BR	IG ON	9 – 14
		1st or 2nd gear	9 – 4
		3rd or O/D gear	Below 1.5
S2 (E18–20) – E1 (E19–17)	V–W ↔ BR	IG ON	Below 1.5
		2nd or 3rd gear	9 – 4
		1st or O/D gear	Below 1.5
SL (E18–19) – E1 (E19–17)	P ↔ BR	IG ON	Below 1.5
		Vehicle driving under lock–up position	9 – 14
OD2 (E20–19) – E1 (E19–17)	L ↔ BR	O/D main switch ON (O/D OFF)	Below 3
		O/D main switch OFF (O/D ON)	9 – 14
L (E20–12) – E1 (E19–17)	Y–G ↔ BR	IG ON and Shift lever L range	7.5 – 14
		IG ON and Shift lever other than L range	Below 1.5
2 (E20–3) – E1 (E19–17)	O ↔ BR	IG ON and Shift lever 2 range	7.5 – 14
		IG ON and Shift lever other than 2 range	Below 1.5
R (E20–2) – E1 (E19–17)	R–B ↔ BR	IG ON and Shift lever R range	7.5 – 14
		IG ON and Shift lever other than R range	Below 1.5
NSW (E20–13) – E1 (E19–17)	B–W ↔ BR	IG ON and Shift lever P or N range	Below 3
		IG ON and Shift lever other than P or N range	9 –14
SLT^+ (E18–6) – SLT^- (E18–5)	LG–B ↔ P–B	IG ON	9 – 14
SPD (E20–22) – E1 (E19–17)	G ↔ BR	IG ON and rotate driving wheel slowly	Pulse generation
KD (E20–4) – E1 (E19–17)	Y ↔ BR	IG ON and accelerator pedal fully depressed	Below 1.5
		IG ON and accelerator pedal released	9 – 14
STP (E20–6) – E1 (E19–17)	G–W ↔ BR	IG ON and brake pedal depressed	9 – 14
		IG ON and brake pedal released	Below 1.5
PWR (E20–28) – E1 (E19–17)	P ↔ BR	IG ON and pattern select switch: PWR	9 – 14
		IG ON and pattern select switch: NORM	Below 1.5
SNWI (E20–16) – E1 (E19–17)	P–B ↔ BR	IG ON and SNOW mode switch: ON	9 – 14
		IG ON and SNOW mode switch: OFF	Below 1.5

DI1FT-06

PROBLEM SYMPTOMS TABLE

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.

HINT:

The Matrix Chart is divided tnto 3 chapters.

Chapter 1: Electronic circuit matrix chart

Chapter 2: On–vehicle repair matrix chart

Chapter 3: Off–vehicle repair matrix chart

If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for eaxh 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 Engine and ECT ECU.

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)	Engine and ECT ECU	IN–30
No up–shift (3rd → O/D)	1. O/D main switch & O/D OFF indicator light circuit 2. Engine and ECT ECU	DI–49 IN–30
No down–shift (O/D → 3rd)	1. O/D main switch & O/D OFF indicator light circuit 2. Engine and ECT ECU	DI–49 IN–30
No down–shift (A particular gear, from 1st to 3rd gear, is not down–shifted)	Engine and ECT ECU	IN–30
No lock–up	Engine and ECT ECU	IN–30
No lock–up OFF	Engine and ECT ECU	IN–30
Shift point too high or too low	Engine and ECT ECU	IN–30
Up–shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch & O/D OFF indicator light circuit 2. Engine and ECT ECU	DI–49 IN–30
Up–shift to O/D from 3rd while engine is cold	Engine and ECT ECU	IN–30
No kick–down	1. Kick–down switch circuit 2. Engine and ECT ECU	DI–57 IN–30
Engine stalls when starting off or stopping	Engine and ECT ECU	IN–30

Chapter 2: On–vehicle repair
(★ : A245E automatic transaxle repair manual Pub. No. RM757E)

Symptom	Suspect Area	See page
Does not move in any forward ranges	Off–vehicle matrix chart	–
Does not move in reverse range	Off–vehicle matrix chart	–
Does not move in any range	1. Primary regulator valve 2. Manual valve 3. Off–vehicle matrix chart	★ ★ –
No–up shift (1st → 2nd)	1. 1 – 2 shift valve 2. Off–vehicle matrix chart	★ –
No–up shift (2nd → 3rd)	1. 2 – 3 shift valve 2. Off–vehicle matrix chart	★ –
No–up shift (3rd → O/D)	1. 3 – 4 shift valve 2. Off–vehicle matrix chart	★ –
No–down shift (O/D → 3rd)	1. 3 – 4 shift valve 2. Off–vehicle matrix chart	★ –
No–down shift (3rd → 2nd)	1. 2 – 3 shift valve 2. Off–vehicle matrix chart	★ –
No–down shift (2nd → 1st)	1. 1 – 2 shift valve 2. Off–vehicle matrix chart	★ –
Harsh engagement (N → R)	1. C_2 accumulator 2. Off–vehicle matrix chart	★ –
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle matrix chart	★ –
Harsh engagement (N → L)	1. C_1 accumulator 2. Low coast modulator valve 3. Off–vehicle matrix chart	★ ★ –
Harsh engagement (1st → 2nd "D" range)	1. Accumulator control valve 2. B_2 accumulator 3. Off–vehicle matrix chart	★ ★ –
Harsh engagement (1st → 2nd "2" range)	1. B_2 accumulator 2. Accumulator control valve 3. 2nd coast modulator control 4. Off–vehicle matrix chart	★ ★ ★ –
Harsh engagement (1st → 2nd → 3rd → O/D)	Primary regulator valve	★
Harsh engagement (2nd → 3rd)	1. C_2 accumulator 2. Accumulator control valve 3. Off–vehicle matrix chart	★ ★ –
Harsh engagement (3rd → O/D)	1. B_2 accumulator 2. C_3 accumulator 3. Off–vehicle matrix chart	★ ★ –
Harsh engagement (O/D → 3rd)	1. B_4 accumulator 2. Off–vehicle matrix chart	★ –
Harsh engagement (3rd → 2nd)	1. C_2 accumulator 2. Off–vehicle matrix chart	★ –
Slip (Forward & Reverse)	1. Primary regulator valve 2. Oil strainer 3. Off–vehicle matrix chart	★ AX–4 –
Slip ("R" range, 1st, 2nd, 3rd, O/D)	Off–vehicle matrix chart	–

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

Chapter 3: Off–vehicle repair
(★ : A245E automatic transaxle repair manual Pub. No. RM757E)

Symptom	Suspect Area	See page
Does not move in any forward ranges	Forward clutch (C_1)	★
Does not move in reverse range	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3) 3. U/D brake (B_4)	★ ★ ★
Does not move in any ranges	1. Torque converter 2. Oil pump 3. U/D one–way clutch (F_3) 4. Front planetary gear 5. Rear planetary gear	AX–33 ★ ★ ★ ★
No–up shift (1st → 2nd)	1. 2nd brake (B_2) 2. No.1 one–way clutch (F_1)	★ ★
No–up shift (2nd → 3rd)	Direct clutch (C_2)	★
No–up shift (3rd → O/D)	U/D clutch (C_3)	★
No–down shift (O/D → 3rd)	1. U/D brake (B_4) 2. U/D one–way clutch (F_3)	★ ★
No–down shift (3rd → 2nd)	No.1 one–way clutch (F_1)	★
No–down shift (2nd → 1st)	No.2 one–way clutch (F_2)	★
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	★ ★
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. On–vehicle matrix chart	★ –
Harsh engagement (N → L)	Forward clutch (C_1)	★
Harsh engagement (1st → 2nd "D" range)	1. 2nd brake (B_2) 2. No.1 one–way clutch (F_1)	★ ★
Harsh engagement (1st → 2nd "2" range)	1. 2nd coast brake (B_1) 2. 2nd brake (B_2) 3. No.1 one–way clutch (F_1)	★ ★ ★
Harsh engagement (2nd → 3rd)	Direct clutch (C_2)	★
Harsh engagement (3rd → O/D)	U/D clutch (C_3)	★
Harsh engagement (O/D → 3rd)	U/D brake (B_4)	★
Harsh engagement (3rd → 2nd)	Direct clutch (C_2)	★
Slip (Forward & Reverse)	1. Torque converter 2. Oil pump	AX–33 ★
Slip ("R" range)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	★ ★
Slip (1st)	1. Forward clutch (C_1) 2. No.2 one–way clutch (F_2) 3. U/D one–way clutch (F_3)	★ ★ ★

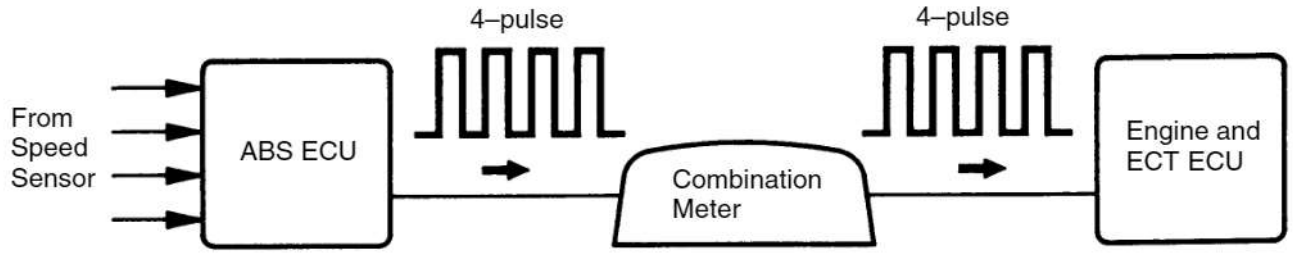
Symptom	Suspect Area	See page
Slip (2nd)	1. Forward clutch (C_1) 2. 2nd brake (B_2) 3. No.1 one–way clutch (F_1) 4. U/D one–way clutch (F_3)	★ ★ ★ ★
Slip (3rd)	1. Forward clutch (C_1) 2. Direct clutch (C_2) 3. U/D one–way clutch (F_3)	★ ★ ★
Slip (O/D)	1. Forward clutch (C_1) 2. Direct clutch (C_2) 3. U/D clutch (C_3)	★ ★ ★
No engine braking (1st "L" range)	1st and reverse brake (B_3)	★
No engine braking (2nd "2" range)	2nd coast brake (B_1)	★
Poor acceleration	1. Torque converter 2. Forward clutch (C_1)	AX–33 ★
No lock–up	Torque converter	AX–33
Engine stalls when starting off or stopping	Torque converter	AX–33

DI3VC-05

CIRCUIT INSPECTION

DTC	P0500	Speed Sensor Malfunction

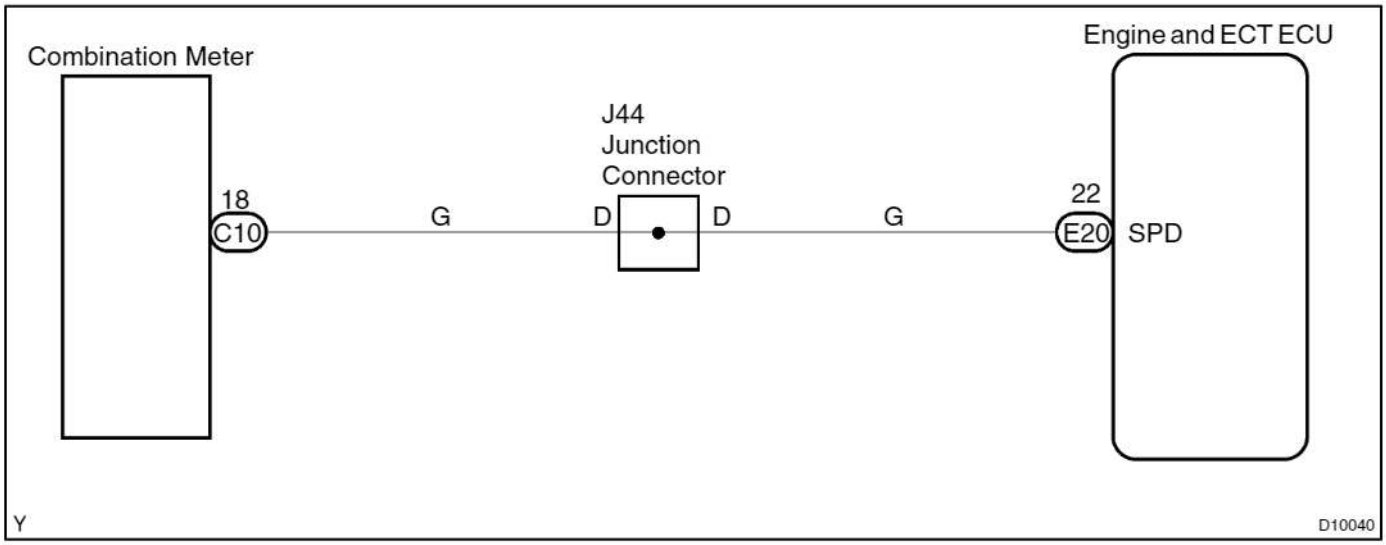
The No.1 speed sensor outputs a 4–pulse signal for every revolution of the transaxle output shaft. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the Engine and ECT ECU.



A00022

DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to Engine and ECT ECU during vehicle driving (2 trip detection logic)	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Engine and ECT ECU • Combination meter

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.

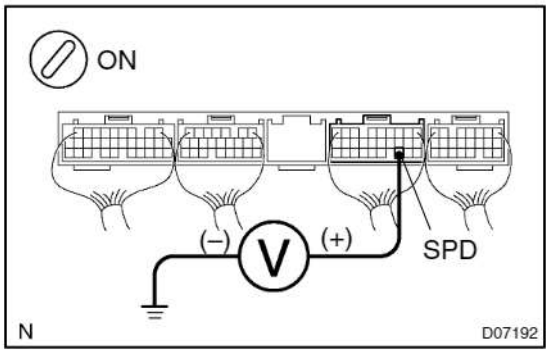
HINT:

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

NG → **Check speedometer circuit. See combination meter troubleshooting.**

OK

2	**Check voltage between terminal SPD of Engine and ECT ECU connector and body ground.**



PREPARATION:

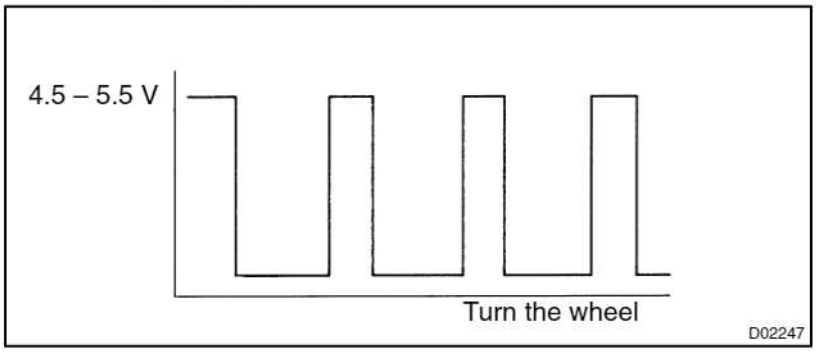
(a) Turn up the floor mat on the passenger side.
(b) Remove the 2 bolts for Engine and ECT ECU.
(c) Shift the shift lever to N range.
(d) Jack up one of the front wheels.
(e) Turn ignition switch ON.

CHECK:

Measure voltage between terminal SPD of Engine and ECT ECU 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 Engine and ECT ECU.**

OK

3	Check Engine and ECT ECU (See page IN–30).

NG → Replace Engine and ECT ECU.

OK →

Check and repair ABS system.

DI1FV-05

DTC	P0750, P0755	Shift Solenoid A/B Malfunction (No. 1/No. 2 Solenoid Valve)

SYSTEM DESCRIPTION

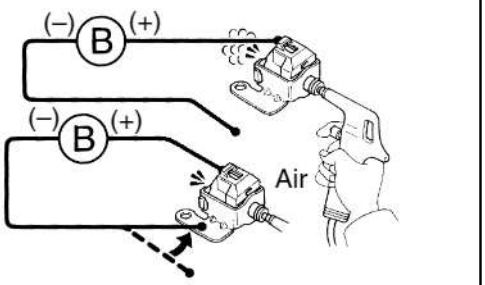
The Engine and ECT ECU uses signals from the vehicle speed sensor and crankshaft position sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the Engine and ECT ECU compares the actual gear with the shift schedule in the Engine and ECT ECU memory to detect the mechanical trouble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

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755	During normal driving, the gear required by the Engine and ECT ECU does not match the actual gear (2–trip detection logic)	• No. 1/No. 2 solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Automatic transaxle (clutch, brake or gear etc.)

HINT:
Check the No. 1 solenoid valve when DTC P0750/62 is output and check the No. 2 solenoid valve when DTC P0755/63 is output.

INSPECTION PROCEDURE

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



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

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

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

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

OK

2	Check the valve body (See chapter 2 in the problem symptoms table).

NG → Repair or replace the valve body.

OK →

Repair the transaxle (See page AX–28).

DTC	P0753,P0758	Shift Solenoid A/B Electrical Malfunction (No. 1/No. 2 Solenoid Valve)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the No. 1 and No. 2 solenoid valves controlled by Engine and ECT ECU. If an open or short circuit occurs in either of the solenoid valves, the Engine and ECT ECU controls the remaining normal 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 SOLENOID 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	O/D	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	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 No. 1 solenoid valve when DTC P0753/62 is output and check the No. 2 solenoid valve when DTC P0758/63 is output.

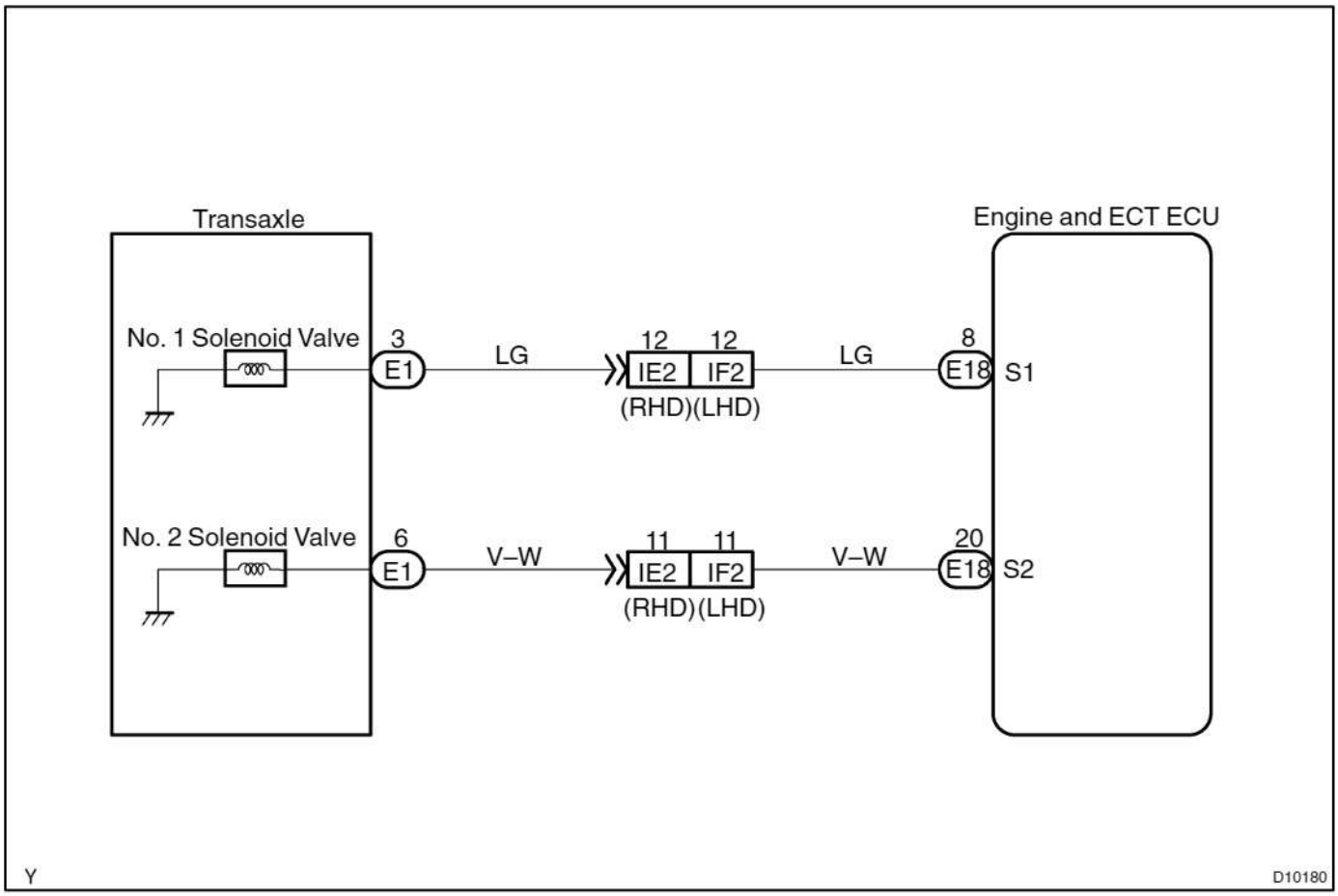
DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The Engine and ECT ECU checks for an open or short circuit in the No. 1 or No. 2 solenoid valve circuit when it changes. The Engine and ECT ECU records DTC P0753/62 or P0758/63 if condition (a) or (b) is detected once, but it does not blink the O/D OFF indicator light. After Engine and ECT ECU detects condition (a) or (b) continuously 8 times or more in one–trip, it causes the O/D OFF indicator light to light up until condition (a) or (b) disappears. After that, if the Engine and ECT ECU detects condition (a) or (b) once, it starts lighting up O/D OFF indicator light again. (a) Solenoid resistance is 8 Ω or less (short circuit) when the solenoid is energized. (b) Solenoid resistance is 100 kΩ or more (open circuit) when the solenoid is not energized.	• Open or short in No. 1/No. 2 solenoid valve circuit • No. 1/No. 2 solenoid valve • Engine and ECT ECU

Fail safe function:

If either of the solenoid valve circuits develops an open or short, the Engine and ECT ECU turns the other solenoid valve ON and OFF to shift to the gear positions shown in the table above. The Engine and ECT ECU also turns the ST solenoid valve OFF at the same time. If both solenoids malfunction, hydraulic control cannot be performed electronically and must be done manually.

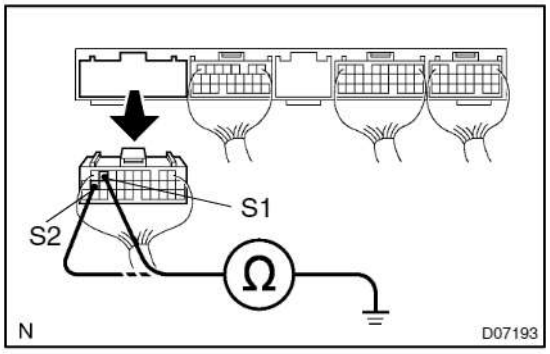
Manual shifting as shown in the above table must be done (In the case of a short circuit, the Engine and ECT ECU stops sending current to the short circuited solenoid).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal S1 or S2 of Engine and ECT ECU connector and body ground.**

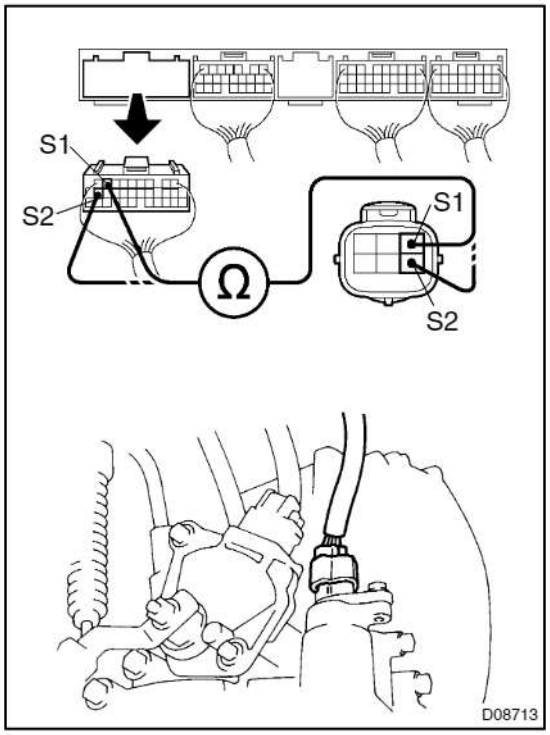


PREPARATION:
Disconnect the connector from Engine and ECT ECU.
CHECK:
Measure resistance between the terminal S1 or S2 of Engine and ECT ECU connector and the body ground.
OK:
Resistance: 11 – 15 Ω at 20°C (68°F)

OK → **Check and replace Engine and ECT ECU (See page IN–30).**

NG

2	**Check harness and connector between Engine and ECT ECU and automatic transaxle solenoid connector.**



PREPARATION:

Disconnect the solenoid connector from the automatic transaxle.

CHECK:

Check harness and connector between the terminal S1 or S2 of Engine and ECT ECU and the terminal S1 or S2 of solenoid connector.

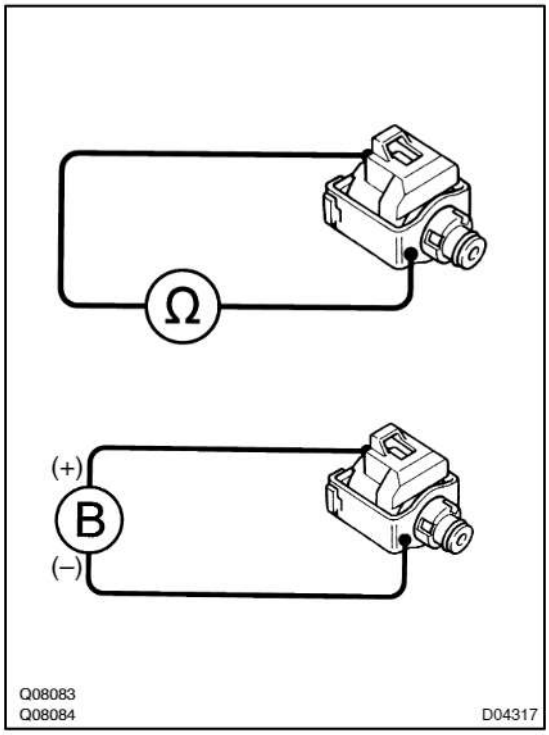
OK:

There is no open and short circuit.

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

OK

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



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.
(d) Remove the No. 1 or No. 2 solenoid valve .

CHECK:

(a) Measure resistance between the solenoid connector and the solenoid body.
(b) Connector positive ⊕ lead to the terminal of solenoid connector, negative ⊖ lead to the solenoid body.

OK:

(a) Resistance: 11 – 15 Ω at 20°C (68°F)
(b) The solenoid makes an operating noise.

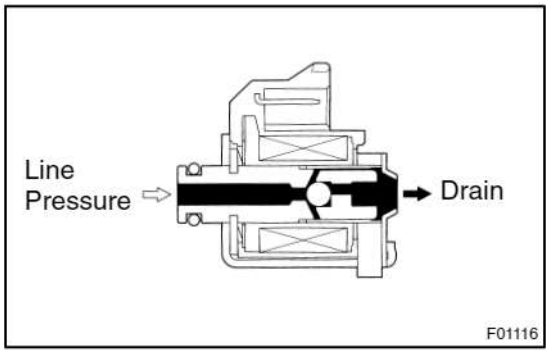
NG → **Replace shift solenoid valve.**

OK →

Repair or replace solenoid wire.

DTC	P0770	Shift Solenoid E Malfunction (SL Solenoid Valve)

SYSTEM DESCRIPTION

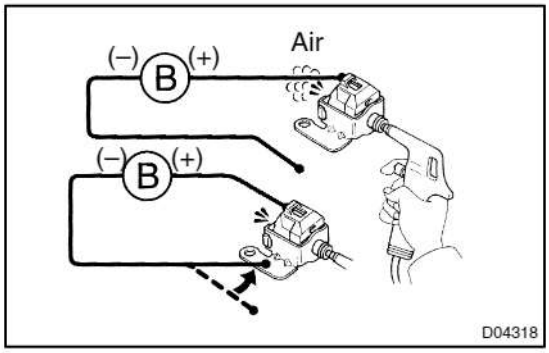


The Engine and ECT ECU uses the signals from the throttle position sensor, air–flow meter and crankshaft position sensor to monitor the engagement condition of the lock–up clutch. Then the Engine and ECT ECU compares the engagement condition of the lock–up clutch with the lock–up schedule in the Engine and ECT ECU memory to detect the mechanical trouble of the shift solenoid valve SL, the valve body and the torque converter or automatic transaxle (clutch, brake or gear etc.).

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) • When lock–up is ON, clutch or brake slips or gear is broken.	• SL solenoid valve is stuck open or closed • Valve body blocked up or stuck • Lock–up clutch • Automatic transaxle (clutch, brake or gear etc.)

INSPECTION PROCEDURE

1	Check SL solenoid valve operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the SL solenoid valve from the valve body.

CHECK:

(a) Applying 490 kPa (5 km/cm^2, 71 psi) of compressed air, check that the solenoid valve opens.

(b) When battery positive voltage is supplied to the shift solenoid valve, check that it does no leak air.

OK:

(a) Solenoid valve opens.

(b) Solenoid valve does not leak air.

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

OK

2	Check valve body (See chapter 2 in the problem symptoms table).

NG → Repair or replace the valve body.

OK

3	Check torque converter (See page AX–33).

NG → Replace the torque converter.

OK

Repair the transaxle.

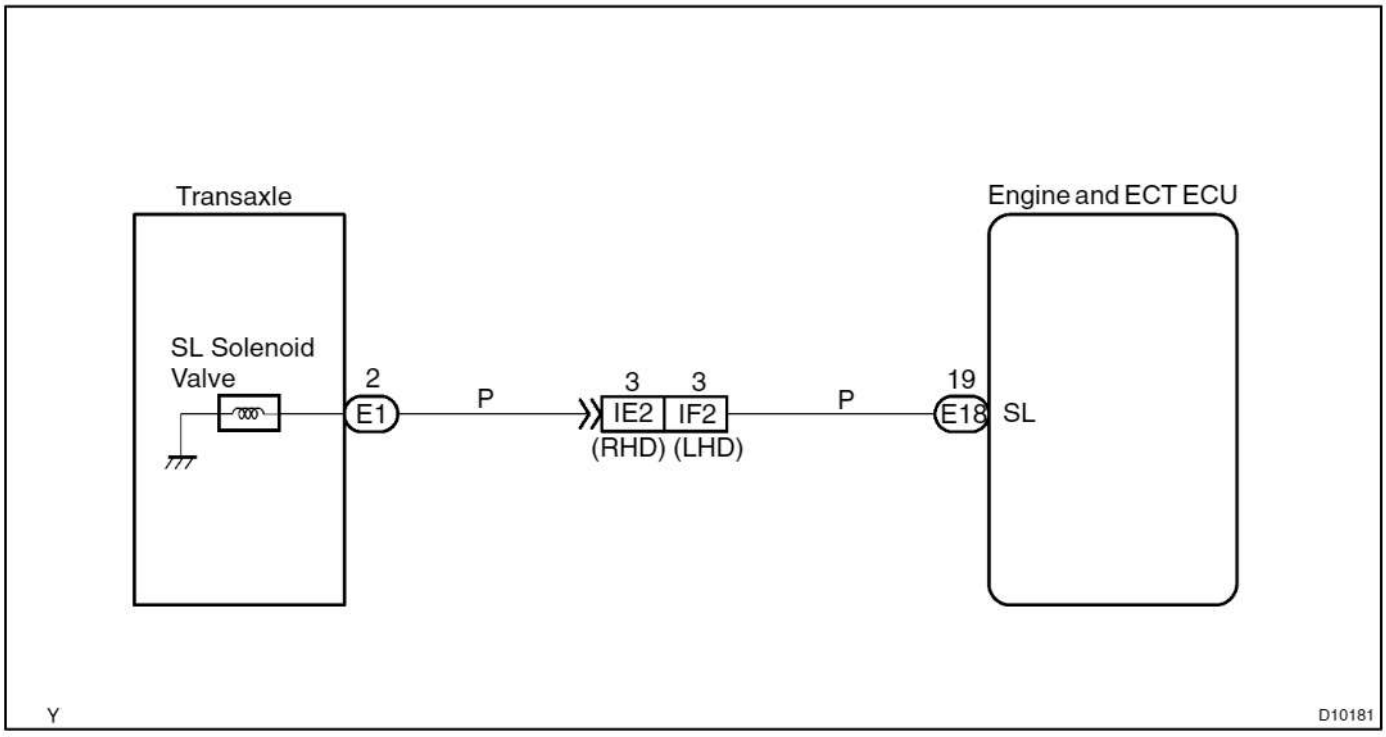
DTC	P0773	Shift Solenoid E Electrical Malfunction (SL Solenoid Valve)

CIRCUIT DESCRIPTION

The SL solenoid valve is turned ON and OFF by signals from the Engine and ECT ECU to control the hydraulic pressure acting on the lock–up relay valve, then the signals control operation of the lock–up clutch.
Fail safe function
If the Engine and ECT ECU detects a malfunction, it turns the SL solenoid valve OFF.

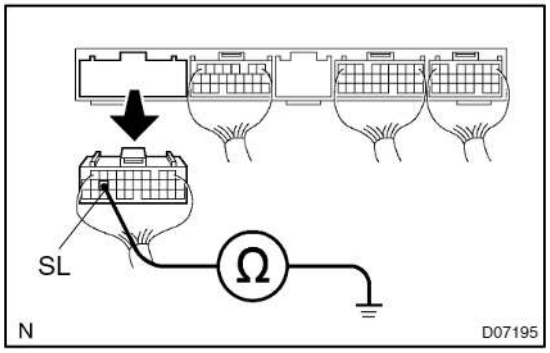
DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) is detected for 1 time. (2–trip detection logic) (a) Solenoid resistance is 8 Ω or less for short circuit when solenoid is energized. (b) Solenoid resistance is 100 kΩ or more for open circuit when solenoid is not energized.	• Open or short on SL solenoid valve circuit • SL solenoid valve • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal SL of Engine and ECT ECU and body ground.**

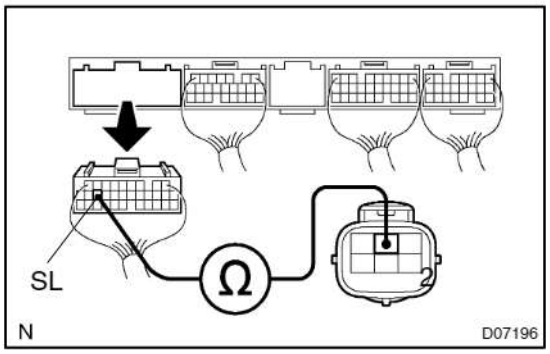


PREPARATION:
Disconnect the connector from Engine and ECT ECU.
CHECK:
Measure resistance between the terminal SL of Engine and ECT ECU and the body ground.
OK:
Resistance: 11 – 15 Ω

OK	**Check and replace the Engine and ECT ECU (See page IN–30).**

NG

2	**Check harness and connector between Engine and ECT ECU and automatic transaxle solenoid connector.**

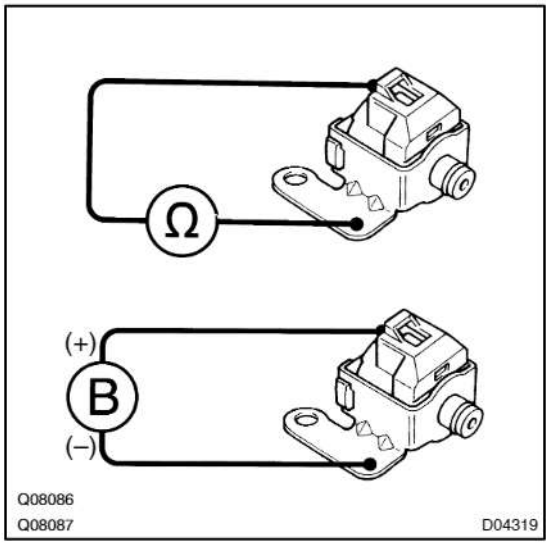


PREPARATION:
Disconnect the solenoid connector from the transaxle.
CHECK:
Check the harness and connector between the terminal SL of Engine and ECT ECU and the terminal 2 of solenoid connector.
OK:
There is no open or short circuit.

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

OK

3	Check SL solenoid valve.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the SL solenoid valve connector.
(d) Remove the SL solenoid valve.

CHECK:

(a) Measure resistance between the terminal SL of shift solenoid valve and the solenoid body.
(b) Connect positive (+) lead to the terminal of solenoid connector, negative (–) lead to the solenoid body.

OK:

(a) Resistance: 11 – 15 Ω
(b) The SL solenoid valve makes operation noise.

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

OK

Check and replace or repair the solenoid wire.

DI80B-01

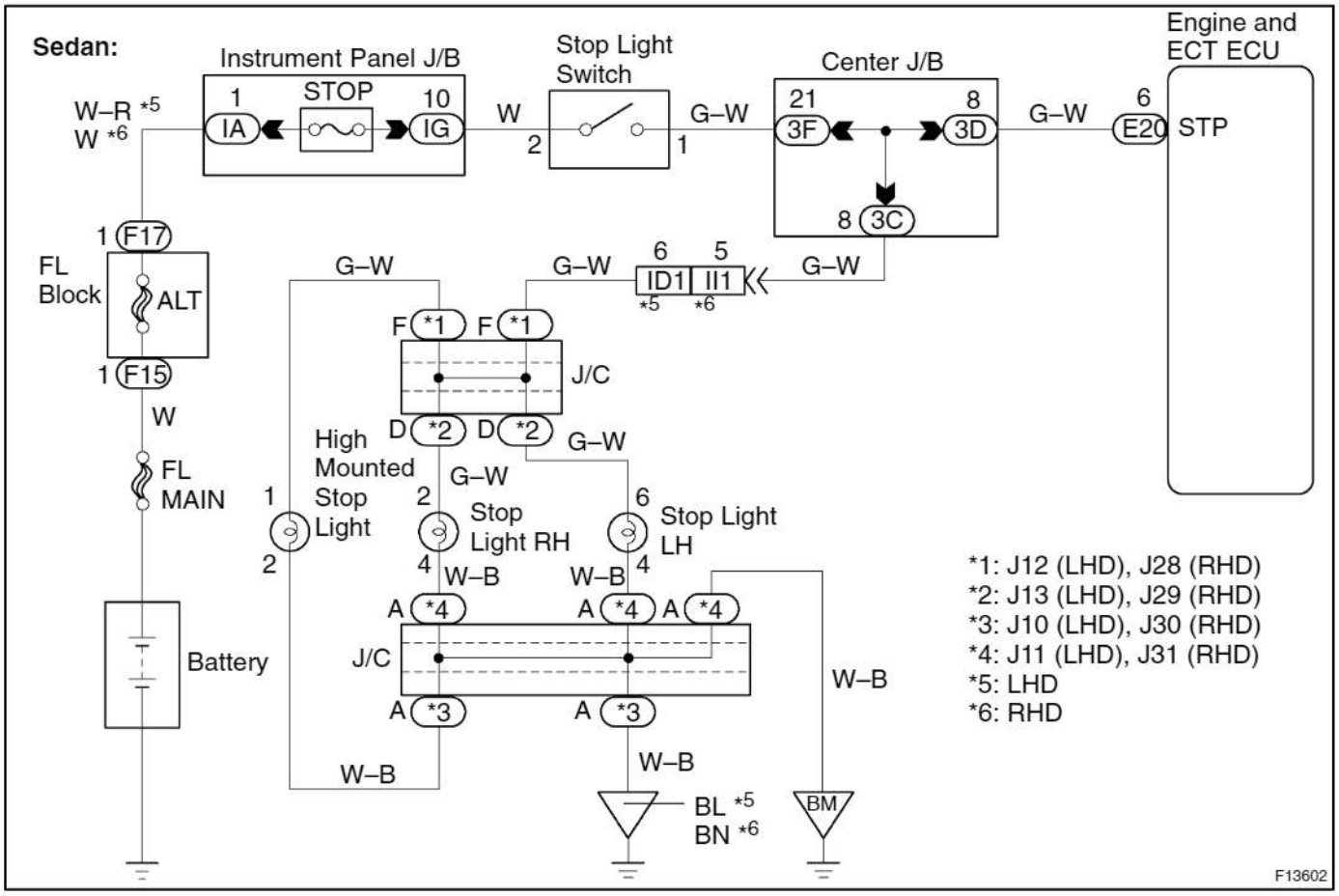
DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

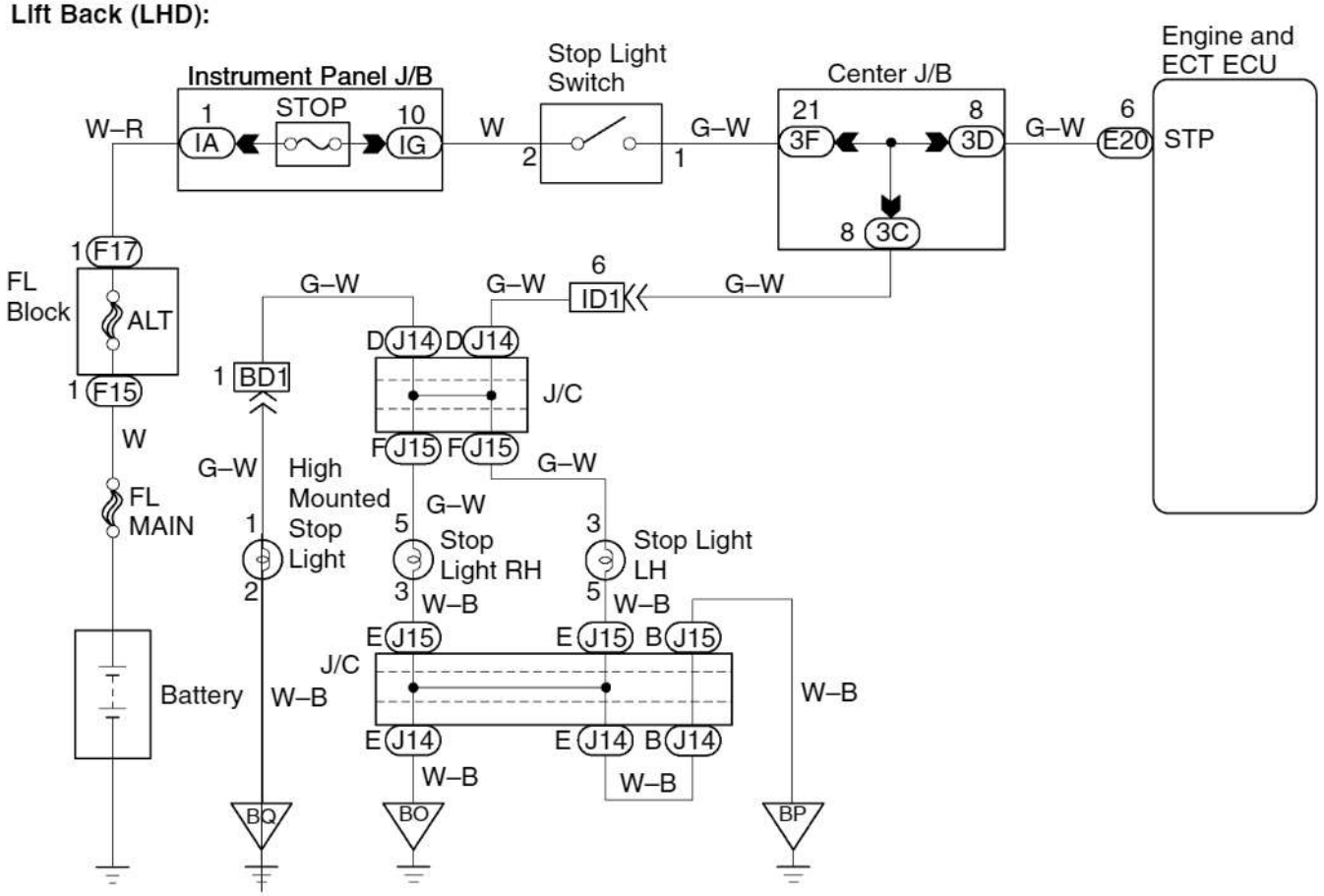
The purpose of this circuit is to prevent the engine from stalling, while driving in lock–up condition, when brakes are suddenly applied.
When the brake pedal is operated, this switch sends a signals to Engine and ECT ECU. Then the Engine and ECT ECU cancels operation of the lock–up clutch while braking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

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to Engine and ECT ECU during driving. (2–trip detection logic)	• Open or short in stop light switch circuit • Stop light switch • Engine and ECT ECU

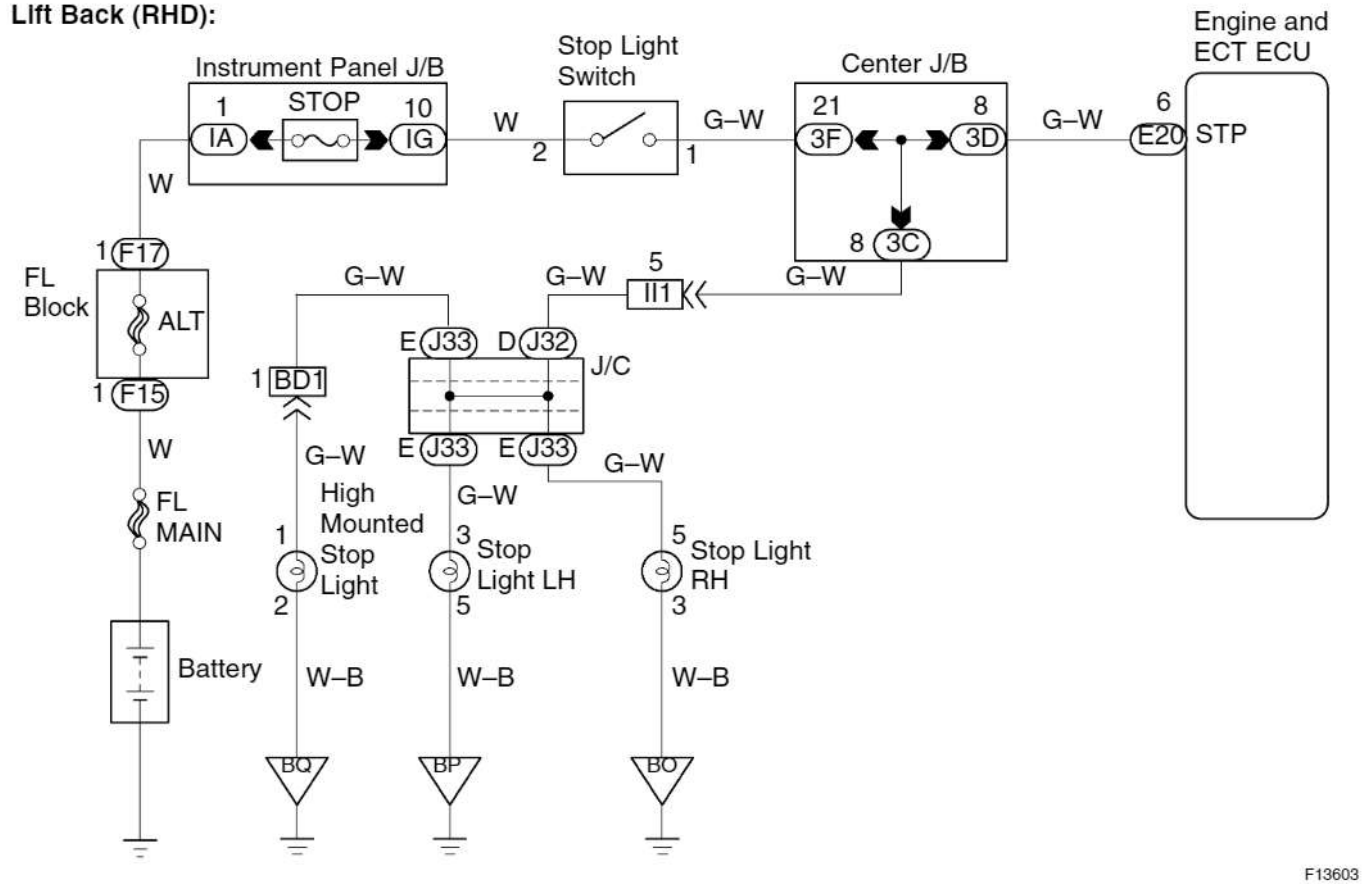
WIRING DIAGRAM



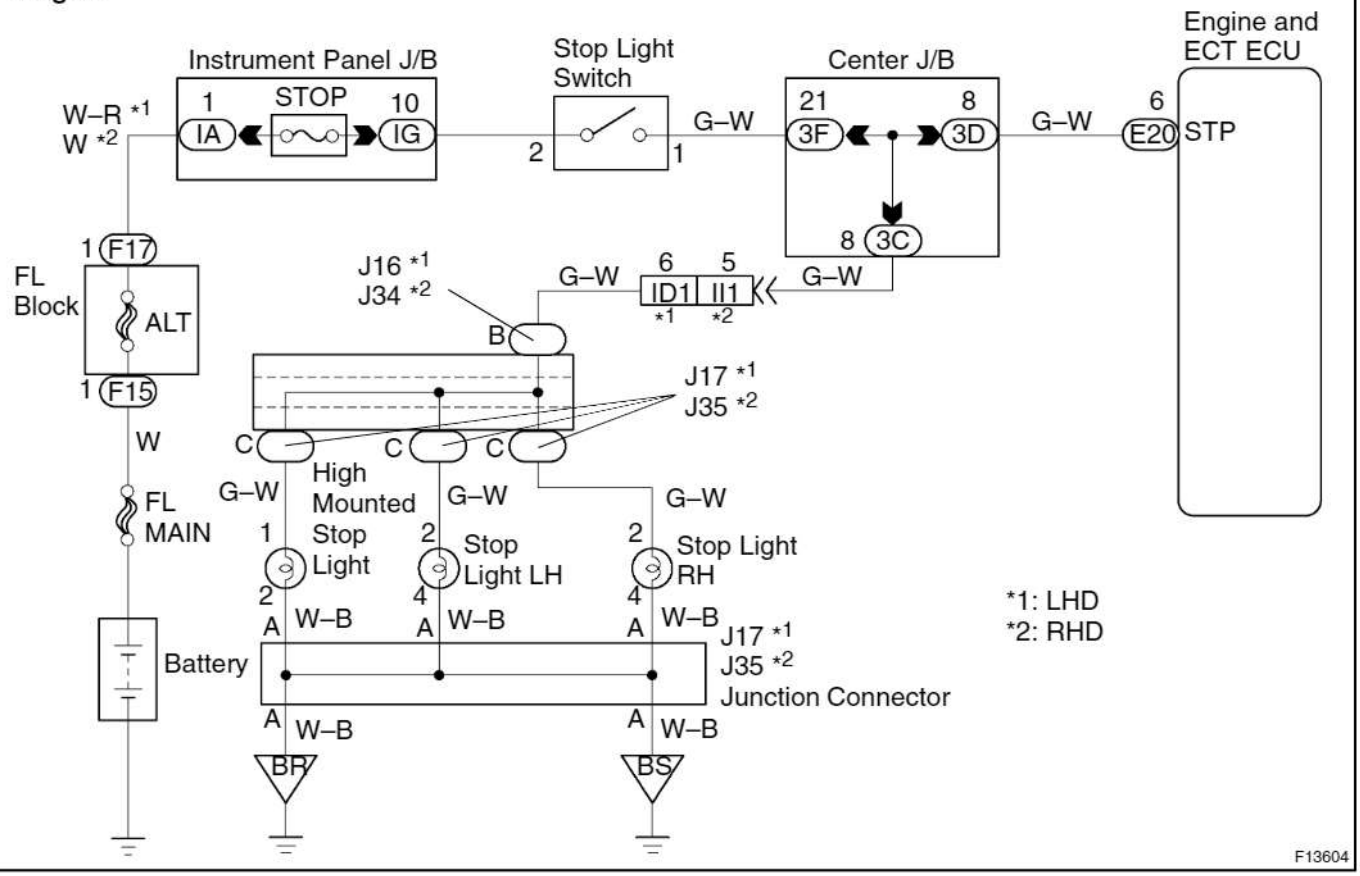
Lift Back (LHD):



Lift Back (RHD):



Wagon:


Instrument Panel J/B
Stop Light Switch
Center J/B
Engine and ECT ECU
W–R *1
W *2
1
STOP
10
IA
IG
2
1
G–W
21
8
3F
3D
G–W
6
E20
STP
8
3C
1
F17
FL Block
ALT
1
F15
W
J16 *1
J34 *2
G–W
6
5
ID1
II1
*1
*2
G–W
B
J17 *1
J35 *2
C
C
C
High Mounted Stop Light
Stop Light LH
Stop Light RH
G–W
G–W
G–W
1
2
2
2
4
4
FL MAIN
A
W–B
A
W–B
A
W–B
Battery
J17 *1
J35 *2
Junction Connector
A
W–B
A
W–B
BR
BS
*1: LHD
*2: RHD
F13604

INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check operation of stop light.**

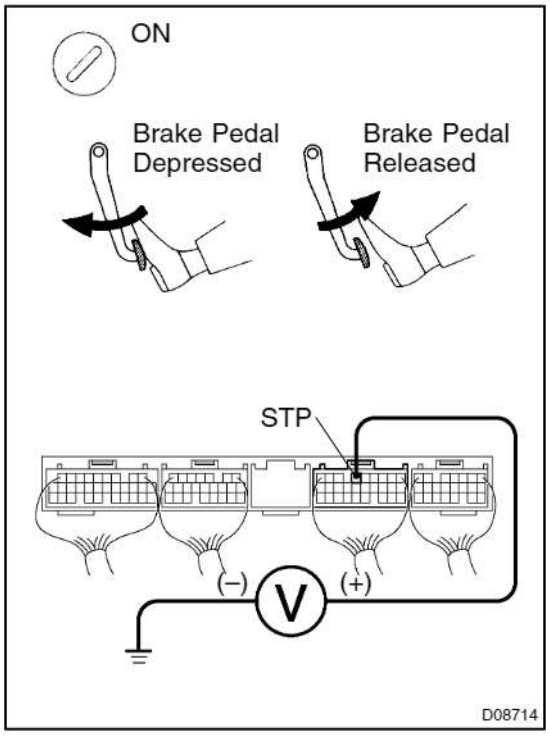
PREPARATION:

Check if the stop lights go on and off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit (See Pub. No. RM599E BE section).**

OK

2	**Check STP signal.**



When using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the STP signal on the hand–held tester.

OK:

Brake pedal is depressed: STP ... ON

Brake pedal is released: STP ... OFF

When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal STP of Engine and ECT ECU and body ground.

OK:

Brake pedal	Voltage
Depressed	7.5 – 14 V
Released	Below 1.5 V

OK → **Check for intermittent problems (See page DI–18).**

NG

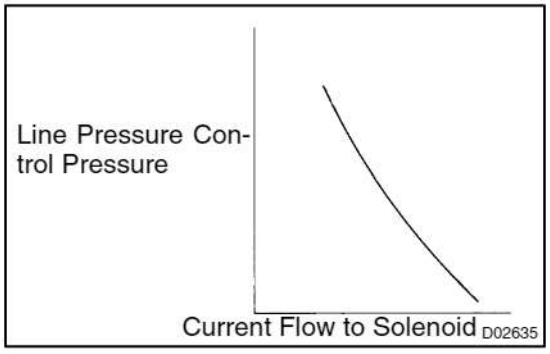
3	**Check harness and connector between Engine and ECT ECU and stop light switch (See page IN–30).**

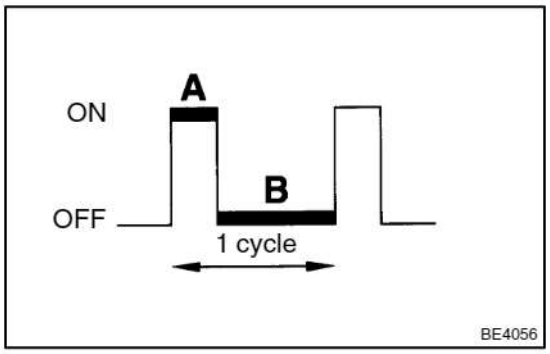
NG → **Repair or replace harness or connector.**

OK

Check and replace Engine and ECT ECU (See page IN–30).

DTC	P1760	Linear Solenoid for Line Pressure Control Circuit malfunction (SLT Solenoid Valve)



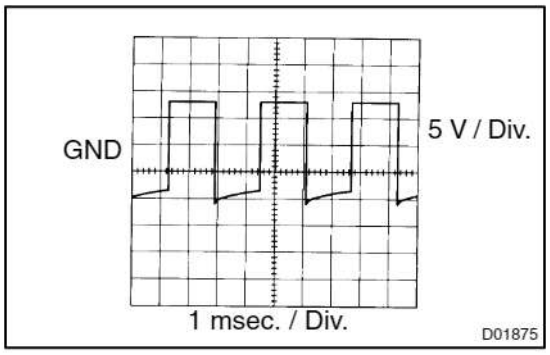


CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the SLT solenoid valve, under electronic control, to precisely and minutely modulates and generates line pressure according to the accelerator pedal effort, or engine power output detected.
This reduces the function of line pressure and provides smooth shifting characteristics.
Upon receiving the throttle valve opening angle signal, Engine and ECT ECU controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, 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

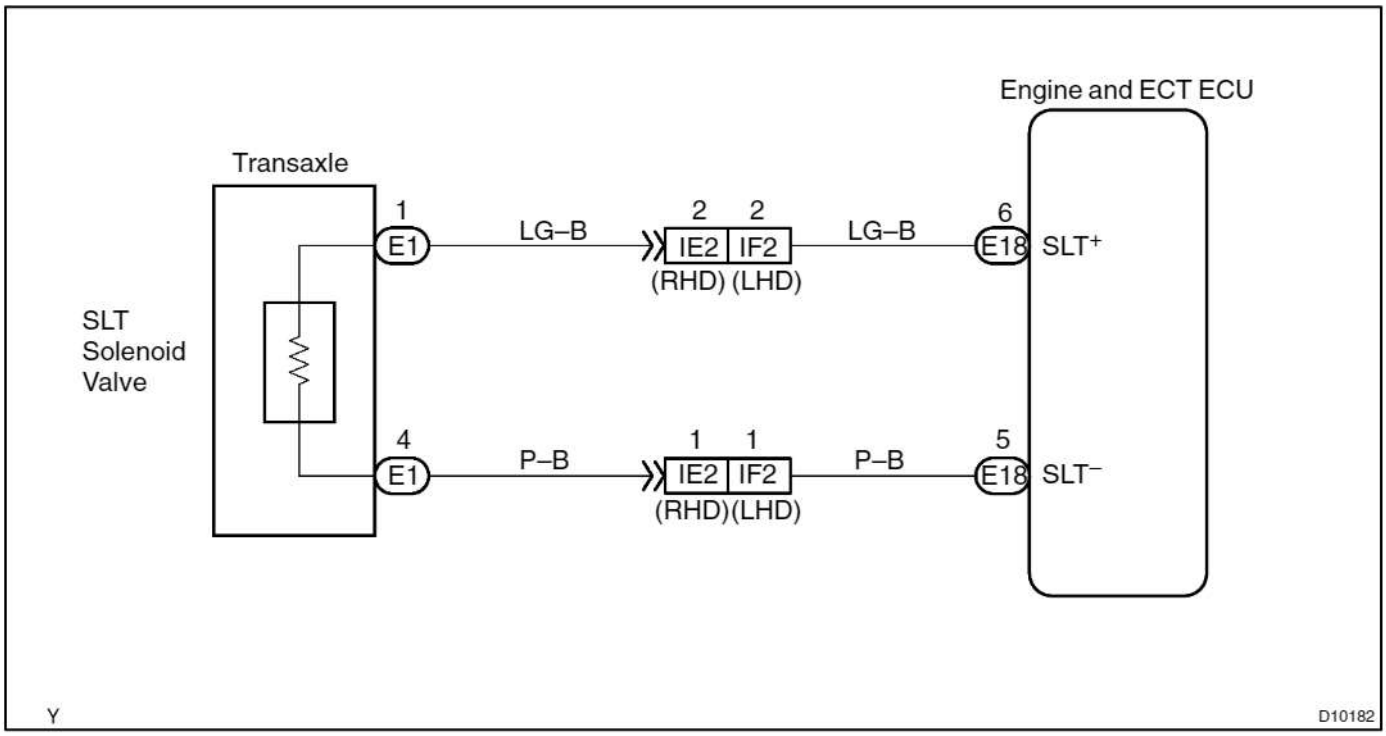
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760	(a) or (b) condition below is detected for 1 second or more. (a) SLT^- terminal: 0V (b) SLT^- terminal: 12V	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECT ECU



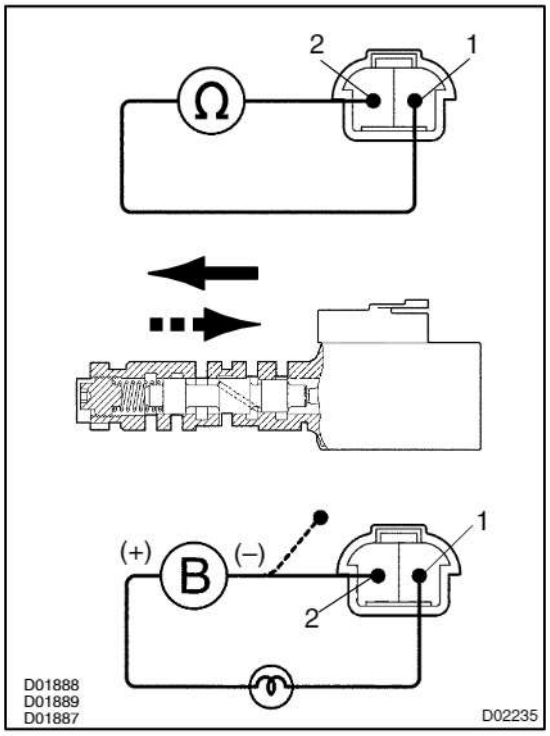
HINT:
Refer to the chart for the wave form between terminals SLT^+ and SLT^- during engine idling.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check SLT solenoid valve.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) 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 ~ 10 W bulb to terminal 1 of solenoid connector and negative (–) lead to terminal 2, then check the movement of the valve.

OK:

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

NG → **Replace SLT solenoid valve.**

OK ↓

2	**Check harness and connector between SLT solenoid valve and Engine and ECT ECU (See page IN–30).**

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

OK ↓

Check and replace Engine and ECT ECU (See page IN–30).

DI80C–01

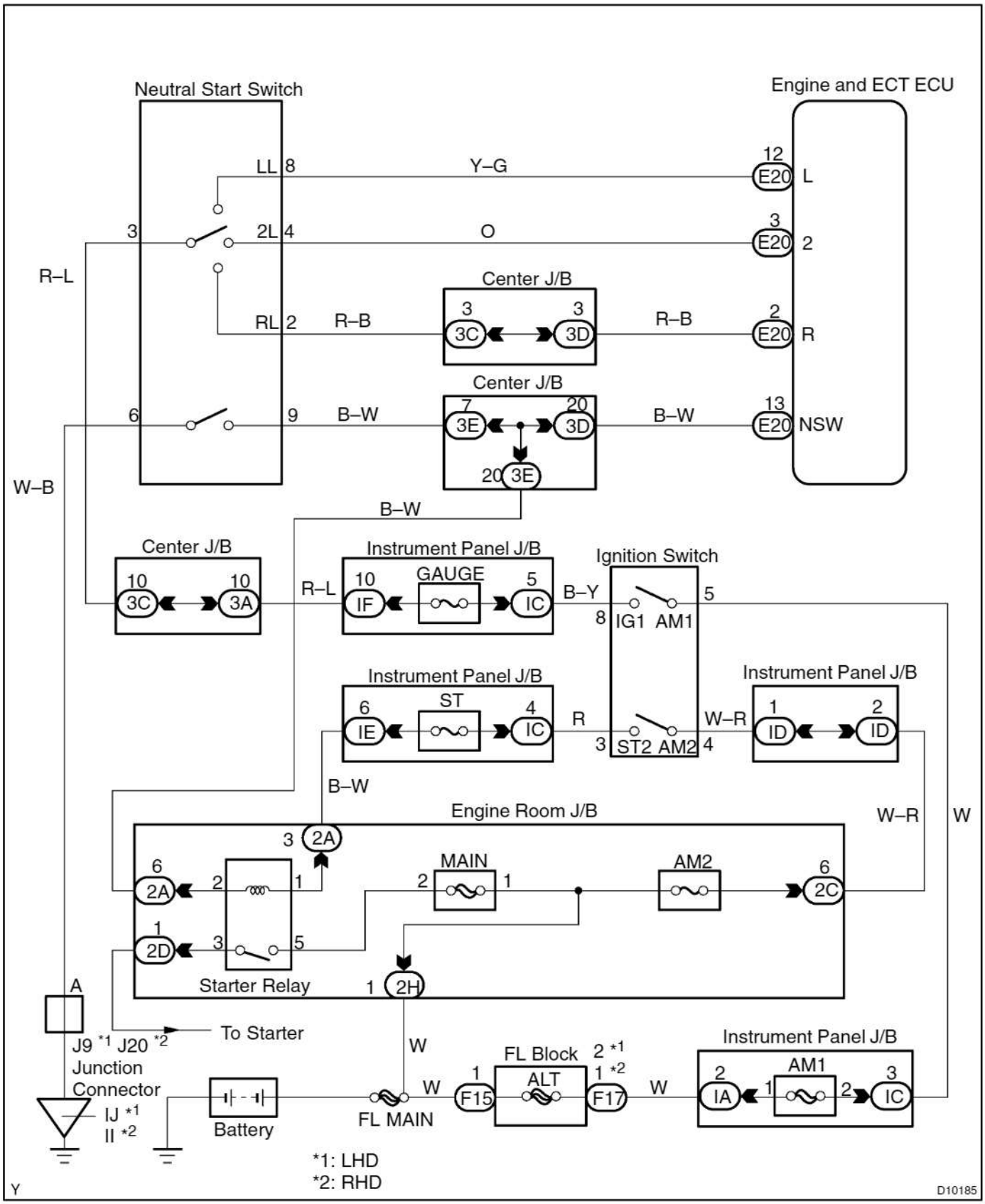
DTC	P1780	Neutral Start Switch Malfunction

CIRCUIT DESCRIPTION

The neutral start switch detects the shift lever range and sends the signals to the Engine and ECT ECU. The Engine and ECT ECU receives the signals (NSW, R, 2 and L) from the neutral start switch, when the signal is not sent to the Engine and ECT ECU from the neutral start switch, the Engine and ECT ECU judges that the shift lever is in the D range.

DTC No.	DTC Detecting Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for "N", "R", "2" or "L" range. (2–trip detection logic)	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU
	When driving under the conditions (a), (b) and (c) for 30 seconds or more, the park/neutral position switch is ON (N position). (2–trip detection logic) (a) Vehicle speed: 80 km/h (50 mph) or more (b) Engine speed: 1,500 – 5,000 rpm (c) Manifold absolute pressure: 300 mmHg or more	

WIRING DIAGRAM



INSPECTION PROCEDURE

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

When using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

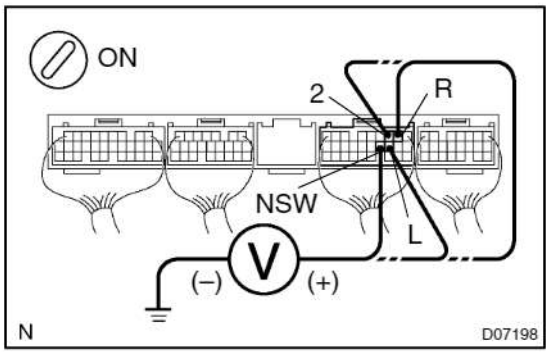
(b) Turn the ignition switch ON.

CHECK:

Shift the shift lever to the P, R, N, 2 and L ranges, and read the NSW, REVERSE, 2ND and LOW signals on the hand–held tester.

OK:

Shift range	Signal
P, N	NSW OFF → ON
R	REVERSE OFF → ON
2	2ND OFF → ON
L	LOW OFF → ON



When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between the terminals NSW, R, 2 and L of Engine and ECT ECU and the body ground when the shift lever is shifted to the following ranges.

OK:

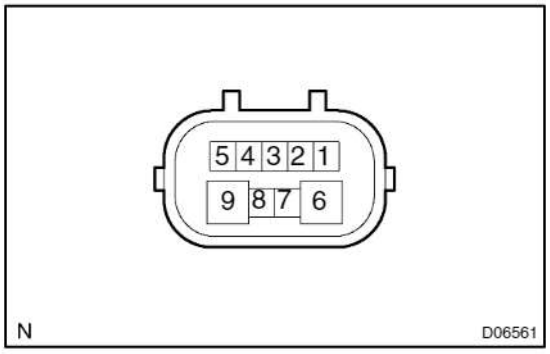
Range	NSW–Body ground	R–Body ground	2–Body ground	L–Body ground
P, N	0 V	0 V	0 V	0 V
R	7.5 – 14 V*	7.5 – 14 V*	0 V	0 V
D	7.5 – 14 V	0 V	0 V	0 V
2	7.5 – 14 V	0 V	7.5 – 14 V	0 V
L	7.5 – 14 V	0 V	0 V	7.5 – 14 V

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

OK → **Check and replace Engine and ECT ECU (See page IN–30).**

NG

2	Check neutral start switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the neutral start switch.

CHECK:

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

Shift Range	Terminal No. to continuity	
P	–	6 – 9
R	2 – 3	–
N	–	6 – 9
2	3 – 4	–
L	3 – 8	–

OK:

There is continuity.

NG → **Replace the neutral start switch.**

OK

Repair or replace harness and connector between battery and neutral start switch, neutral start switch and Engine and ECT ECU (See page IN–30).

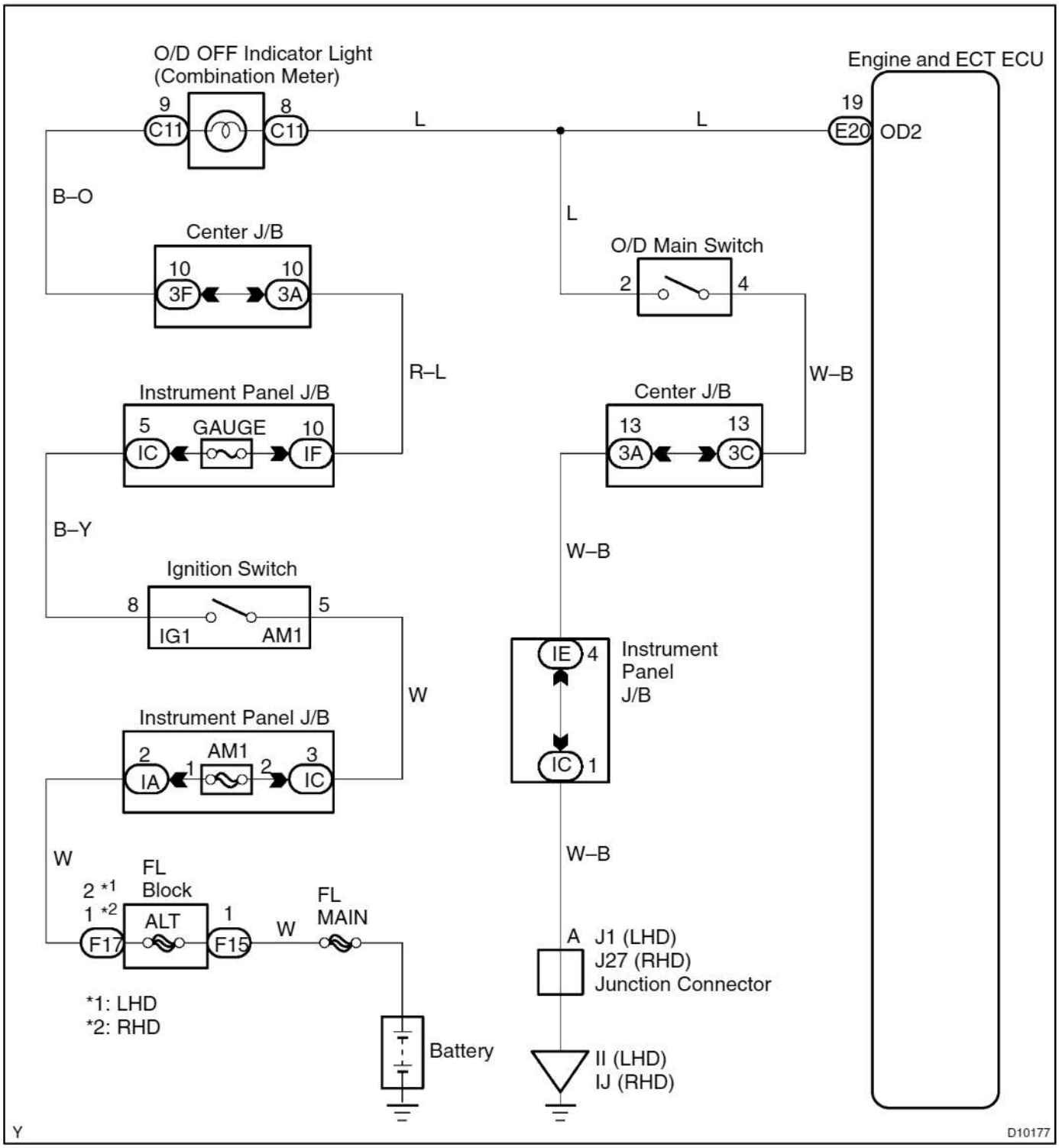
DI80D-01

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

CIRCUIT INSPECTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed once again. In O/D main switch OFF position, the O/D OFF indicator light lights up, and the Engine and ECT ECU prohibits shifting to O/D.

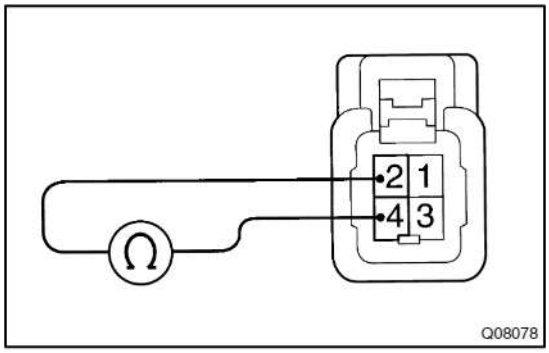
WIRING DIAGRAM



INSPECTION PROCEDURE

O/D OFF indicator light does not light up

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



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between the terminals 2 and 4 of the O/D main switch connector.
OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

NG → **Replace the O/D main switch.**

OK

2	**Check and replace the combination meter (See page BE–1).**

NG → **Replace the combination meter.**

OK

3	Check OVERDRIVE CUT SW2 signal.

When using hand–held tester:

PREPARATION:

(a) Connect a hand–held tester to the DLC3.

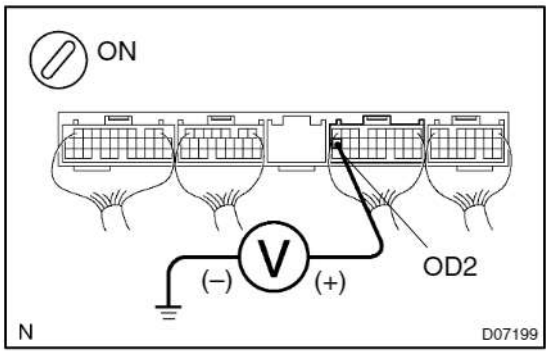
(b) Turn the ignition switch ON and the hand–held tester main switch ON.

CHECK:

Read the OVERDRIVE CUT SW2 signal on the hand–held tester.

OK:

O/D main switch condition	OVERDRIVE CUT SW2 signal
O/D ON (Pushed in)	OFF
O/D OFF (Pushed once again)	ON



When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between the terminal OD2 of Engine and ECT ECU and the body ground.

OK:

O/D main switch	Voltage
ON	Below 3 V
OFF	9 – 14

OK → **Check and replace the Engine and ECT ECU (See page IN–30).**

NG

4	**Check harness and connector between O/D OFF indicator light and Engine and ECT ECU (See page IN–30).**

PREPARATION:
Disconnect the connector (E6) of Engine and ECT ECU and the connector (C14) of the combination meter.
CHECK:
Measure the continuity between the connector (E6) of Engine and ECT ECU and the connector (C14) of the combination meter.
OK:

Continuity

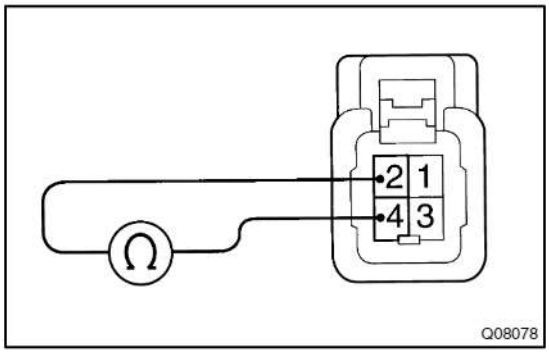
NG → **Repair or replace the harness or connector.**

OK

Repair or replace the wire harness or connectors between the connector of Engine and ECT ECU and the body ground.

O/D OFF indicator light remains ON

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



PREPARATION:
Disconnect the O/D main switch connector.

CHECK:
Check continuity between the terminals 2 and 4 of O/D main switch connector.

OK:

O/D main switch	Resistance
ON	No continuity
OFF	Continuity

NG → **Repair the O/D main switch.**

OK

2	**Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and Engine and ECT ECU (See page IN–30).**

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

OK

Check and replace the Engine and ECT ECU (See page IN–30).

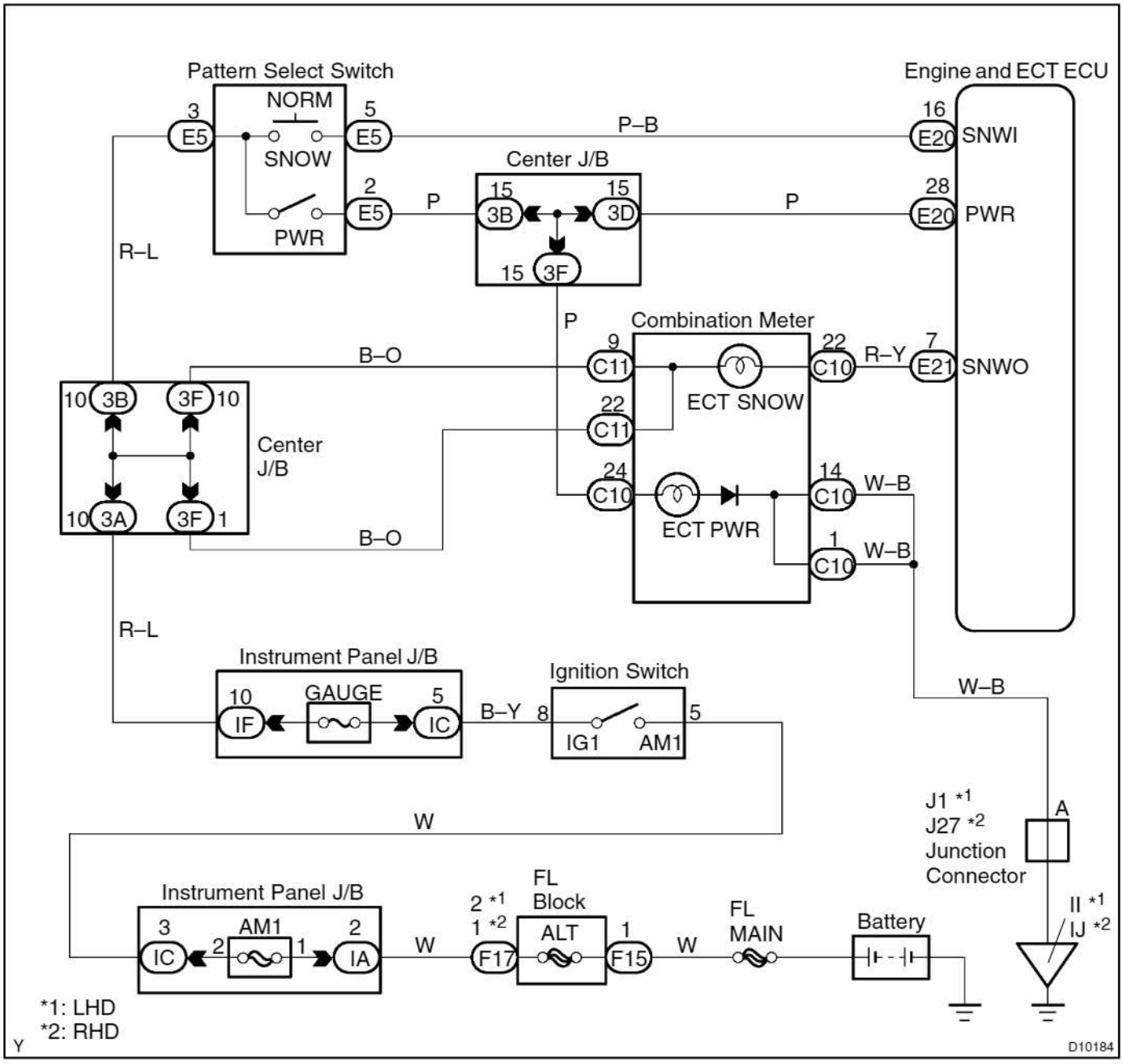
DI336-03

Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

The Engine & ECT ECU memory contains the shift programs for the NORMAL, POWER and SNOW (w/ SNOW mode) patterns, 2 range, L range and the lock–up patterns. By following the programs corresponding to the signals from the pattern select switch, the neutral start switch and other various sensors, the Engine & ECT ECT switches the solenoid valves ON and OFF, and controls the transaxle gear change and the lock–up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check PATTERN SEL SW signal.**

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:

Read the PATTERN SEL SW signal on the hand–held tester.

OK:

Pattern select switch	PATTERN SEL SW signal
POWER	ON
NORM	OFF
SNOW	OFF

When not using hand–held tester:

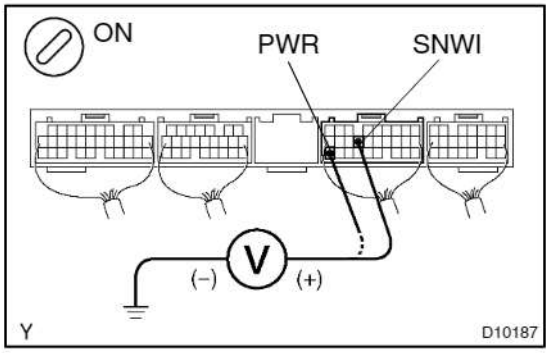
PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal each of PWR, SNWI of Engine & ECT ECU and body ground when the pattern select switch is set to the PWR (POWER), NORM (NORMAL) or SNOW (SNOW) position.

OK:



Switch position	Tester connection	Specified condition
PWR	PWR – Body ground	9 – 14 V
	SNWI – Body ground	Below 1.5 V
NORM	PWR – Body ground	Below 1.5 V
	SNWI – Body ground	Below 1.5 V
SNOW	PWR – Body ground	Below 1.5 V
	SNWI – Body ground	9 – 14 V

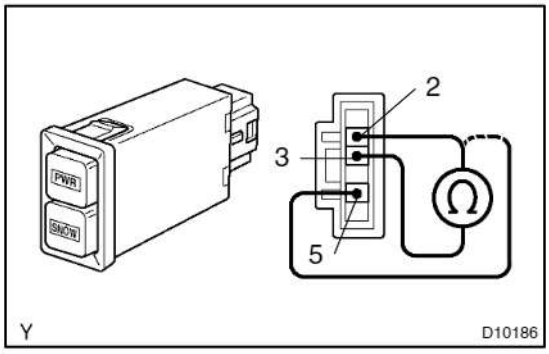
HINT:

The Engine & ECT ECU uses the normal pattern signal if the PWR and SNWI signals are not input.

OK → **Proceed to next circuit inspection shown in symptom problems table (See page DI–18).**

NG

2	Check pattern select switch



PREPARATION:

Disconnect the pattern select switch connector.

CHECK:

Check continuity between terminals 2 and 3 (PWR, NORM), 3 and 5 (SNOW) of pattern select switch connector when the select switch is set to PWR, NORM or SNOW position.

OK:

Switch position	Tester connection	Specified condition
PWR	2 – 3	Continuity
NORM	2 – 3, 3 – 5	No continuity
SNOW	3 – 5	Continuity

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

OK

3	Check harness and connector between battery and pattern select switch, pattern select switch and Engine & ECT ECU (See page IN–30).

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

OK

Check and replace the Engine & ECT ECU (See page IN–30).

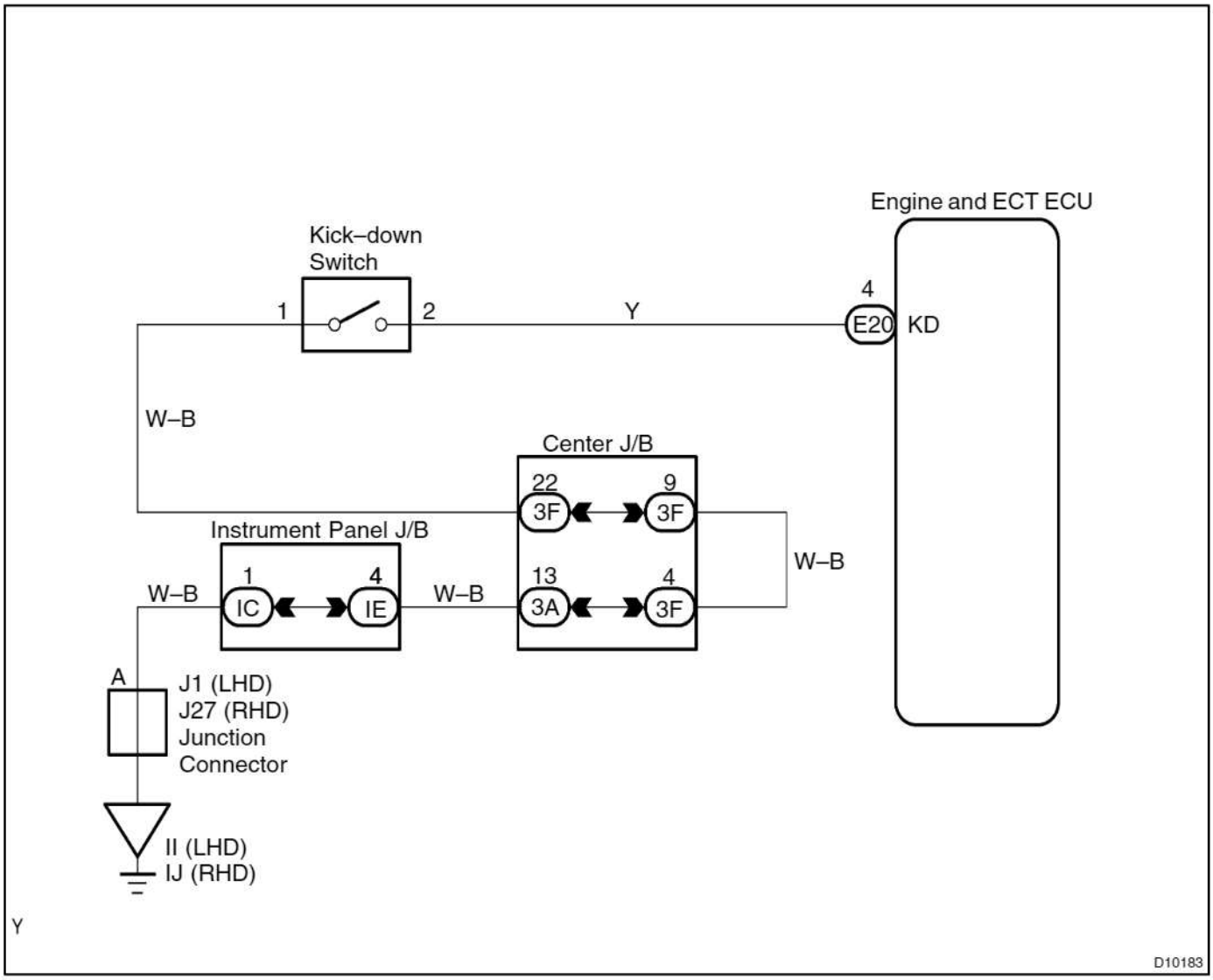
DI80E–01

Kick–down Switch Circuit (LHD)

CIRCUIT DESCRIPTION

The kick–down switch is turned ON when the accelerator pedal is depressed beyond the full throttle opening and sends signals to Engine and ECT ECU.
When the kick–down switch is turned ON, the Engine and ECT ECU controls gear shifting according to the programmed shift diagrams.
If a short circuit develops in the kick–down switch, the Engine and ECT ECU disregards the kick–down signals and controls shifting at the normal shift points.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check KICK DOWN SW signal.**

When using hand–held tester:

PREPARATION:

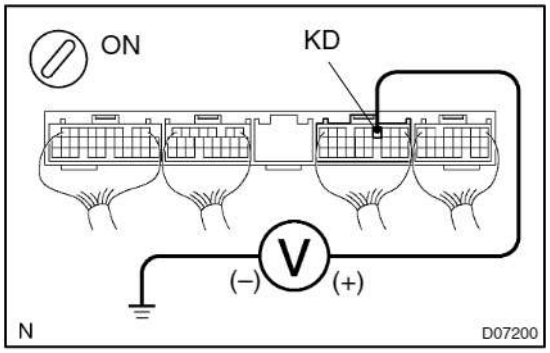
(a) Remove the DLC3 cover.
(b) Connect a hand–held tester to the DLC3.
(c) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the KICK DOWN SW signal on the hand–held tester.

OK:

Accelerator Pedal	KICK DOWN SW signal
Fully depressed (kick–down SW is ON)	ON
Released (kick–down SW is OFF)	OFF



When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal KD of Engine and ECT ECU connector and body ground when accelerator pedal is fully depressed or not.

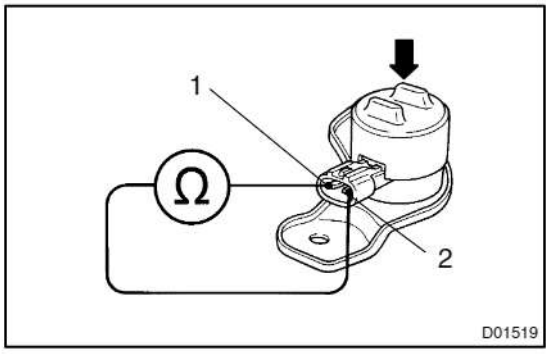
OK:

Accelerator Pedal	Voltage
Fully depressed (kick–down SW is on)	Below 1 V
Released (kick–down SW is OFF)	10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–18).**

NG

2	Check kick–down switch.



PREPARATION:
Disconnect the kick–down switch connector.
CHECK:
Check continuity at each terminal of kick–down switch connector.
OK:

Kick–down Switch	Specified continuity
ON	Continuity
OFF	No continuity

NG → **Replace kick–down switch**

OK →

3	Check harness and connector between Engine & ECT ECU and kick–down switch, kick–down switch and body ground (See page IN–30).

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

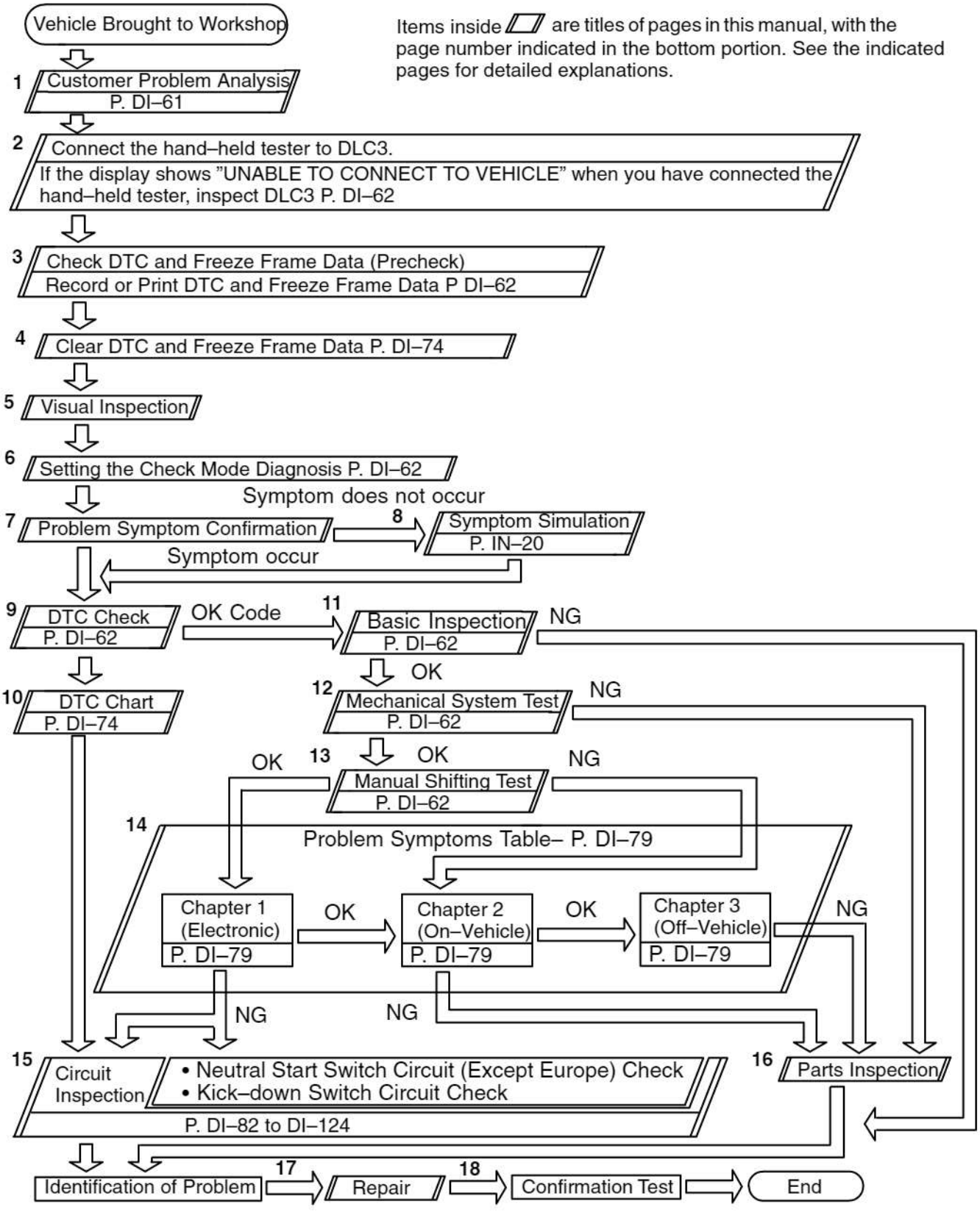
OK →

Check and replace Engine & ECT ECU (See page IN–30).

AUTOMATIC TRANSAXLE (U240E)

HOW TO PROCEED WITH TROUBLESHOOTING

DI2L4–11



DI2L5-06

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transaxle 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 Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any range ☐ Particular range)
	☐ 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 range)
	☐ Slip or shudder
	☐ No kick–down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

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

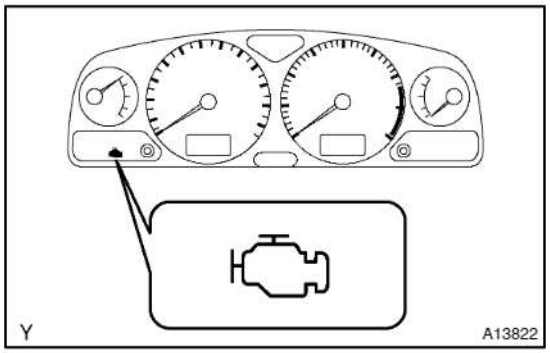
DI80F–01

PRE–CHECK

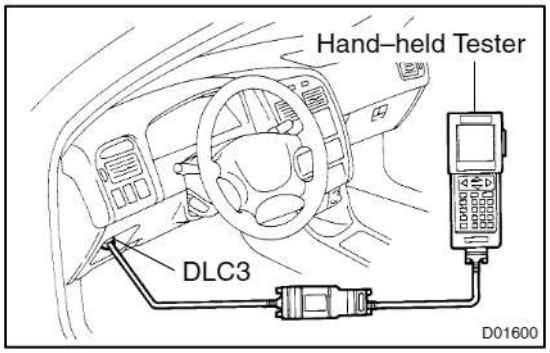
1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect an OBD scan tool complying with ISO15031–4 or hand–held tester to the vehicle, and read off various data output from the vehicle's engine and ECT ECU.

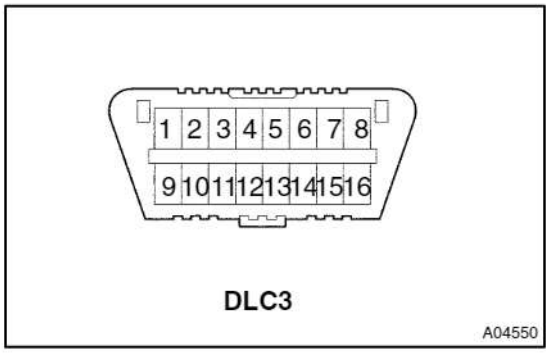


- Euro–OBD regulations require that the vehicle's on–board computer lights up the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the CHK ENG lighting up when a malfunction is detected, the applicable DTCs prescribed by ISO15031–6 are recorded in the engine and ECT ECU memory (See page DI–74).
  If the malfunction only occurs in 3 trips, the CHK ENG goes off but the DTCs remain recorded in the engine and ECT ECU memory.



- To check the DTCs, connect an OBD scan tool or hand–held tester to the Data Link Connector (DLC3) on the vehicle. The OBD 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 ISO controlled codes and manufacturer controlled codes.
  ISO controlled codes must be set as prescribed by the ISO, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–74).

- 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 engine and ECT ECU to check mode when troubleshooting, the technician can cause the CHK ENG to light up and for a malfunction that is only detected once or momentarily (hand–held tester) (See page DI–62).
- *2 trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the engine and ECT ECU memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the CHK ENG to light up .



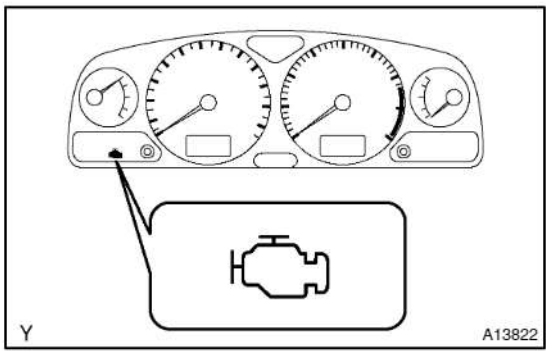
DLC3

(b) Inspect the DLC3.
The vehicle's engine and ECT ECU uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with ISO15031–3 and matches the ISO 9141–2 format.

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

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD scan tool or hand–held tester to the 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 the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected 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)

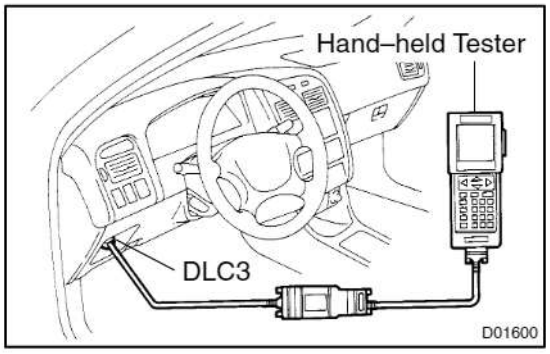
(a) Check the CHK ENG.

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

HINT:

If the CHK ENG does not light up, troubleshoot the combination meter (See page BE–1).

(2) When the engine is started, the CHK ENG 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 the normal mode to the 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 scan tool or hand–held tester.

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

(3) Turn the ignition switch ON and push the OBD scan tool or hand–held tester switch ON.

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

(5) See page DI–74 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD 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 symptom is simulated the 1st time. Then repeat the simulation process again. When the problem has been simulated twice, the CHK ENG is indicated on the instrument panel and DTCs are recorded in the engine and ECT ECU.

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 the check mode.

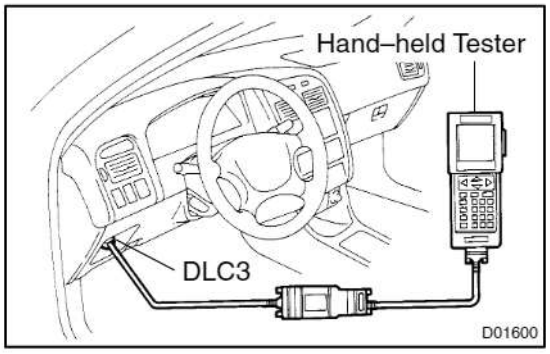
(a) Check the DTC.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transaxle in P position.
- A/C switched off.

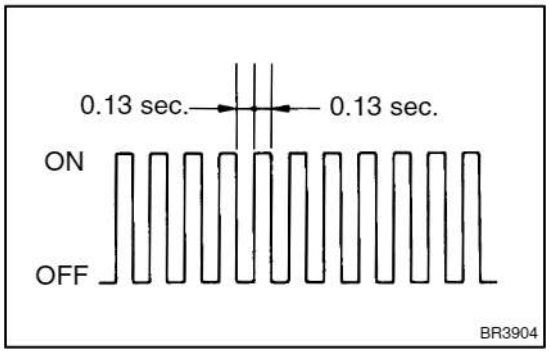
(2) Turn the ignition switch OFF.

(3) Prepare the hand–held tester.



(4) Connect the hand–held tester to DLC3 at the lower 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 CHK ENG flashes).

(7) Start the engine (CHK ENG 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 switches the diagnosis system from 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 actions will erase the DTC and freezed frame data. Operating an OBD scan tool or hand–held tester to erase the codes (See the OBD scan tool's instruction book for operating instructions.).

4. PROBLEM SYMPTOM CONFIRMATION

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

5. ROAD TEST

NOTICE:

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

(a) D range test
Shift into the D range and fully depress the accelerator pedal and check the following points:
(1) Check up–shift operation.
Check to see that 1 → 2, 2 → 3 and 3 → O/D up–shift takes place, and that the shift points conform to the automatic shift schedule (See page SS–23).

HINT:

- O/D Gear Up–shift Prohibition Control (1. Water temp. is 60 °C (140 °F) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Water temp. is 60 °C (140 °F) or lower)

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up–shift.
(3) Check for abnormal noises and vibration.
Run in D range lock–up or O/D gear and check for abnormal noises and vibration.

HINT:

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

(4) Check kick–down operation.
While running in the D range, 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 in the automatic shift schedule (See page SS–23).
(5) Check for abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D range O/D gear, at a steady speed (lock–up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

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

(b) 2 range test
Shift into the 2 range 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 range.

(2) Check engine braking.
While running in the 2 range 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 range test

Shift into the L range and fully depress the accelerator pedal and check the following points:

(1) Check no up–shift.

While running in the L range, check that there is no up–shift to 2nd gear.

(2) Check engine braking.

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

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

(d) R range test

Shift into the R range 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 range test

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

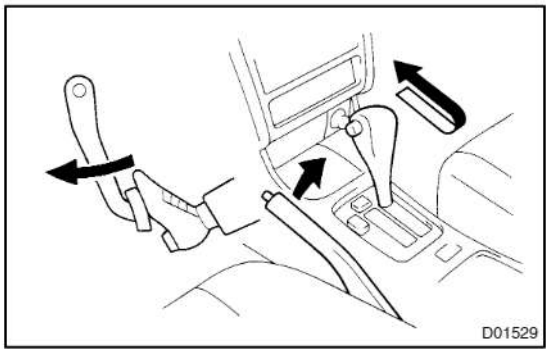
6. BASIC INSPECTION

(a) Check the fluid level.

HINT:

Drive the vehicle so that the engine and transaxle are at normal operating temperature.

Fluid temperature: 70 – 80 °C (158 – 176 °F)

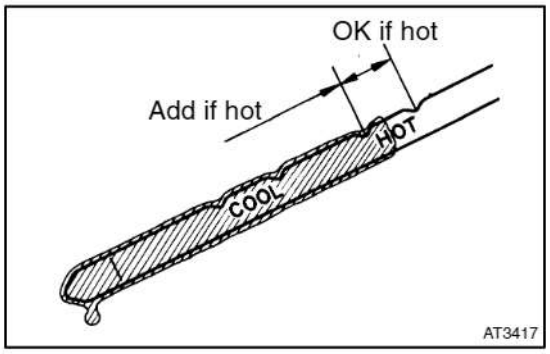


(1) Park the vehicle on a level surface and set the parking brake.

(2) With the engine idling and the brake pedal depressed, shift the shift lever into all ranges from P to L range and return to P range.

(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 range, add new fluid.

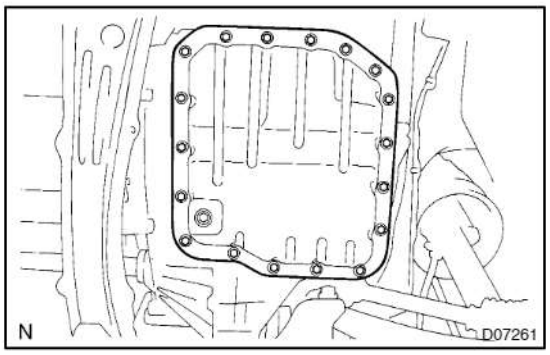
Fluid type: ATF Type T–IV

NOTICE:

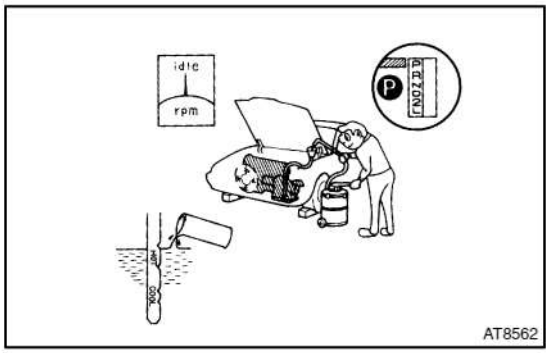
Do not overfill.

(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.

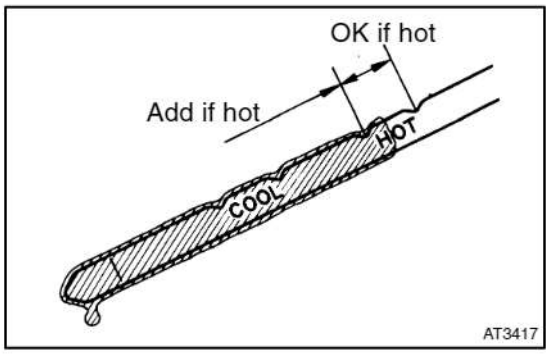


(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF Type T–IV

Capacity: 4.1 liters (4.3 US qts, 3.6 Imp.qts)

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



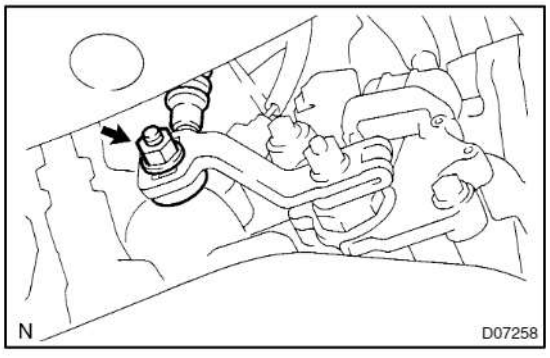
(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
(6) Check the fluid level at the normal operating temperature, 70 – 80 °C (158 – 176 °F), and add as necessary.

NOTICE:

Do not overfill.

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

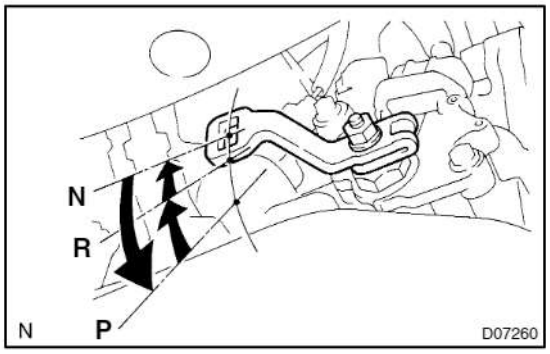
If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other parts.



(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N range to other positions, check that the lever can be shifted smoothly and accurately to each range 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.

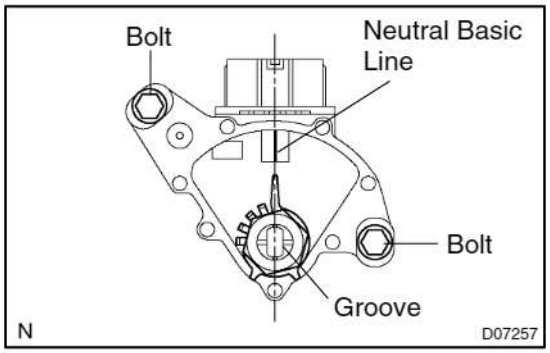
(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully downward.



(3) Return the control shaft lever 2 notches to N range.
(4) Set the shift lever to N range.
(5) While holding the shift lever lightly toward the R range side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

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



(f) Inspect and adjust the neutral start switch.
Check that the engine can be started with the shift lever only in the N or P range, but not in other ranges.

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

(1) Loosen the neutral start switch bolt and set the shift lever to the N range.
(2) Align the groove and the neutral basic line.
(3) Holding the shift selector, and tighten the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

HINT:
For continuity inspection of the neutral start switch, see page DI–112.

7. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

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

NOTICE:

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

(1) Chock the 4 wheels.
(2) Connect a 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 range. Press all the way down on the accelerator pedal with your right foot.
(7) Quickly read the stall speed at this time.

Stall speed: 2,550 ± 150 rpm

(8) Do the same test in the R range.

Stall speed: 2,550 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R ranges	• 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 could be faulty.
(b) Stall speed high in D range	• Line pressure too low • Forward clutch slipping • No.2 one–way clutch not operating properly • O/D clutch slipping
(c) Stall speed high in R range	• Line pressure too low • Direct clutch slipping • 1st & reverse brake slipping • O/D clutch slipping
(d) Stall speed high in D and R ranges	• 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 ATF 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) Chock the 4 wheels.
(2) Connect a hand–held tester to DLC3.
(3) Start engine and check idle speed.
Idle speed: 675 ± 50 rpm (In N range and A/C OFF)
(4) Shift the lever from N to D range. 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
(5) In the same way, measure the time lag for N → R.
Time lag: N → R less than 1.5 seconds

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

Problem	Possible cause
N → D time lag is longer	• Line pressure too low • Forward clutch worn • O/D No. 2 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

8. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation ATF 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 stopper outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the rear side of the transaxle case and connect SST (See page AX–33 for the location to connect SST).

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

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Connect a hand–held tester to DLC3.

(5) Start the engine and check idling speed.

(6) Keep your left foot pressing firmly on the brake pedal and shift into D range.

(7) Measure the line pressure when the engine is idling.

(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

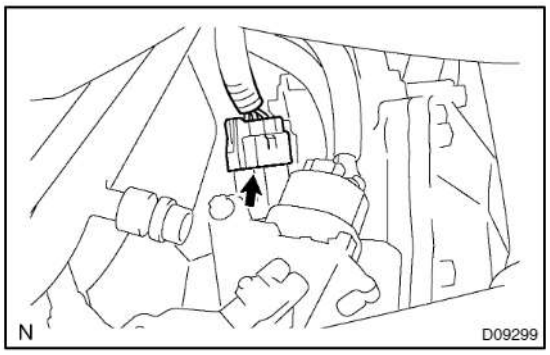
(9) In the same way, do the test in R range.

Specified line pressure:

Condition	D range kPa (kgf / cm^2, psi)	R range kPa (kgf / cm^2, psi)
Idling	372 – 412 (3.8 – 4.2, 54 – 59)	640 – 742 (6.5 – 7.6, 93 – 107)
Stall	931 – 1,031 (9.5 – 10.5, 134 – 149)	1,768 – 1,968 (18.0 – 20.1, 255 – 286)

Evaluation:

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



9. MANUAL SHIFTING TEST

HINT:

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

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

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

While driving, shift through the L, 2 and D ranges.

Check that the gear change corresponds to the shift range.

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

HINT:

If the L, 2 and D range 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 transaxle itself.

(c) Connect the solenoid wire.

(d) Cancel out the DTC.

DI6RF–03

DIAGNOSTIC TROUBLE CODE CHART

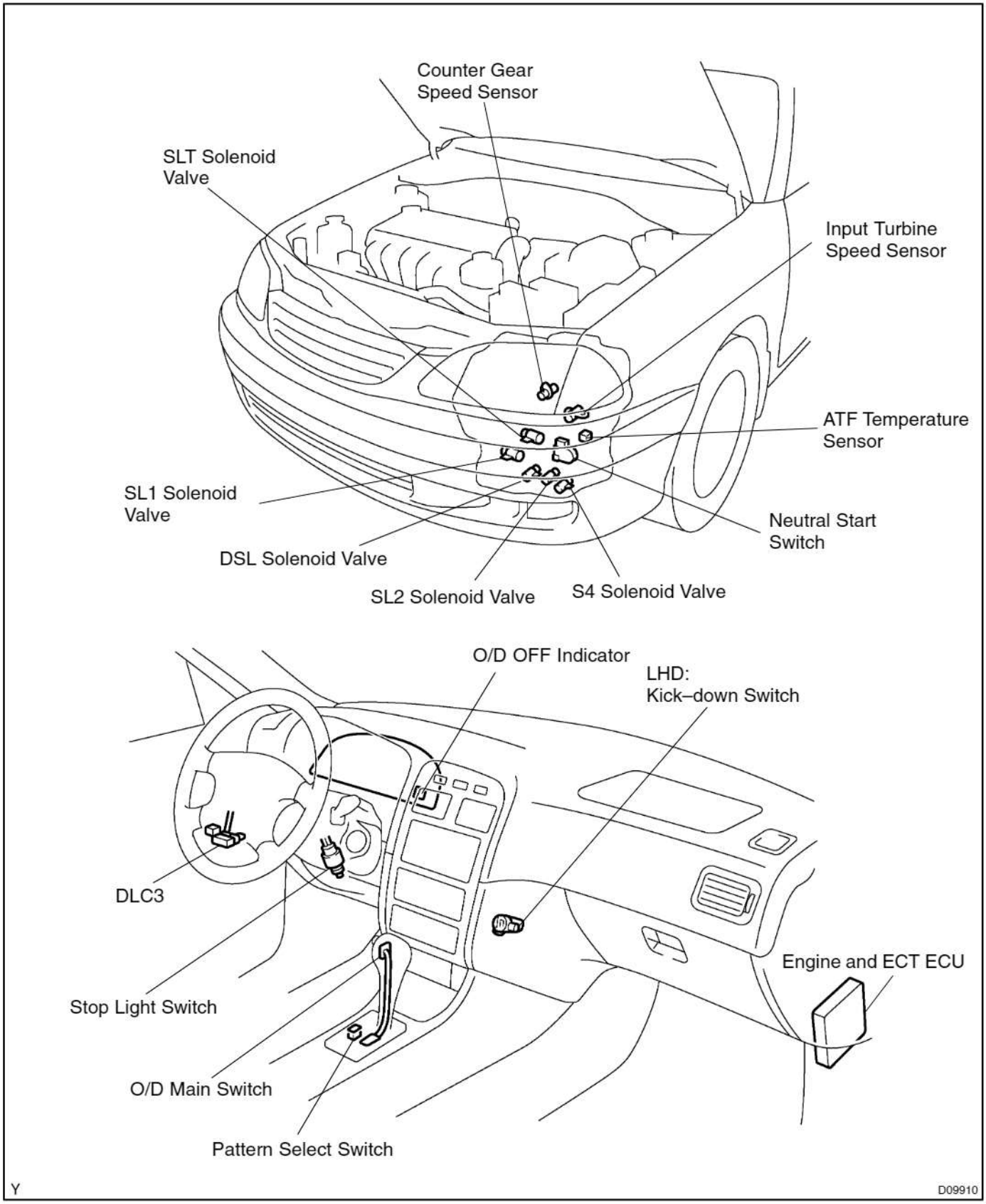
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

DTC No. (See Page)	Detection Item	Trouble Area	Check engine warning light *1	Memory*2
P0500 (DI–82)	Vehicle Speed Sensor Malfunction	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Combination meter • Engine and ECT ECU • Automatic transaxle assembly	○	○
P0710 (DI–85)	Transmission Fluid Temperature Sensor Malfunction	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • Engine and ECT ECU	○	○
P0711 *3 (DI–85)	Transmission Fluid Temperature Sensor Rnge/Performance problem	• Open or short in ATF temperature sensor circuit • ATF temperature sensor • Engine and ECT ECU	○	○
P0750 *3 (DI–87)	Shift Solenoid A Malfunction (SL1 Solenoid Valve)	• SL1 solenoid valve is stuck open or closed • Valve body is blocked up or stuck	○	○
P0753 (DI–89)	Shift Solenoid A Electrical Malfunction (SL1 Solenoid Valve)	• Open or short in SL1 solenoid valve circuit • SL1 solenoid valve • Engine and ECT ECU	○	○
P0755 *3 (DI–87)	Shift Solenoid B Malfunction (SL2 Solenoid Valve)	• SL2 solenoid valve is stuck open or closed • Valve body is blocked up or stuck	○	○
P0758 (DI–89)	Shift Solenoid B Electrical Malfunction (SL2 Solenoid Valve)	• Open or short in SL2 solenoid valve circuit • SL2 solenoid valve • Engine and ECT ECU	○	○
P0765 *3 (DI–87)	Shift Solenoid D Malfunction (S4 Solenoid Valve)	• S4 solenoid valve is stuck open or closed • Valve body is blocked up or stuck	○	○
P0768 (DI–89)	Shift Solenoid D Electrical Malfunction (S4 Solenoid Valve)	• Open or short in S4 solenoid valve circuit • S4 solenoid valve • Engine and ECT ECU	○	○
P0770 *3 (DI–95)	Shift Solenoid E Malfunction (DSL Solenoid Valve)	• DSL solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Lock–up clutch	○	○
P0773 (DI–97)	Shift Solenoid E Electrical Malfunction (DSL Solenoid Valve)	• Open or short in shift solenoid valve DSL circuit • DSL solenoid valve • Engine and ECT ECU	○	○
P1520 (DI–100)	Stop Light Switch Circuit	• Open or short in stop light switch circuit • Stop light switch • Engine and ECT ECU	○	○
P1725 (DI–105)	NT Revolution Sensor Circuit Malfunction (Input Turbine Speed Sensor)	• Open or short in input turbine speed sensor circuit • Input turbine speed sensor • Engine and ECT ECU	○	○
P1730 (DI–107)	NC Revolution Sensor Circuit Malfunction (Counter Gear Speed Sensor)	• Open or short in counter gear speed sensor circuit • Counter gear speed sensor • Engine and ECT ECU	○	○
P1760 (DI–109)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (SLT Solenoid Valve)	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECT ECU	○	○
P1780 (DI–112)	Neutral Start Switch Malfunction	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU	○	○

*1: "○" mark means Check engine warning light blinks once every 2 seconds.
"X" mark means Check engine warning light never blinks.
*2: "○" mark means Engine and ECT ECU memorizes the malfunction code if the Engine and ECT ECU detects the DTC detection condition.
*3: European spec. only
HINT:
This DTC may be output when the clutch, brake and gear components etc. inside the automatic transaxle are damaged.

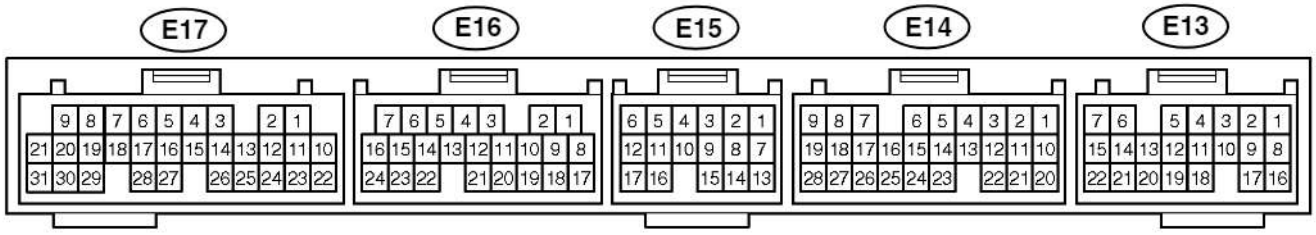
DI6TF–03

PARTS LOCATION



DI6RG–03

TERMINALS OF ECU



D01054 D03442

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP (E13–22) ↔ E1 (E16–3)	G–W ↔ BR	IG ON and brake pedal depressed	10 – 14
		IG ON and brake pedal released	Below 1
$SL1^+$ (E14–7) ↔ $SL1^-$ (E14–6)	B ↔ W	IG ON	10 – 14
		1st or 2nd gear	10 – 14
		3rd or O/D gear	Below 1
$SL2^+$ (E14–7) ↔ $SL2^-$ (E14–16)	G ↔ L	IG ON	Below 1
		1st or 2nd gear	10 – 14
		3rd or O/D gear	Below 1
DSL (E14–25) ↔ Body ground	P ↔ Body ground	IG ON	Below 1
		Vehicle driving under lock–up position	10 – 14
NC^+ (E15–4) ↔ NC^- (E15–10)	W ↔ B	Engine is running	Pulse signal is output Below 1 ↔ 4 – 5
NT^+ (E15–5) ↔ NT^- (E15–11)	G ↔ R	Engine is running	Pulse signal is output Below 1 ↔ 4 – 5
SLT^+ (E14–15) ↔ SLT^- (E14–24)	R ↔ L–W	IG ON	10 – 14
OD2 (E13–11) ↔ E1 (E16–3)	L ↔ BR	O/D main switch ON	10 – 14
		O/D main switch OFF	Below 1
L (E14–4) ↔ E1 (E16–3)	Y–G ↔ BR	IG ON and Shift lever L range	10 – 14
		IG ON and Shift lever other than L range	Below 1
2 (E14–11) ↔ E1 (E16–3)	O ↔ BR	IG ON and Shift lever 2 range	10 – 14
		IG ON and Shift lever other than 2 range	Below 1
R (E14–1) ↔ E1 (E16–3)	R–B ↔ BR	IG ON and Shift lever R range	10 – 14
		IG ON and Shift lever other than R range	Below 1
D (E14–10) ↔ E1 (E16–3)	B–Y ↔ BR	IG ON and Shift lever D range	10 – 14
		IG ON and Shift lever other than D range	Below 1
NSW (E15–23) ↔ E1 (E16–3)	B–W ↔ BR	IG ON and Shift lever P or N range	10 – 14
		IG ON and Shift lever other than P or N range	Below 1
THO (E14–8) ↔ E2 (E16–19)	O ↔ BR	IG ON and ATF temperature 110 °C (230 °F)	Below 1
S4 (E14–26) ↔ E1 (E16–3)	Y ↔ BR	IG ON	Below 1
		IG ON and O/D gear	10 – 14
KD (E13–17) ↔ E1 (E16–3)	Y ↔ BR	IG ON and accelerator pedal is fully depressed	Below 1.5
		IG ON and accelerator is released	10 – 14

SPD (E13–6) ↔ E1 (E16–3)	G ↔ BR	IG ON and vehicle stationary	Below 1
		IG ON and turn one front wheel slowly	Pulse signal is output Below 1 ↔ 4 –6
PWR (E14–9) – E1 (E16–3)	P ↔ BR	IG ON and pattern select switch: PWR	9 – 14
		IG ON and pattern select switch: NORM	Below 1
SNWI (E14–19) – E1 (E16–3)	P–B ↔ BR	IG ON and SNOW mode switch: ON	9 – 14
		IG ON and SNOW mode switch: OFF	Below 1.5

DI6RH-03

PROBLEM SYMPTOMS TABLE

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.

Chapter 1: Electronic circuit matrix chart

Chapter 2: On–vehicle repair matrix chart

Chapter 3: Off–vehicle repair matrix chart

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 Engine and ECT ECU.

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. Neutral start switch circuit 2. Engine and ECT ECU	DI–112 IN–30
No up–shift (3rd → O/D)	1. O/D main switch circuit 2. Engine and ECT ECU	DI–116 IN–30
No down–shift (O/D → 3rd)	Engine and ECT ECU	IN–30
No down–shift (A particular gear, from 3rd to 1st gear, is not down–shifted)	1. Neutral start switch circuit 2. Engine and ECT ECU	DI–112 IN–30
No lock–up or No lock–up off	1. Stop light switch circuit 2. Engine and ECT ECU	DI–100 IN–30
Shift point too high or too low	Engine and ECT ECU	IN–30
Up–shift to 2nd while in L range	Engine and ECT ECU	IN–30
Up–shift to 3rd while in 2 range	Engine and ECT ECU	IN–30
Up–shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch circuit 2. Engine and ECT ECU	DI–116 IN–30
Up–shift to O/D from 3rd while engine is cold	Engine and ECT ECU	IN–30
Harsh engagement (N → D)	Engine and ECT ECU	IN–30
Harsh engagement (Lock–up)	Engine and ECT ECU	IN–30
Harsh engagement (Any driving range)	Engine and ECT ECU	IN–30
Poor acceleration	Engine and ECT ECU	IN–30
No kick–down	1. Kick–down switch circuit 2. Engine and ECT ECU	DI–124 IN–30
Engine stalls when starting off or stopping	Engine and ECT ECU	IN–30

Chapter 2: On–vehicle repair
(★: U240E automatic transaxle repair manual Pub. No. RM740U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward range and reverse range	1. Manual valve 2. Primary regulator valve 3. Off–vehicle repair matrix chart	★ ★ –
Vehicle does not move in R range	Off–vehicle repair matrix chart	–
No up–shift (1st → 2nd)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	★ –
No up–shift (2nd → 3rd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	★ –
No up–shift (3rd → O/D)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (O/D → 3rd)	3–4 shift valve	★
No down–shift (3rd → 2nd)	2–3 shift valve	★
No down–shift (2nd → 1st)	1–2 shift valve	★
No lock–up or No lock–up off	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	★ –
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle repair matrix chart	★ –
Harsh engagement (N → R)	1. C_2 accumulator 2. Off–vehicle repair matrix chart	★
Harsh engagement (Lock–up)	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	★ –
Harsh engagement (2nd → 3rd)	C_2 accumulator	★
Harsh engagement (3rd → O/D)	B_0 accumulator	★
Harsh engagement (O/D → 3rd)	1. C_0 accumulator 2. B_0 accumulator	★ ★
Slip or shudder (Forward and reverse)	1. Oil strainer 2. Off–vehicle repair matrix chart	★ –
No engine braking (1st: L range)	Off–vehicle repair matrix chart	–
No engine braking (2nd: 2 range)	Off–vehicle repair matrix chart	–
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	★ ★ ★

Chapter 3: Off–vehicle repair
(★: U240E automatic transaxle repair manual Pub. No. RM740U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward range and reverse range	1. Front and rear planetary gear 2. U/D planetary gear 3. U/D one–way clutch (F_2) 4. Forward clutch (C_1) 5. U/D brake (B_3)	★ ★ ★ ★ ★
Vehicle does not move in R range	1. Front and rear planetary gear unit 2. U/D planetary gear unit 3. Direct clutch (C_2) 4. U/D brake (C_3) 5. 1st & reverse brake (B_2)	★ ★ ★ ★ ★
No up–shift (1st → 2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_1)	★ ★
No up–shift (2nd → 3rd)	Direct clutch (C_2)	★
No up–shift (3rd → O/D)	U/D clutch (C_3)	★
No lock–up or No lock–up off	Torque converter	AX–38
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. U/D one–way clutch (F_2) 3. No. 1 one–way clutch (F_1)	★ ★ ★
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st & reverse brake (B_2)	★ ★
Harsh engagement (Lock–up)	Torque converter	AX–38
Slip or shudder (Forward position: After warm–up)	1. Torque converter 2. Forward clutch (C_1) 3. Direct clutch (C_2) 4. U/D brake (C_3) 5. No. 1 one–way clutch (F_1) 6. U/D one–way clutch (F_2)	AX–38 ★ ★ ★ ★ ★
Slip or shudder (R range)	1. Direct clutch (C_2) 2. 1st & reverse brake (B_2)	★ ★
Slip or shudder (1st)	No. 1 one–way clutch (F_1)	★
Slip or shudder (2nd)	1. U/D one–way clutch (F_2) 2. 2nd brake (B_1)	★ ★
Slip or shudder (3rd)	Direct clutch (C_2)	★
Slip or shudder (O/D)	U/D clutch (C_3)	★
No engine braking (1st – 3rd: D range)	U/D brake (B_3)	★
No engine braking (1st: L range)	1st & reverse brake (B_2)	★
No engine braking (2nd: 2 range)	2nd brake (B_1)	★
Poor acceleration (All range)	1. Torque converter 2. U/D planetary gear	AX–38 ★
Poor acceleration (O/D)	1. U/D clutch (C_3) 2. U/D planetary gear	★ ★
Large shift shock or engine stalls when starting off or stopping	Torque converter	AX–38

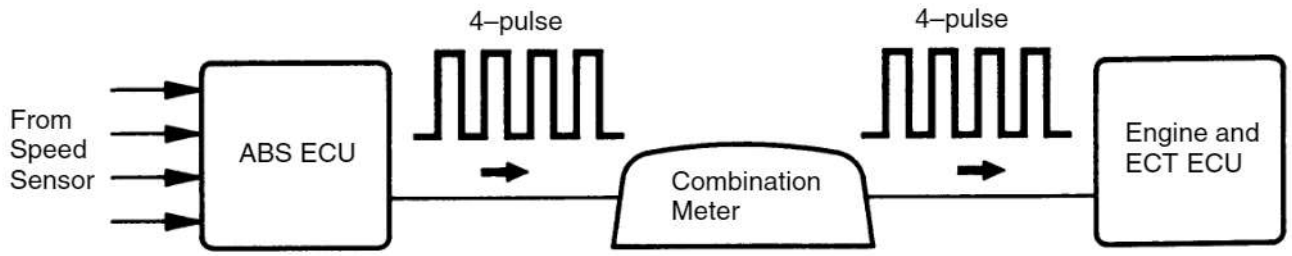
DI6RI-03

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction

CIRCUIT DESCRIPTION

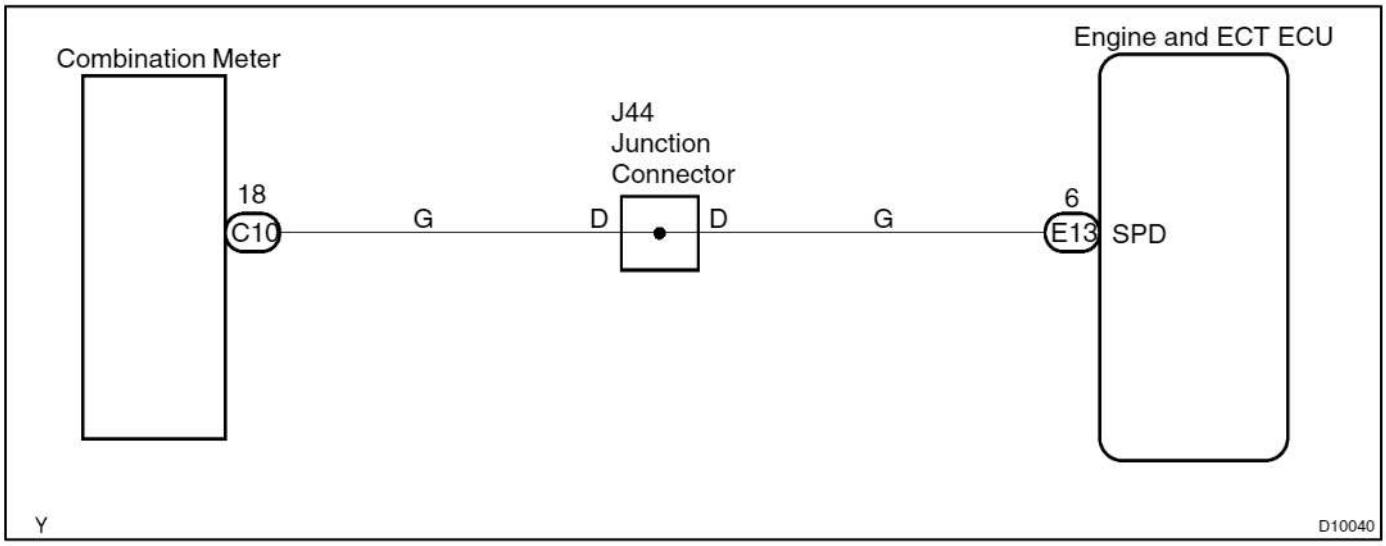
The ABS ECU output the vehicle speed signals to a speedometer in the combination meter, and the signals it is then transmitted to the Engine and ECT ECU. The Engine and ECT ECU determines the vehicle speed based on the frequency of these pulse signals.



A00022

DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to Engine and ECT ECU during vehicle driving (2 trip detection logic)	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Engine and ECT ECU • Combinationmeter

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of speedometer.**

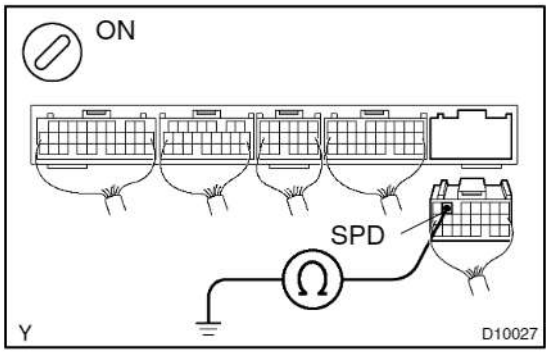
HINT:
Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

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 (See page BE–1).**

OK

2	**Check for short in harness and connector between terminal SPD of Engine and ECT ECU connector and body ground.**

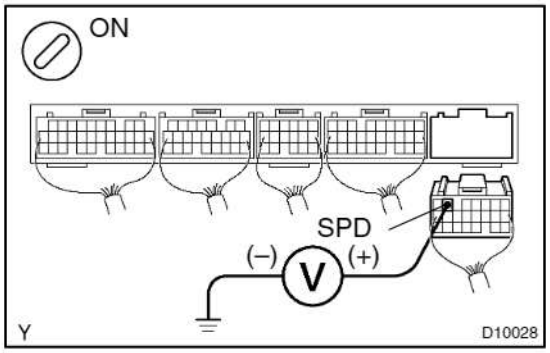


PREPARATION:
Disconnect the connector of the Engine and ECT ECU.
CHECK:
Check continuity between terminal SPD of the Engine and ECT ECU connector and body ground.
OK:
No continuity (1M Ω or higher)

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

OK

3	**Check voltage between terminal SPD of Engine and ECT ECU connector and body ground.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminal SPD of Engine and ECT ECU connector and body ground.
OK:
Voltage: 9 – 14 V

NG → **Check for open in harness and connector between J44 junction connector and Engine and ECT ECU (See page IN–30).**

OK

4	**Check for open in harness and connector between J44 junction connector and combination meter (See page IN–30).**

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

OK

5	**Check Engine and ECT ECU (See page IN–20).**

NG → **Replace Engine and ECT ECU.**

OK

Check and repair ABS system.

DTC	P0710	Transmission Fluid Temperature Sensor Malfunction (ATF Temperature Sensor)

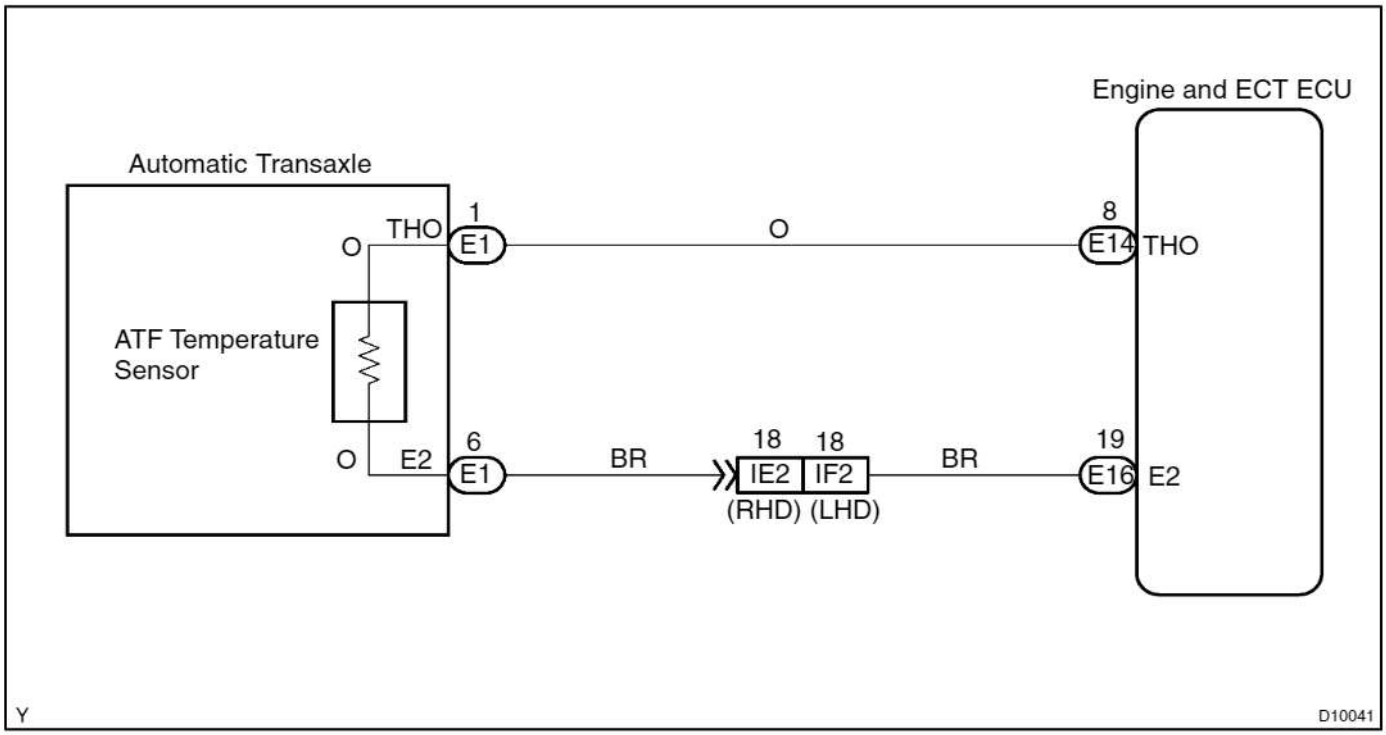
DTC	P0711	Transmission Fluid Temperature Circuit Range/Performance problem (Europe only)

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the Engine and ECT ECU.

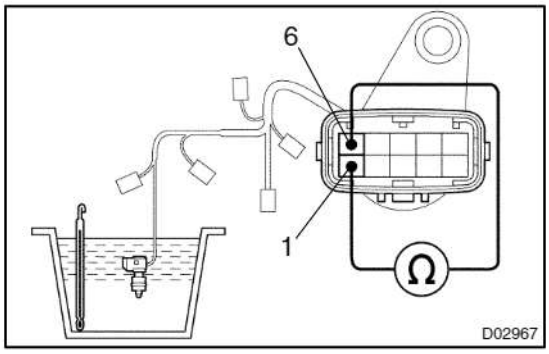
DTC No.	DTC Detecting Condition	Trouble Area
P0710	Either (a) or (b) is detected for 0.5 sec. or more. (1–trip detection logic) (a) Temp. sensor resistance is less than 79 Ω. (b) After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 kΩ.	• Open or short in ATF temp. sensor • ATF temp. sensor • Engine and ECT ECU
P0711	Both (a) and (b) are detected. (2–trip detection logic) (a) After 12 seconds of the engine start, the temp. of the atmosphere and that of the engine coolant is more than –10°C. (b) After a normal driving for over 20 minutes and 10km, the ATF temp. is less than 10°C.	• Open in ATF temp. sensor • ATF temp. sensor • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ATF temperature sensor.**



PREPARATION:

(a) Disconnect the solenoid wire connector.
(b) Remove the oil pan.
(c) Disconnect all solenoid valve connectors.
(d) Remove the transmission wire harness.

CHECK:

Measure resistance between terminals 1 and 6 of solenoid connector at 25 °C (77 °F) and 110 °C (230 °F).

OK:

Resistance (Approx.):
25 °C (77 °F): 3.5 kΩ
110 °C (230 °F): 231 – 263 Ω

NG → **Replace the ATF temperature sensor (transaxle wire).**

OK

2	**Check harness and connector between ATF temperature sensor and Engine and ECT ECU (See page IN–30).**

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

OK

Check and replace the Engine and ECT ECU (See page IN–30).

DI4ZZ-05

DTC	P0750	Shift Solenoid A Malfunction (SL1 Solenoid Valve) (Europe only)

DTC	P0755	Shift Solenoid B Malfunction (SL2 Solenoid Valve) (Europe only)

DTC	P0765	Shift Solenoid D Malfunction (S4 Solenoid Valve) (Europe only)

SYSTEM DESCRIPTION

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

Then the Engine and ECT ECU compares the actual gear with the shift schedule in the Engine and ECT ECU memory to detect mechanical trouble of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755 P0765	During normal driving, the gear required by the ECM does not match the actual gear (2–trip detection logic)	• SL1/SL2/S4 solenoid valve is stuck open or closed • Valve body is blocked up or stuck

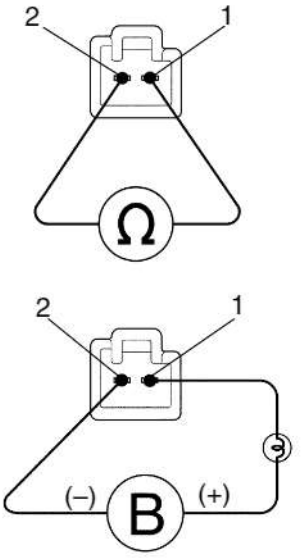
HINT:

Check the SL1 solenoid valve when DTC P0750/62 is output, check the SL2 solenoid valve when DTC P0755/63 is output and check S4 solenoid valve when DTC P0765/65 is output.

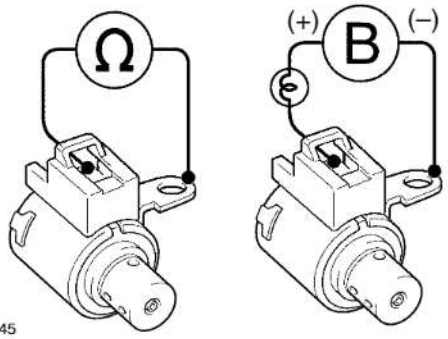
INSPECTION PROCEDURE

1	**Check SL1, SL2 or S4 solenoid valve operation.**

SL1 and SL2 solenoid valve



S4 solenoid valve



D03445
D03446
D03424 D03423
D03724

PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the SL1, SL2 or S4 solenoid valve.

Check Solenoid Resistance:

CHECK:

(a) SL1 or SL2 solenoid valve:
Measure resistance between terminals 1 and 2 of solenoid connector.
(b) S4 solenoid valve:
Measure resistance between terminal 1 of solenoid connector and solenoid body.

OK:

(a) Resistance: 5.1 – 5.5 Ω
(b) The shift solenoid valve makes operation noise.

Check Solenoid Operation:

CHECK:

(a) SL1 or SL2 solenoid valve:
Connect the positive (+) lead with an 23–W bulb to terminal 1 and the negative (–) lead to terminal 2 of solenoid connector, then check the movement of the valve.
(b) S4 solenoid valve:
Connect the positive (+) lead with an 23–W bulb to terminal 1 of solenoid connector and the negative (–) lead to the solenoid valve body, then check the movement of the valve.

OK:

(a) Resistance: 5.1 – 5.5 Ω
(b) The shift solenoid valve makes operation noise.

NG → **Replace the SL1, SL2 or S4 solenoid valve.**

OK

Check the valve body (See page AX–8).

DI6RY–03

DTC	P0753	Shift Solenoid A Electrical Malfunction (SL1 Solenoid Valve)

DTC	P0758	Shift Solenoid B Electrical Malfunction (SL2 Solenoid Valve)

DTC	P0768	Shift Solenoid D Electrical Malfunction (S4 Solenoid Valve)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the SL1 and SL2 solenoid valves controlled by Engine and ECT ECU. If an open or short circuit occurs in either of the solenoid valves, the Engine and ECT ECU controls the remaining normal solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The Engine and ECT ECU checks for an open or short circuit in the SL1 and SL2 solenoid valves. (a) When the solenoid is energized, the duty ratio exceed 75 %. (b) When the solenoid is not energized, the duty ratio is less than 3 %.	• Open or short in SL1/SL2/S4 solenoid valve circuit • SL1/SL2/S4 solenoid valve • Engine and ECT ECU
P0768	The Engine and ECT ECU checks for an open or short circuit in the S4 solenoid valve circuit when it changes. The Engine and ECT ECU records DTC P0768/65 if condition (a) or (b) is detected. (a) When the solenoid is energized, the solenoid resistance is 8 Ω or less and is counted. (b) When the solenoid is not energized, the solenoid resistance is 100 kΩ or more and is counted.	

HINT:

Check the SL1 solenoid valve when DTC P0753/62 is output, check the SL2 solenoid valve when DTC P0758/63 is output and check the S4 solenoid valve when DTC P0768/65 is output.

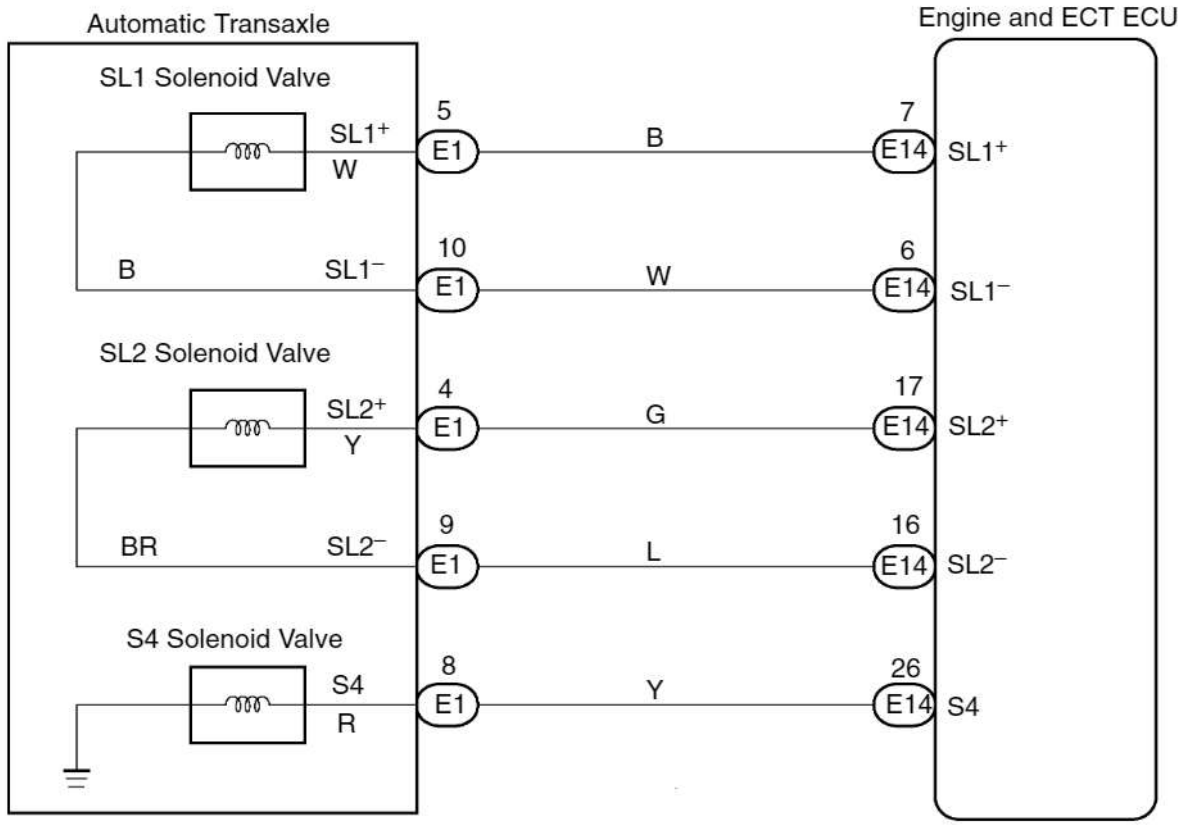
Fail safe function:
If either of the shift solenoid valve circuits develops an open or short, the Engine and ECT ECU turns the other solenoid ON and OFF to shift to the gear positions shown in the table below. The Engine and ECT ECU also turns the DSL solenoid valve OFF at the same time. If both solenoids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

NORMAL				SL1 SOLENOID MALFUNCTIONING								SL2 SOLENOID MALFUNCTIONING			
				Driving at 3rd or O/D				Driving at 1st or 2nd							
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
ON	ON	OFF	1st	X	ON → OFF	OFF	3rd	X	ON	OFF	2nd	ON → OFF	X	OFF	3rd
OFF	ON	OFF	2nd	X	ON → OFF	OFF	3rd	X	ON	OFF	2nd	OFF	X	OFF	3rd
OFF	OFF	OFF	3rd	X	OFF	OFF	3rd	X	OFF → ON	OFF → ON	3rd	OFF	X	OFF	3rd
OFF	OFF	ON	O/D	X	OFF	ON	O/D	X	OFF → ON	ON	3rd	OFF	X	ON	O/D

S4 SOLENOID MALFUNCTIONING				SL1 AND SL2 SOLENOID MALFUNCTIONING				SL1 AND S4 SOLENOID MALFUNCTIONING							
								Driving at 3rd or O/D				Driving at 1st or 2nd			
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
ON	ON	X	1st	X	X	OFF	3rd	X	ON → OFF	X	3rd	X	ON	X	2nd
OFF	ON	X	2nd	X	X	OFF	3rd	X	ON → OFF	X	3rd	X	ON	X	2nd
OFF	OFF	X	3rd	X	X	OFF	3rd	X	OFF	X	3rd	X	OFF → ON	X	2nd
OFF	OFF	X	3rd	X	X	ON	O/D	X	OFF	X	3rd	X	OFF → ON	X	2nd

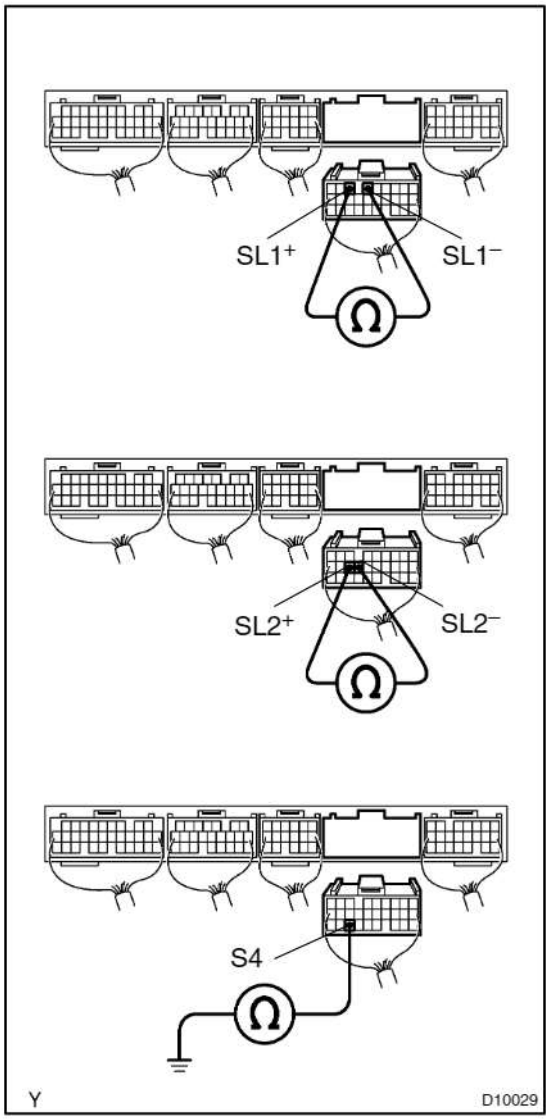
SL2 AND S4 SOLENOID MALFUNCTIONING				SL1, SL2 AND S4 SOLENOID MALFUNCTIONING			
Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4	
ON → OFF	X	X	3rd	X	X	X	3rd
OFF	X	X	3rd	X	X	X	3rd
OFF	X	X	3rd	X	X	X	3rd
OFF	X	X	3rd	X	X	X	3rd

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminals of Engine and ECT ECU.**



PREPARATION:

Disconnect the connector from Engine and ECT ECU.

CHECK:

(a) Measure resistance between terminals SL1+ and SL1– of Engine and ECT ECU connector.

(b) Measure resistance between terminals SL2+ and SL2– of Engine and ECT ECU connector.

(c) Measure resistance between terminal S4 of Engine and ECT ECU connector and body ground.

OK:

Resistance:

(a) SL1+ – SL1–: 5.3 ± 0.2 Ω

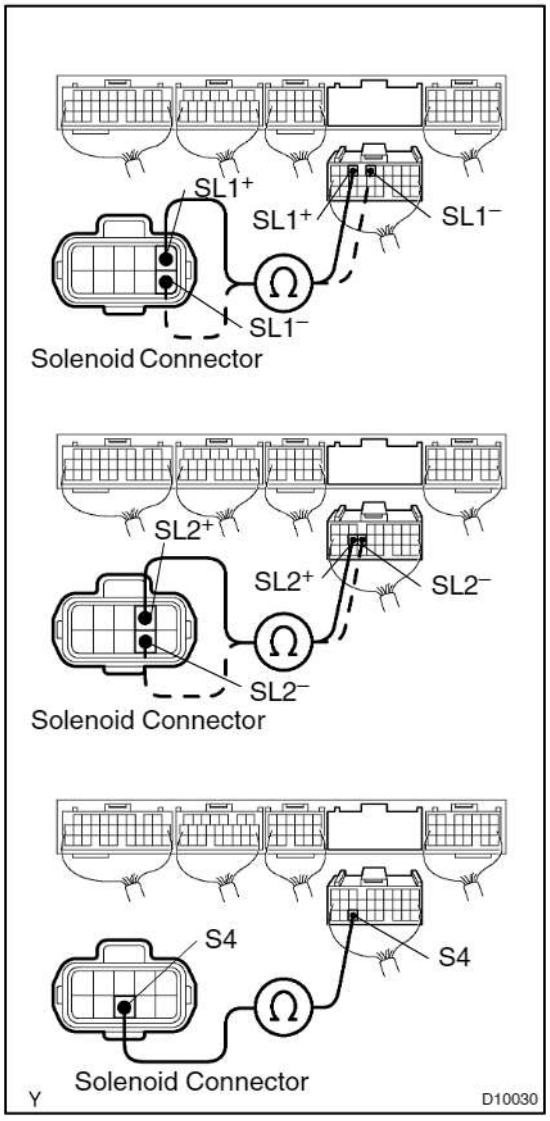
(b) SL2+ – SL2–: 5.3 ± 0.2 Ω

(c) S4 – Body ground: 13 ± 2 Ω

OK → **Check and replace the Engine and ECT ECU.**

NG

2	**Measure harness and connector between Engine and ECT ECU and automatic transaxle solenoid connector.**



PREPARATION:

(a) Disconnect the solenoid connector from the automatic transaxle.

(b) Disconnect the connector from the Engine and ECT ECU.

CHECK:

(a) Measure the harness and connector between terminal $SL1^+$ or $SL1^-$ of Engine and ECT ECU and terminal $SL1^+$ or $SL1^-$ of solenoid connector.

(b) Measure the harness and connector between terminal $SL2^+$ or $SL2^-$ of Engine and ECT ECU and terminal $SL2^+$ or $SL2^-$ of solenoid connector.

(c) Measure the harness and connector between terminal S4 of Engine and ECT ECU and terminal S4 of solenoid connector.

OK:

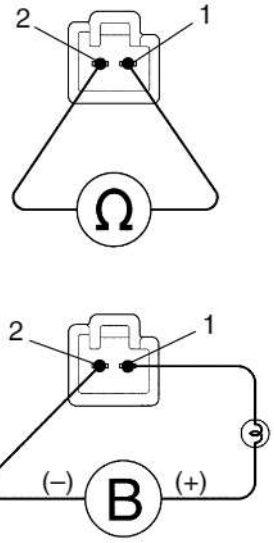
Resistance: 0 Ω

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

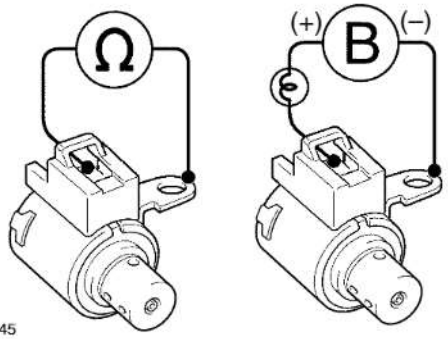
OK

3	Check SL1, SL2 or S4 solenoid valve.

SL1 and SL2 solenoid valve



S4 solenoid valve



D03445
D03446
D03424 D03423
D03724

PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the SL1, SL2, or S4 solenoid valve.

Check Solenoid Resistance:

CHECK:

(a) SL1 or SL2 solenoid valve:
Measure resistance between terminals 1 and 2 of solenoid connector.
(b) S4 solenoid valve:
Measure resistance between terminal 1 of solenoid connector and solenoid body.

OK:

Resistance: 5.1 – 5.5 Ω

Check Solenoid Operation:

CHECK:

(a) SL1 or SL2 solenoid valve:
Connect the positive (+) lead with an 23–W bulb to terminal 1 and the negative (–) lead to terminal 2 of solenoid connector, then check the movement of the valve.
(b) S4 solenoid valve:
Connect the positive (+) lead with an 23–W bulb to terminal 1 of solenoid connector and the negative (–) lead to the solenoid valve body, then check the movement of the valve.

OK:

The shift solenoid valve makes operation noise.

NG → **Replace the solenoid valve.**

OK

Repair or replace the solenoid wire, harness and connector between Engine and ECT ECU and automatic transaxle solenoid connector.

DI4ZX-05

DTC	P0770	Shift Solenoid E Malfunction (DSL Solenoid Valve) (Europe only)

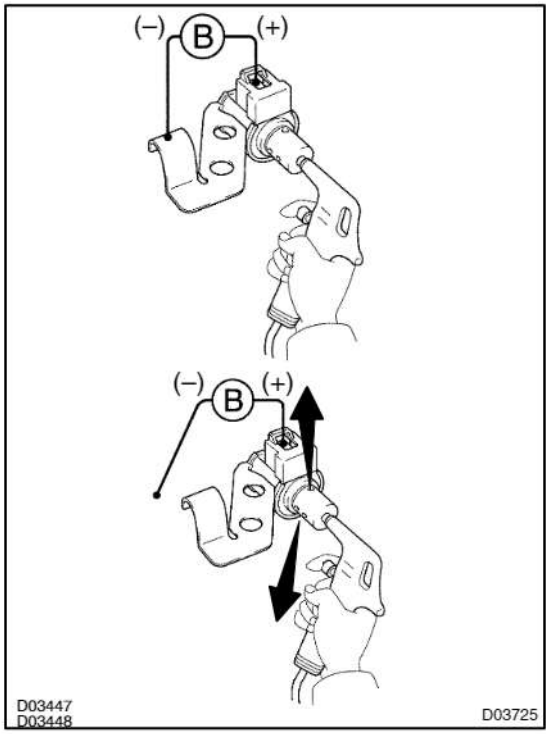
SYSTEM DESCRIPTION

The Engine and ECT ECU 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 Engine and ECT ECU compares the engagement condition of the lock–up clutch with the lock–up schedule in the Engine and ECT ECU memory to detect mechanical trouble of the DSL solenoid valve, valve body and torque converter.

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)	• DSL solenoid valve is stuck open or closed • Valve body blocked up or stuck • Lock–up clutch

INSPECTION PROCEDURE

1	**Check DSL solenoid valve operation.**



PREPARATION:
(a) Remove the oil pan.
(b) Remove the DSL solenoid valve.

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 DSL solenoid valve.**

OK

2	Check valve body (See page AX–8).

NG → Repair or replace the valve body.

OK →

Replace the torque converter (See page AX–38).

DI6RV–03

DTC	P0773	Shift Solenoid E Electrical Malfunction (DSL Solenoid Valve)

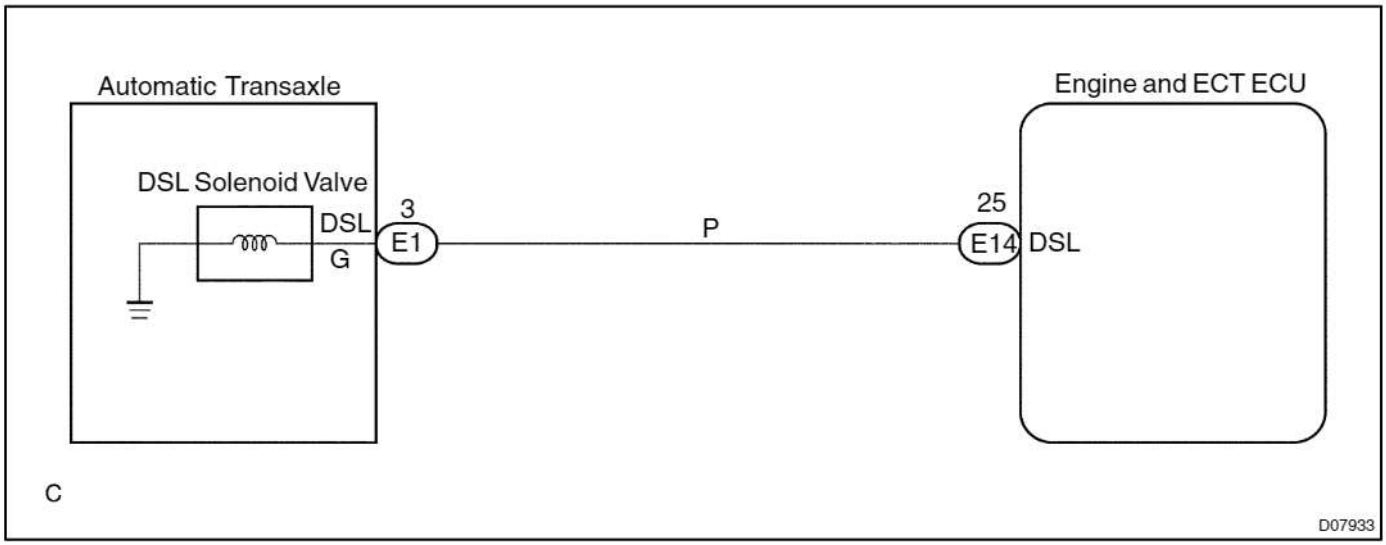
CIRCUIT DESCRIPTION

The DSL solenoid valve is turned ON and OFF by signals from the Engine and ECT ECU 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 (a) or (b) are detected for 1 time. (2–trip detection logic) (a) Solenoid resistance is 8 Ω or less short circuit when solenoid is energized. (b) Solenoid resistance is 100 kΩ or more open circuit when solenoid is not energized.	• Open or short in DSL solenoid valve circuit • DSL solenoid valve • Engine and ECT ECU

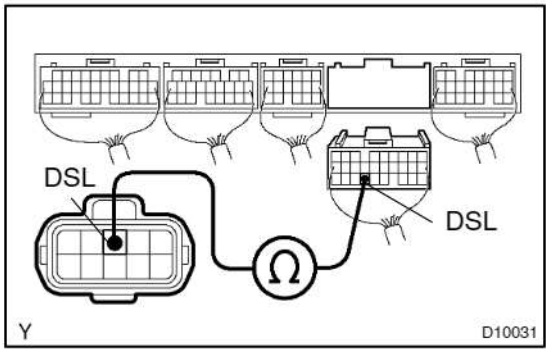
Fail safe function:
If the Engine and ECT ECU detects a malfunction, it turns the DSL solenoid valve OFF.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check harness and connector between Engine and ECT ECU and automatic transaxle solenoid connector.**



PREPARATION:

(a) Disconnect the solenoid connector from the transaxle.

(b) Disconnect the connector from the Engine and ECT ECU.

CHECK:

Measure the harness and connector between terminal DSL of Engine and ECT ECU and terminal DSL of solenoid connector.

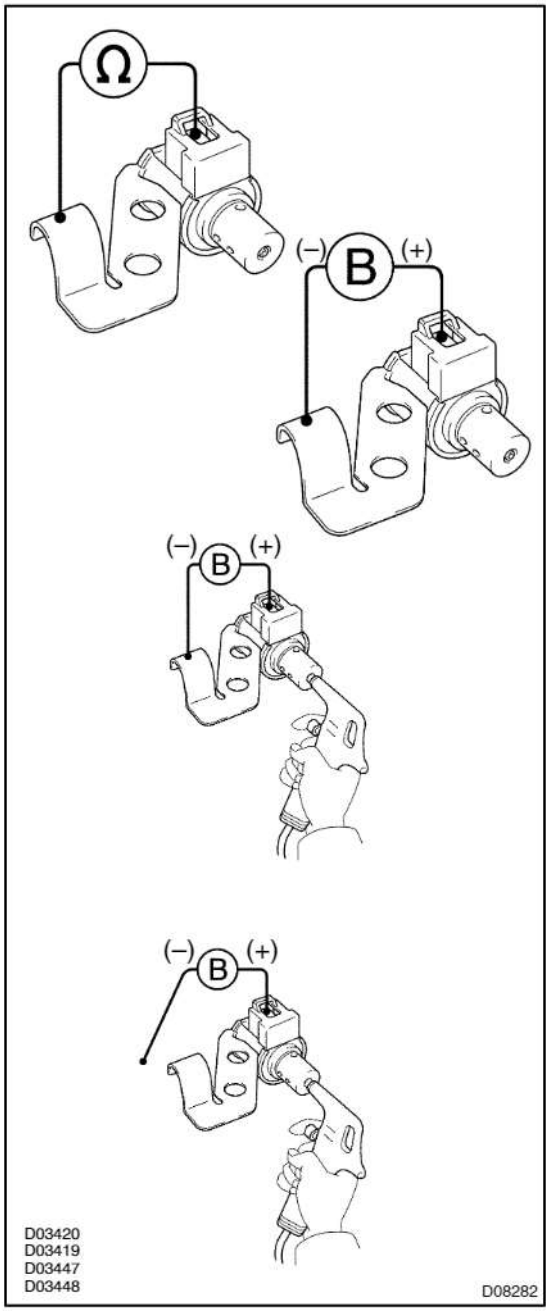
OK:

There is continuity.

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

OK

2	Check shift solenoid valve DSL.



Electrical Check:

PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the DSL solenoid valve connector.
(d) Remove the DSL solenoid valve.

CHECK:

(a) Measure resistance between terminal DSL 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
(b) The DSL solenoid valve makes operation noise.

Mechanical Check (Except Europe Only):

PREPARATION:

(a) Remove the oil pan.
(b) Remove the DSL solenoid valve.

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 DSL solenoid valve.**

OK

Check and replace or repair the solenoid wire.

DI80H–01

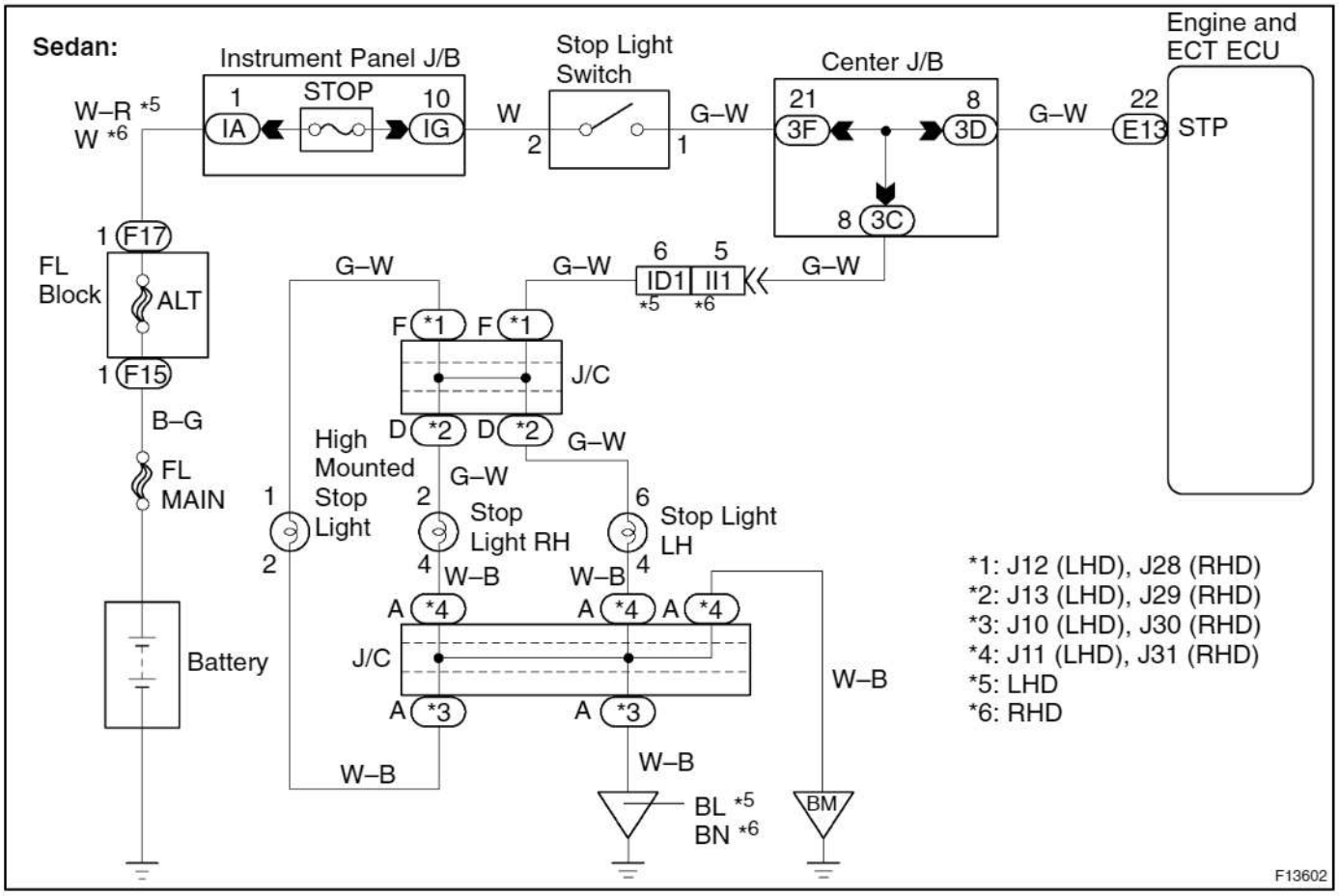
DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

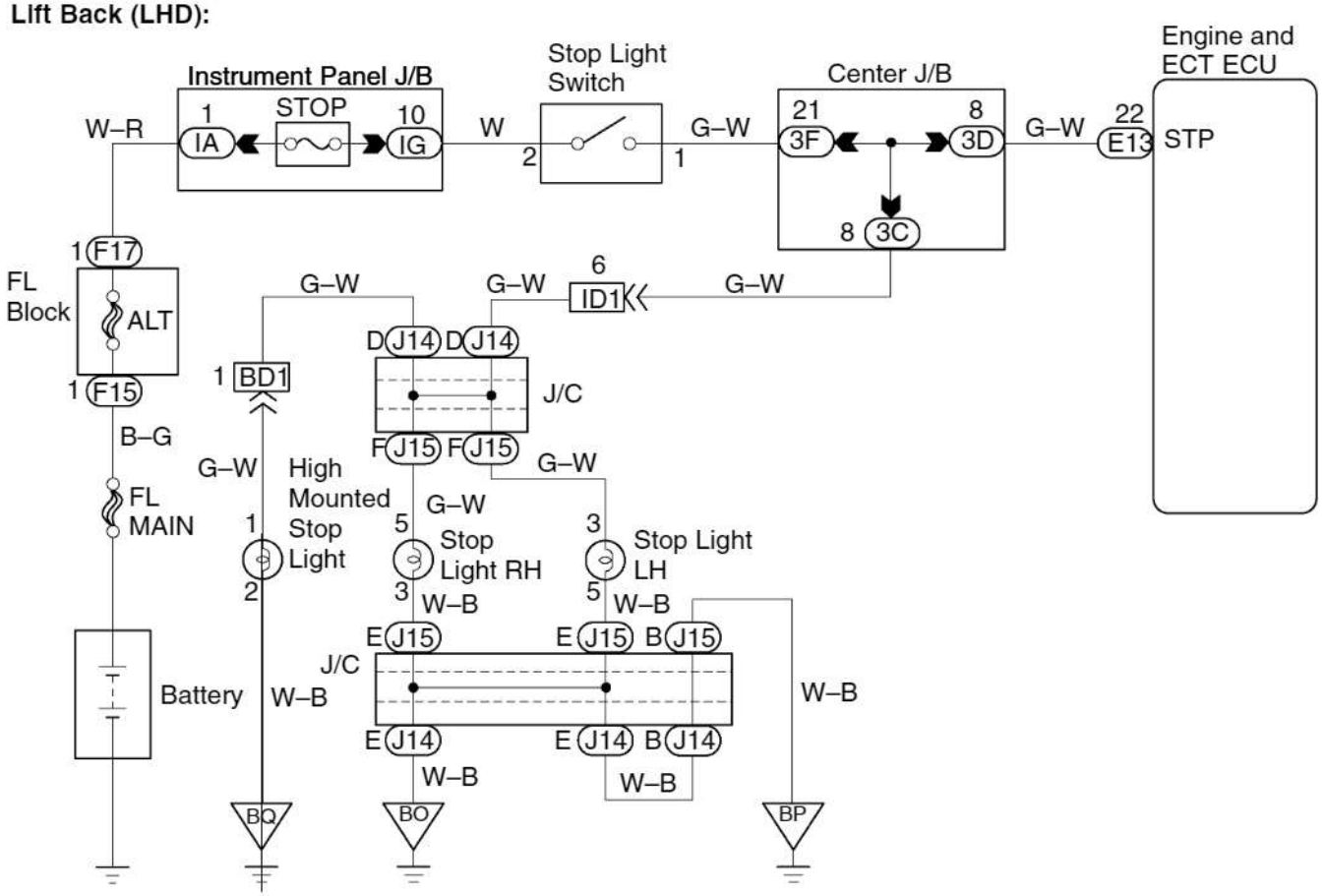
The purpose of this circuit is to prevent the engine from stalling, while driving in lock–up condition, when brakes are suddenly applied.
When the brake pedal is operated, this switch sends a signals to Engine and ECT ECU. Then the Engine and ECT ECU cancels operation of the lock–up clutch while braking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

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to Engine and ECT ECU during driving. (2–trip detection logic)	• Open or short in stop light switch circuit • Stop light switch • Engine and ECT ECU

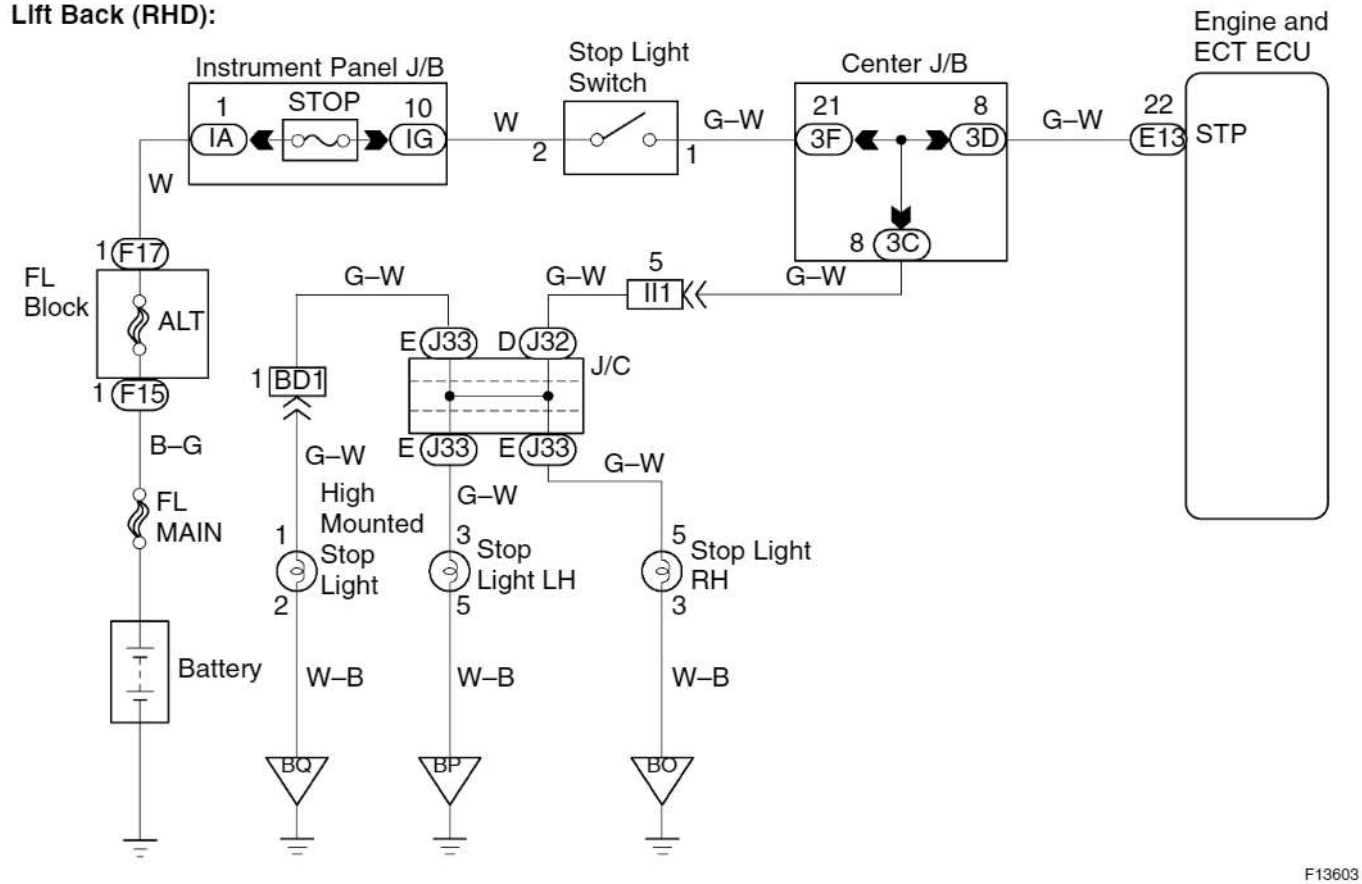
WIRING DIAGRAM



Lift Back (LHD):

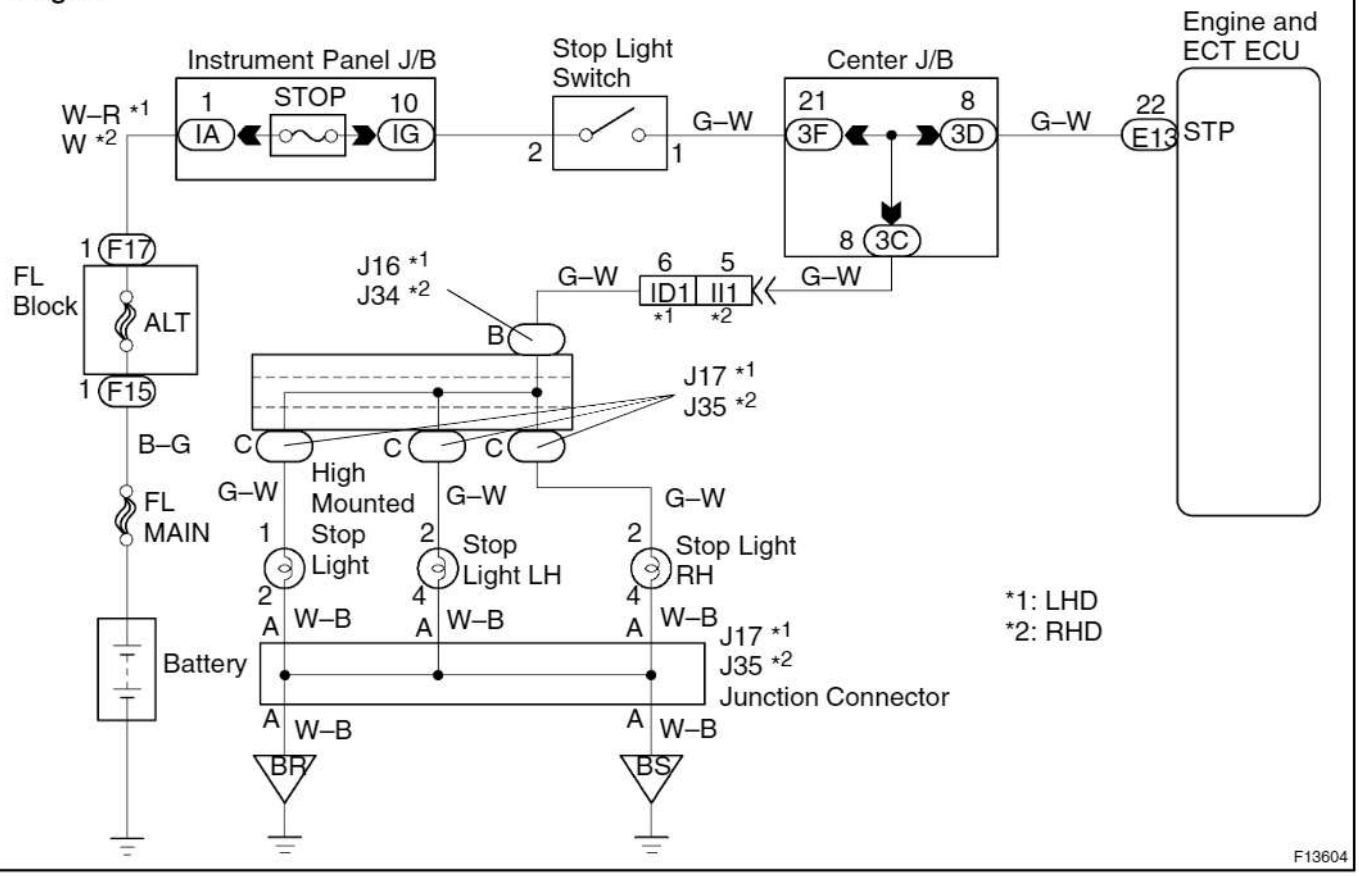


Lift Back (RHD):



F13603

Wagon:


Instrument Panel J/B
Stop Light Switch
Center J/B
Engine and ECT ECU
W–R *1
W *2
1
STOP
10
IA
IG
2
1
G–W
21
8
3F
3D
G–W
22
E13
STP
8
3C
1
F17
FL Block
ALT
1
F15
J16 *1
J34 *2
G–W
6
5
ID1
II1
*1
*2
G–W
B
J17 *1
J35 *2
B–G
C
C
C
High Mounted Stop Light
Stop Light LH
Stop Light RH
G–W
G–W
G–W
1
2
2
4
4
FL MAIN
2
A
W–B
A
W–B
A
W–B
Battery
J17 *1
J35 *2
Junction Connector
A
W–B
A
W–B
BR
BS
*1: LHD
*2: RHD
F13604

INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check operation of stop light.**

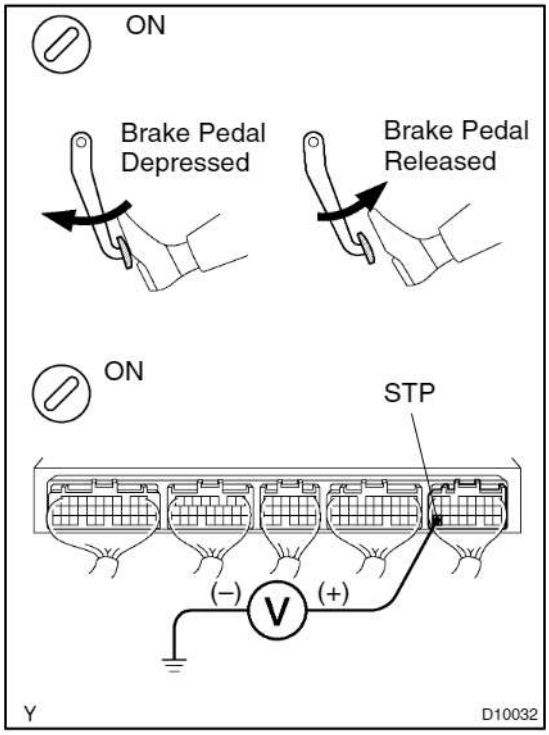
CHECK:

Check if the stop lights go on and off normally when the brake pedal is depressed and released.

NG → **Check and repair stop light circuit.**

OK

2	**Check STP signal.**



When using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the STP signal on the hand–held tester.

OK:

Brake pedal is depressed: STP...ON

Brake pedal is released: STP...OFF

When not using hand–held tester:

PREPARATION:

(a) Remove the glove compartment door.

(b) Turn the ignition switch ON.

CHECK:

Check voltage between terminal STP of the Engine and ECT ECU and body ground.

OK:

Brake pedal	Voltage
Depressed	9.0 – 14 V
Released	Below 1.5 V

OK → **Check for intermittent problems.**

NG

3	**Check harness and connector between Engine and ECT ECU and stop light switch (See page IN–20).**

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

OK

Check and replace Engine and ECT ECU (See page IN–20).

DI6RW–03

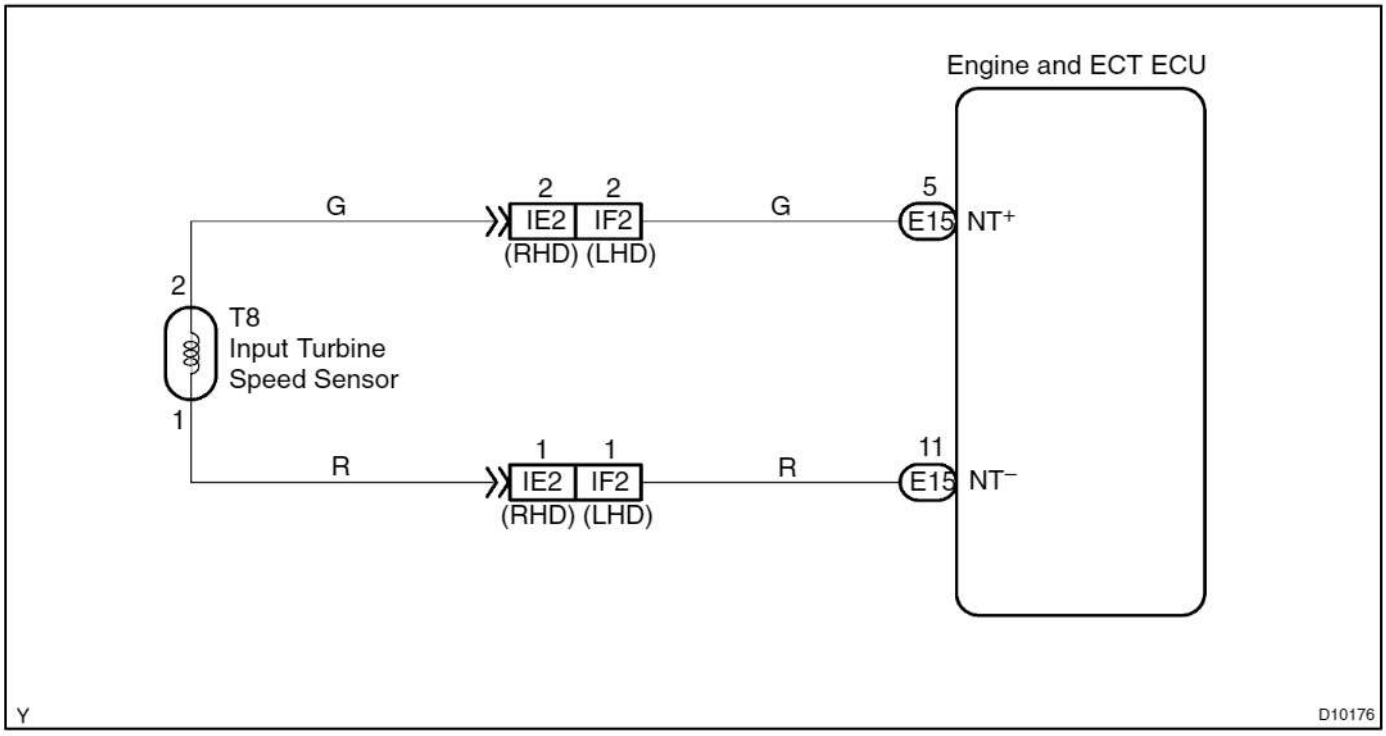
DTC	P1725	NT Revolution Sensor Circuit Malfunction (Input Turbine Speed Sensor)

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) and the counter gear speed sensor signal (NC), the Engine and ECT ECU detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

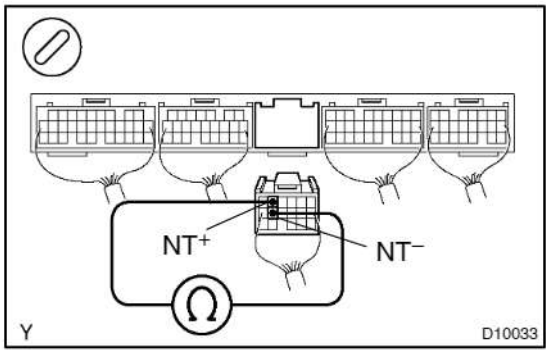
DTC No.	DTC Detecting Condition	Trouble Area
P1725	The Engine and ECT ECU detects conditions (a), (b), (c), (d) and (e) continuity for 5 seconds or more. (1–trip detection logic) (a) Gear change not being performed (b) Gear position: 2nd, 3rd or O/D gear (c) Solenoid valves and neutral start switch are normal (d) T/M input shaft rpm: 300 rpm or less (e) T/M output shaft rpm: 1,000 rpm or less	• Open or short in input turbine (NT) speed sensor circuit • Input turbine (NT) speed sensor • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check resistance between terminals NT+ and NT– of Engine and ECT ECU.**

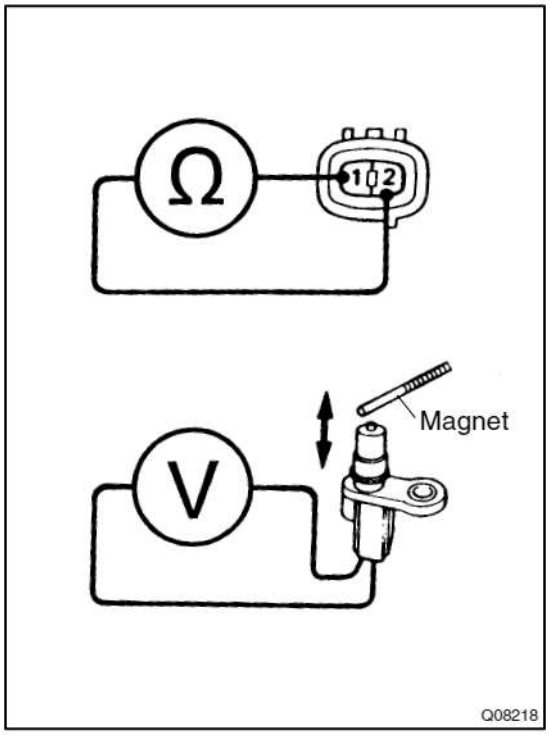


PREPARATION:
Disconnect the connector from Engine and ECT ECU.
CHECK:
Check resistance between terminals NT+ and NT– of Engine and ECT ECU.
OK:
Resistance: 620 ± 60 Ω

OK	**Check and replace the Engine and ECT ECU (See page IN–30).**

NG

2	**Check input turbine speed sensor.**



PREPARATION:
Remove the input turbine speed sensor from transaxle.
CHECK:
(a) Measure resistance between terminals 1 and 2 of speed sensor.
(b) Check voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.
OK:
(a) Resistance: 620 ± 60 Ω at 20 °C (68 °F)
(b) Voltage is generated intermittently.
HINT:
The voltage generated is extremely low.

NG	**Replace the input turbine speed sensor.**

OK

Check and repair the harness and connector between Engine and ECT ECU and input turbine speed sensor (See page IN–30).

DI6RX–03

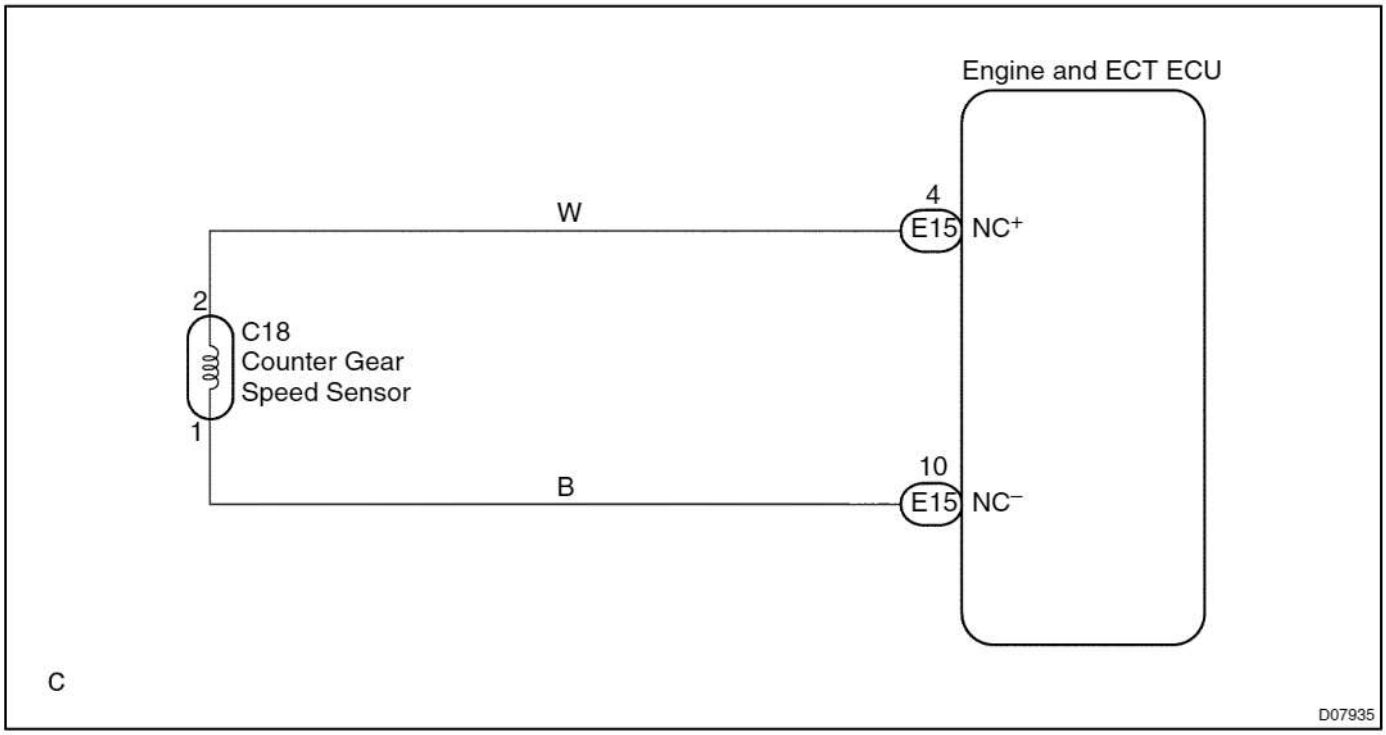
DTC	P1730	NC Revolution Sensor Circuit Malfunction (Counter Gear Speed Sensor)

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) and the input turbine speed sensor signal (NT), the Engine and ECT ECU detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

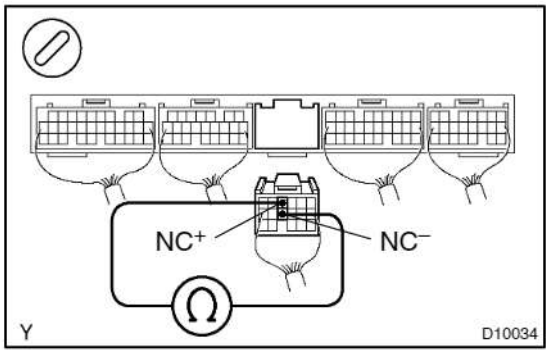
DTC No.	DTC Detecting Condition	Trouble Area
P1730	The Engine and ECT ECU detects conditions (a), (b), (c) and (d) continuity for 5 secs or more. (1–trip detection logic) (a) IG SW: ON (b) Neutral start switch: Except P, N range (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more	• Open or short in counter gear (NC) speed sensor circuit • Counter gear (NC) speed sensor • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check resistance between terminals NC+ and NC– of Engine and ECT ECU.**

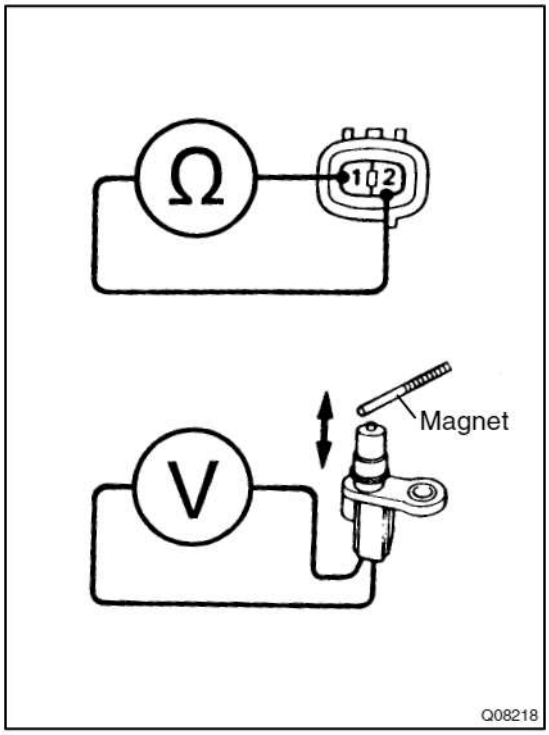


PREPARATION:
Disconnect the connector from Engine and ECT ECU.
CHECK:
Check resistance between terminals NC+ and NC– of Engine and ECT ECU.
OK:
Resistance: 620 ± 60 Ω

OK	**Check and replace the Engine and ECT ECU (See page IN–30).**

NG

2	**Check counter gear speed sensor.**



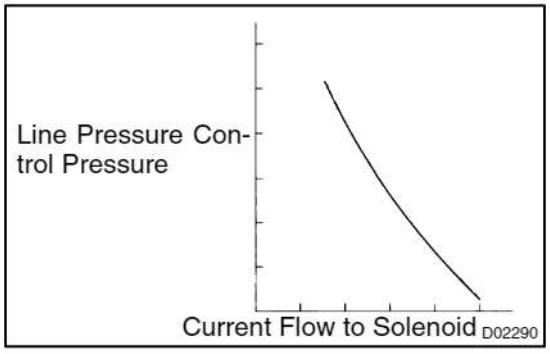
PREPARATION:
Remove the counter gear speed sensor from transaxle.
CHECK:
(a) Measure resistance between terminals 1 and 2 of speed sensor.
(b) Check voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.
OK:
(a) Resistance: 620 ± 60 Ω at 20 °C (68 °F)
(b) Voltage is generated intermittently.
HINT:
The voltage generated is extremely low.

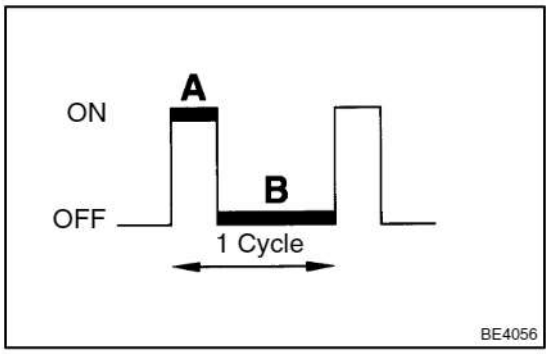
NG	**Replace the counter gear speed sensor.**

OK

Check and repair the harness and connector between Engine and ECT ECU and counter gear speed sensor (See page IN–30).

DTC	P1760	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT Solenoid Valve)



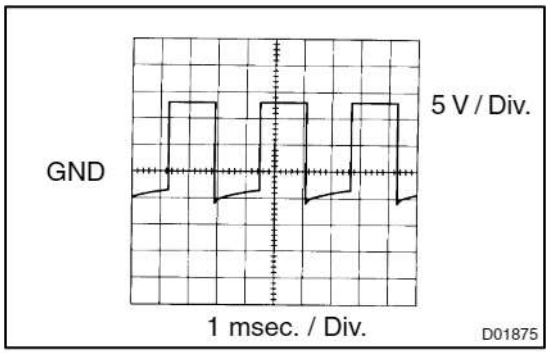


CIRCUIT DESCRIPTION

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 engine power output detected.
This reduces the function of line pressure and provides smooth shifting characteristics.
Upon receiving the throttle valve opening angle signal, Engine and ECT ECU controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, 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

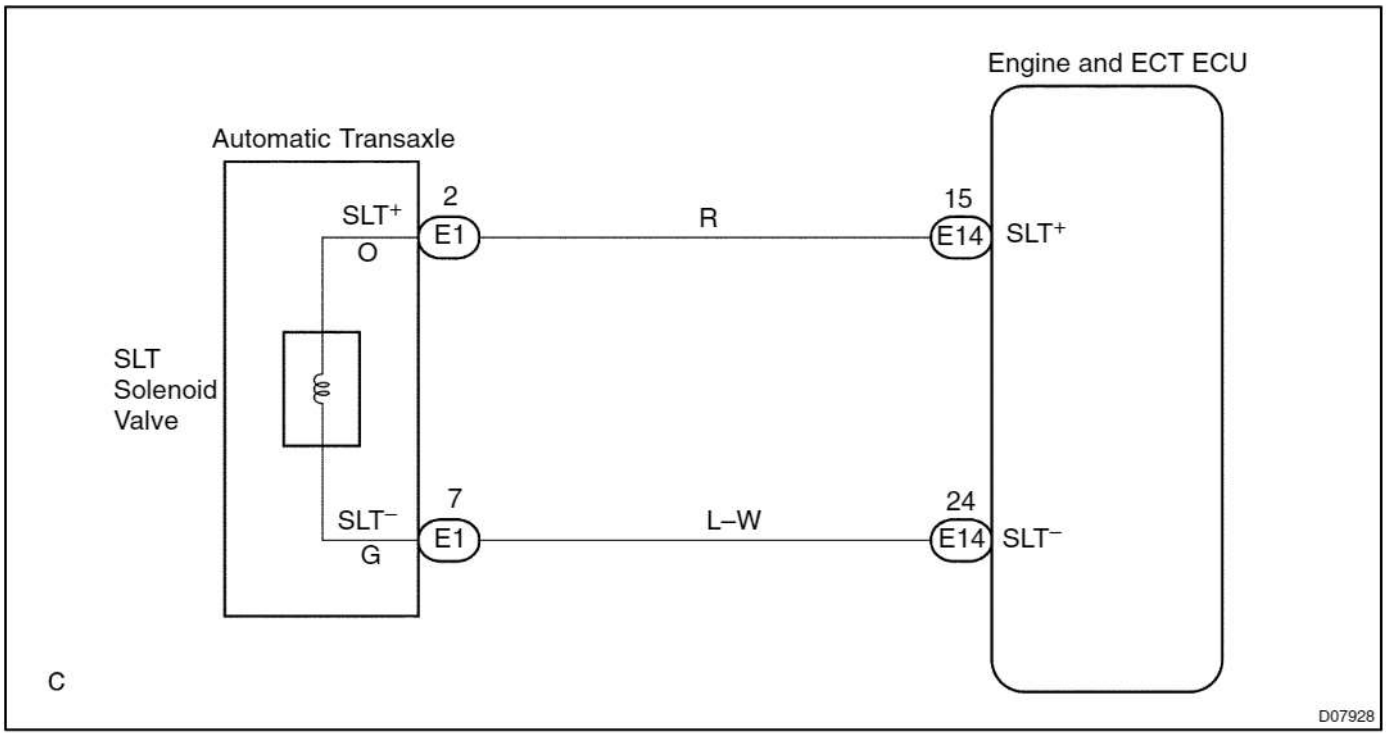
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760	(a) or (b) condition below is detected 1 second or more. (a) SLT^- terminal: 0V (b) SLT^- terminal: 12V	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECT ECU



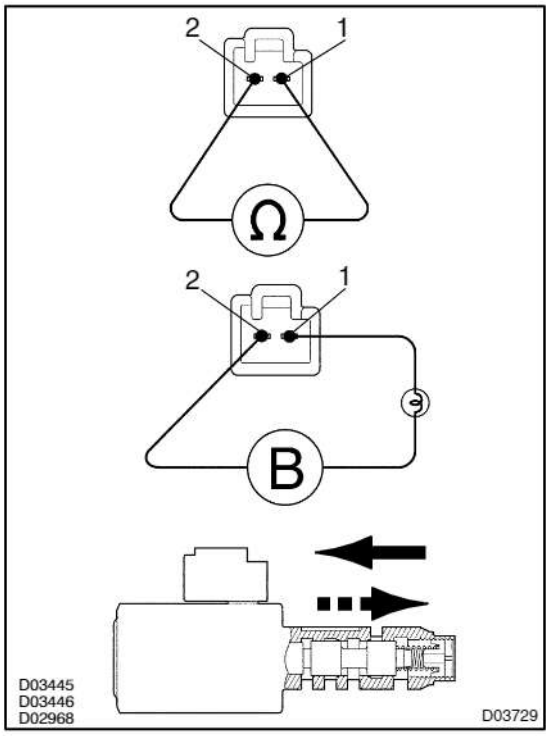
Reference:
Wave form between terminals SLT^+ and SLT^- during engine idling.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check SLT solenoid valve.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) 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 right.
When battery positive voltage is cut off.	Valve moves in ⬅ direction in illustration at left.

NG → **Replace SLT solenoid valve.**

OK ↓

2	**Check harness and connector between SLT solenoid valve and Engine and ECT ECU (See page IN–30).**

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

OK ↓

Replace Engine and ECT ECU.

DI4ZS-05

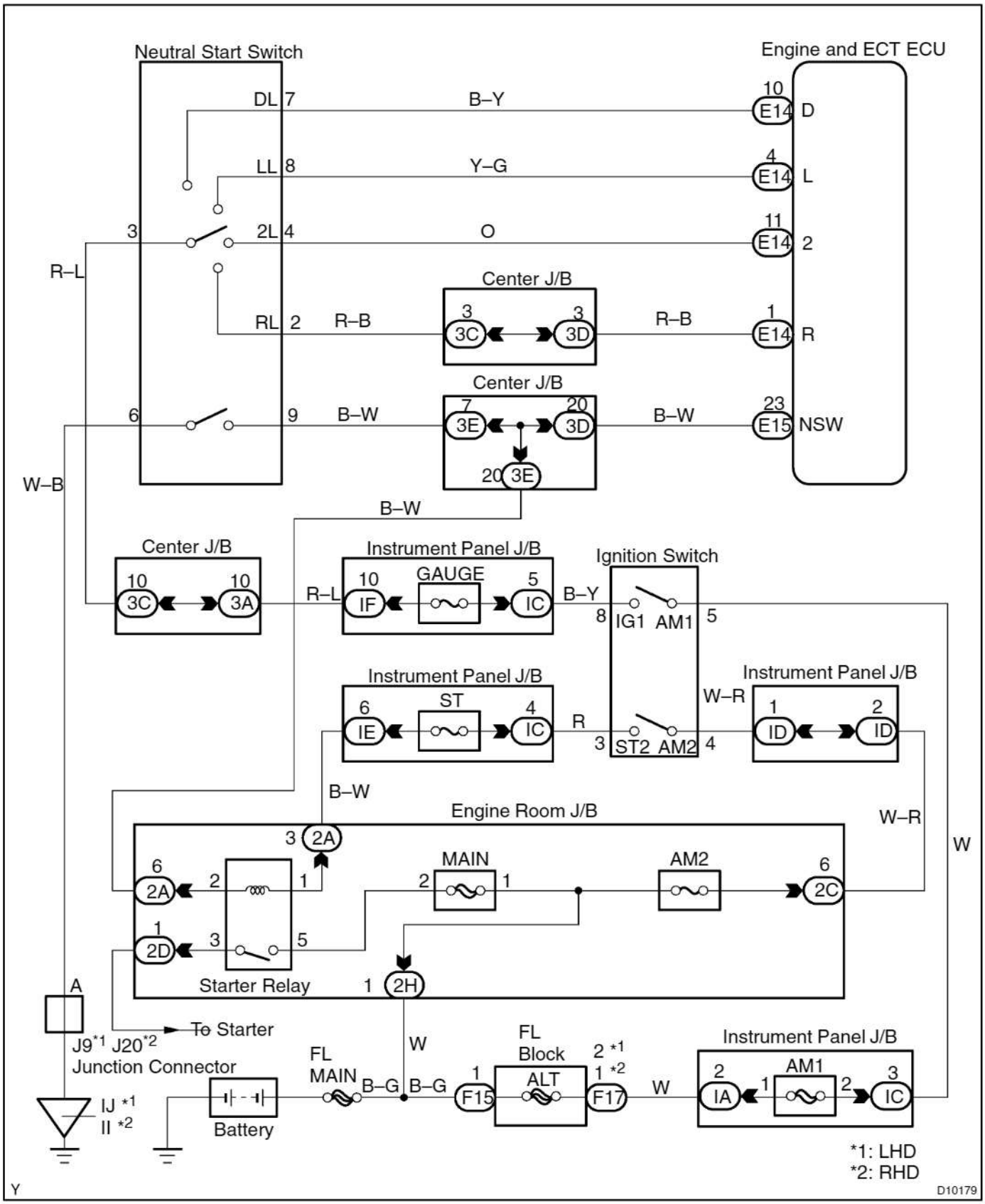
DTC	P1780	Neutral Start Switch Malfunction

CIRCUIT DESCRIPTION

The neutral start switch detects the shift lever position and sends signals to the Engine and ECT ECU. The Engine and ECT ECU receives signals (NSW, R, D 2 and L) from the neutral start switch.

DTC No.	DTC Detection Condition	Trouble Area
P1780	When more than one of the following conditions continue for 500 sec. or more. (a) P, N range input signal is ON. (b) R range input signal is ON. (c) N range input signal is ON. (d) L range input signal is ON. (e) 2 range input signal is ON. (h) D range input signal is ON.	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU
	When any of following conditions for 500 msec. or more in the M position. (a) P, N range input signal is ON. (b) P range input signal is ON. (c) N range input signal is ON. (d) L range input signal is ON.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Read PNP, REVERSE, 2ND DRIVE 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, N, D, 2 and L positions, and read the PNP, REVERSE, 2ND DRIVE and LOW signals on the hand–held tester.

OK:

Shift range	Signal
2	2ND OFF → ON
L	LOW OFF → ON
D	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:

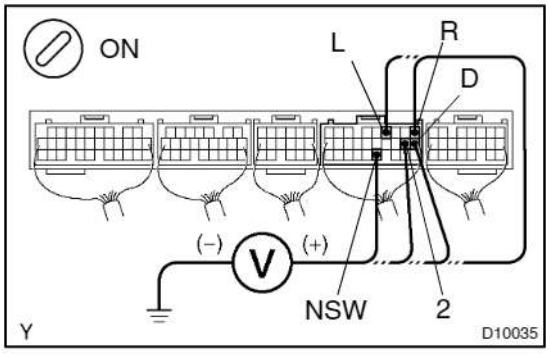
Measure voltage between terminals P. R. N. D. 2 and L of Engine and ECT ECU and body ground when the shift lever is shifted to the following positions.

OK:

Shift range	Tester connection	Specified value
P, R	NSW – Body ground	Battery positive voltage
R	R – Body ground	*Battery positive voltage
D	D – Body ground	Battery positive voltage
2	2 – Body ground	Battery positive voltage
L	L– Body ground	Battery positive voltage

HINT:

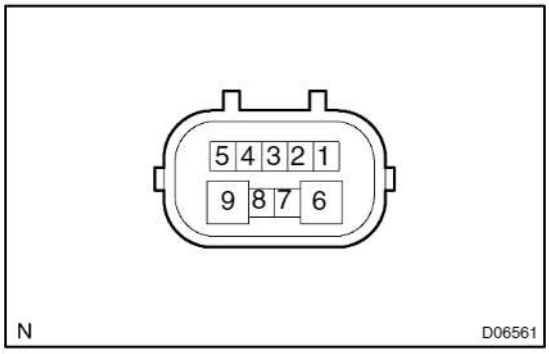
*: The voltage will drop slightly due to lighting up of the back up light.



OK → **Check and replace the Engine and ECT ECU (See page IN–30).**

NG

2	Check neutral start switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the neutral start switch.

CHECK:

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

Shift range	Terminal No. to continuity	
P	–	6 – 9
R	2 – 3	–
N	–	6 – 9
D	3 – 7	–
2	3 – 4	–
L	3 – 8	–

OK:

There is continuity.

NG → **Replace the neutral start switch.**

OK

Repair or replace harness and connector between battery and neutral start switch, neutral start switch and Engine and ECT ECU (See page IN–30).

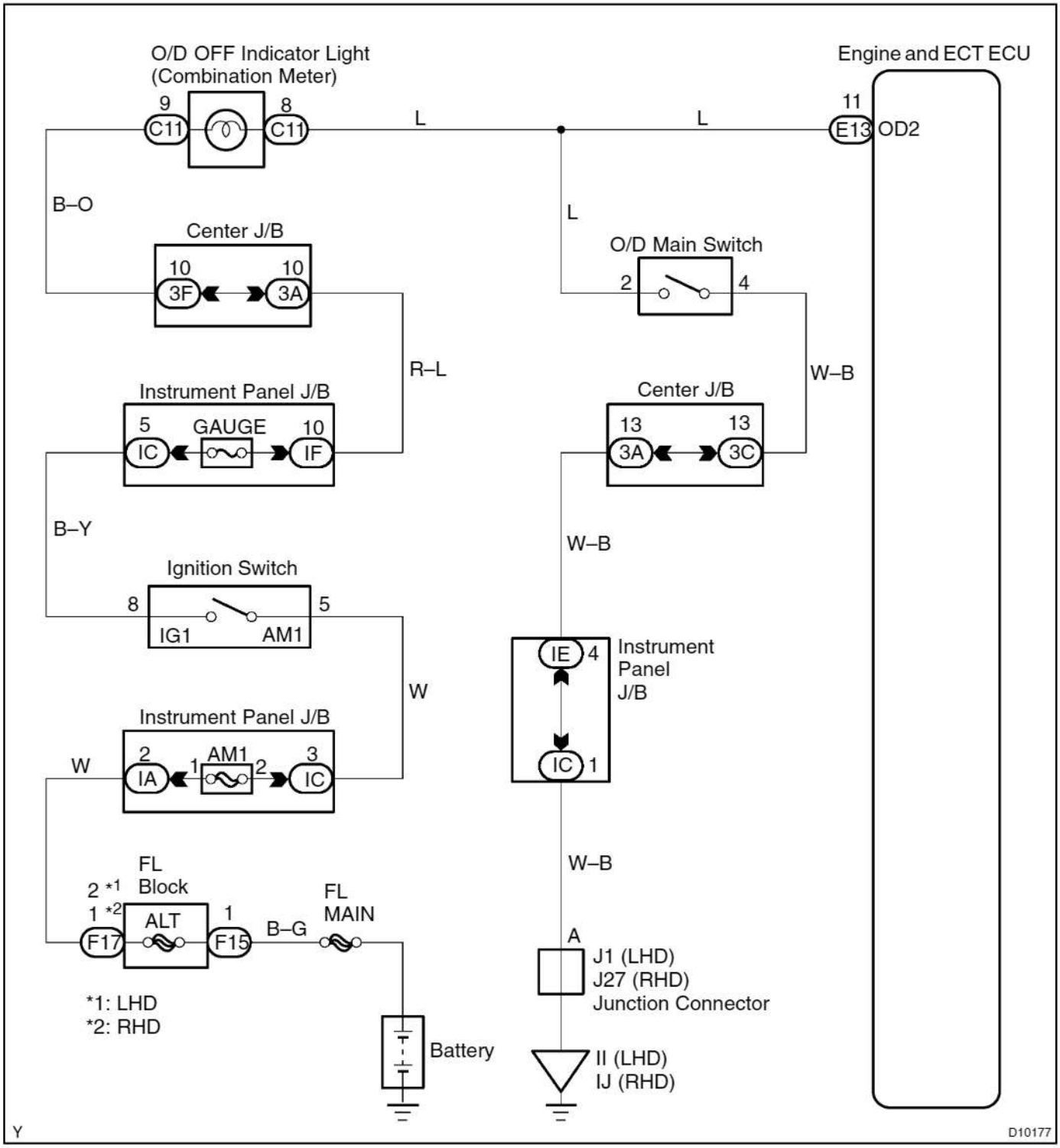
DI6SY–03

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

CIRCUIT DESCRIPTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. If O/D main switch is at OFF position, the O/D OFF indicator light lights up, and the Engine and ECT ECU prohibits shifting overdrive.

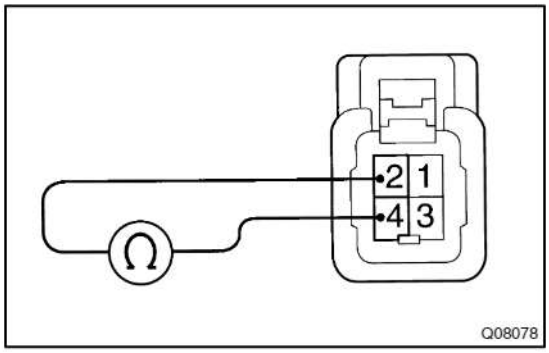
WIRING DIAGRAM



INSPECTION PROCEDURE

O/D OFF indicator light does not light up

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



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 5 and 6 of O/D main switch connector.
OK:

O/D main switch	Resistance
ON	∞ Ω (open)
OFF	0 Ω (continuity)

NG → **Replace the O/D main switch.**

OK ↓

2	**Check and replace combination meter (See page BE–1).**

NG → **Replace the combination meter.**

OK ↓

3	Check OVERDRIVE CUT SW2 signal.

When using hand–held tester:

PREPARATION:

(a) Connect a hand–held tester to the DLC3.

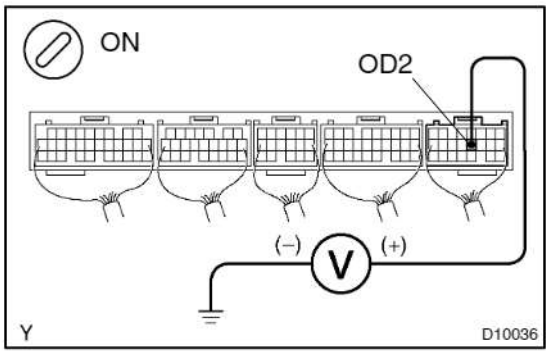
(b) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the OVERDRIVE CUT SW2 signal on the hand–held tester.

OK:

O/D main switch condition	OVERDRIVE CUT SW2 signal
Pushed in	OFF
Pushed out	ON



When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of Engine and ECT ECU and body ground.

OK:

O/D main switch	Voltage
OFF	Below 1.0 V
ON	10 – 14 V

OK → **Check and replace the Engine and ECT ECU (See page IN–30).**

NG

4	**Check harness and connector between O/D OFF indicator light and Engine and ECT ECU (See page IN–20).**

PREPARATION:

Disconnect the connector of Engine and ECT ECU and the connector of the combination meter.

CHECK:

Measure the continuity between the connector of Engine and ECT ECU and the connector of the combination meter.

OK:

Continuity

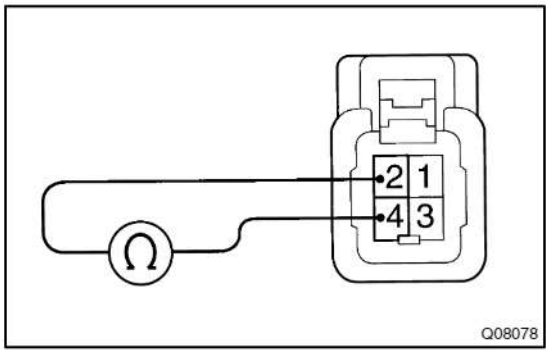
NG → **Repair or replace the harness or connector.**

OK

Repair or replace the wire harness or connectors between the connector of Engine and ECT ECU and body Ground.

O/D OFF indicator light remains ON

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



PREPARATION:
Disconnect the O/D main switch connector.

CHECK:
Check continuity between terminals 1 and 2 of O/D main switch connector.

OK:

O/D main switch	Resistance
ON	∞ Ω (open)
OFF	0 Ω (continuity)

NG → **Replace the O/D main switch.**

OK

2	**Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and Engine and ECT ECU (See page IN–30).**

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

OK

Check and replace the Engine and ECT ECU (See page IN–20).

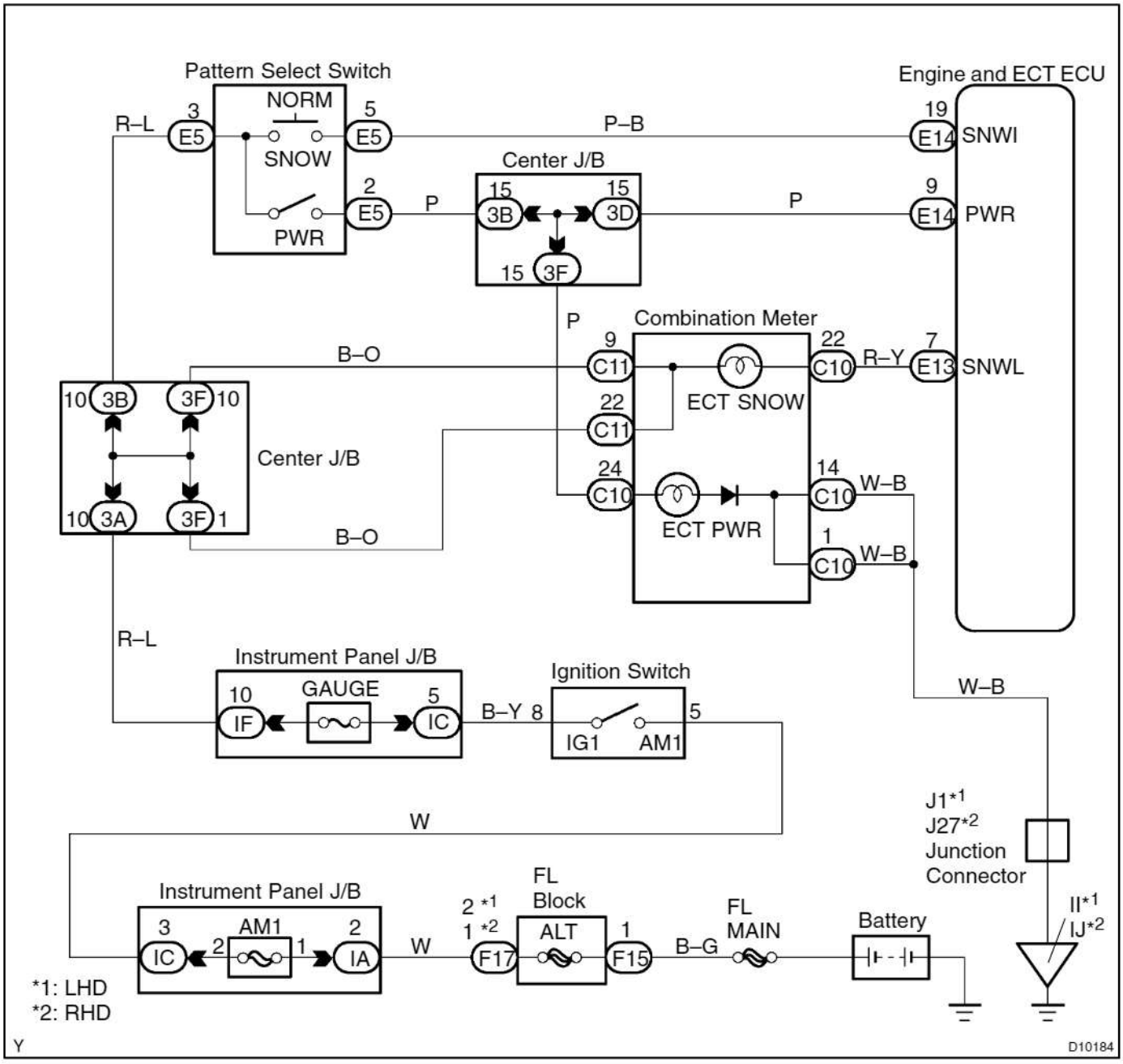
DI336-04

Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

The Engine & ECT ECU memory contains the shift programs for the NORMAL, POWER and SNOW (w/ SNOW mode) patterns, 2 range, L range and the lock–up patterns. By following the programs corresponding to the signals from the pattern select switch, the neutral start switch and other various sensors, the Engine & ECT ECT switches the solenoid valves ON and OFF, and controls the transaxle gear change and the lock–up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check PATTERN SEL SW signal.**

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:

Read the PATTERN SEL SW signal on the hand–held tester.

OK:

Pattern select switch	PATTERN SEL SW signal
POWER	ON
NORM	OFF
SNOW	OFF

When not using hand–held tester:

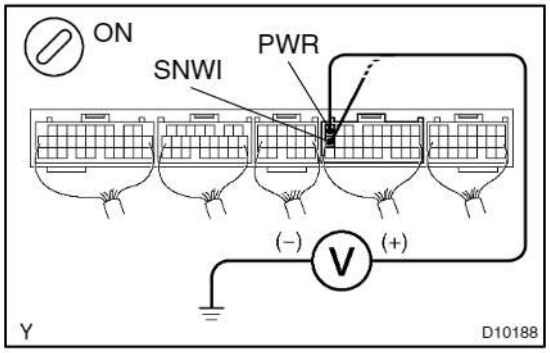
PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal each of PWR, SNWI of Engine & ECT ECU and body ground when the pattern select switch is set to the PWR (POWER), NORM (NORMAL) or SNOW (SNOW) position.

OK:



Switch position	Tester connection	Specified condition
PWR	PWR – Body ground	9 – 14 V
	SNWI – Body ground	Below 1.5 V
NORM	PWR – Body ground	Below 1.5 V
	SNWI – Body ground	Below 1.5 V
SNOW	PWR – Body ground	Below 1.5 V
	SNWI – Body ground	9 – 14 V

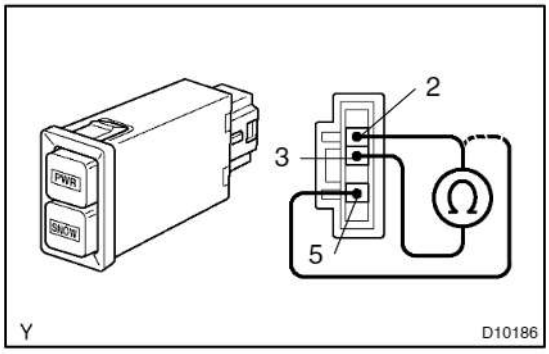
HINT:

The Engine & ECT ECU uses the normal pattern signal if the PWR and SNWI signals are not input.

OK → **Proceed to next circuit inspection shown in symptom problems table (See page DI–79).**

NG

2	Check pattern select switch



PREPARATION:

Disconnect the pattern select switch connector.

CHECK:

Check continuity between terminals 2 and 3 (PWR, NORM), 3 and 5 (SNOW) of pattern select switch connector when the select switch is set to PWR, NORM or SNOW position.

OK:

Switch position	Tester connection	Specified condition
PWR	2 – 3	Continuity
NORM	2 – 3, 3 – 5	No continuity
SNOW	3 – 5	Continuity

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

OK

3	Check harness and connector between battery and pattern select switch, pattern select switch and Engine & ECT ECU (See page IN–30).

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

OK

Check and replace the Engine & ECT ECU (See page IN–30).

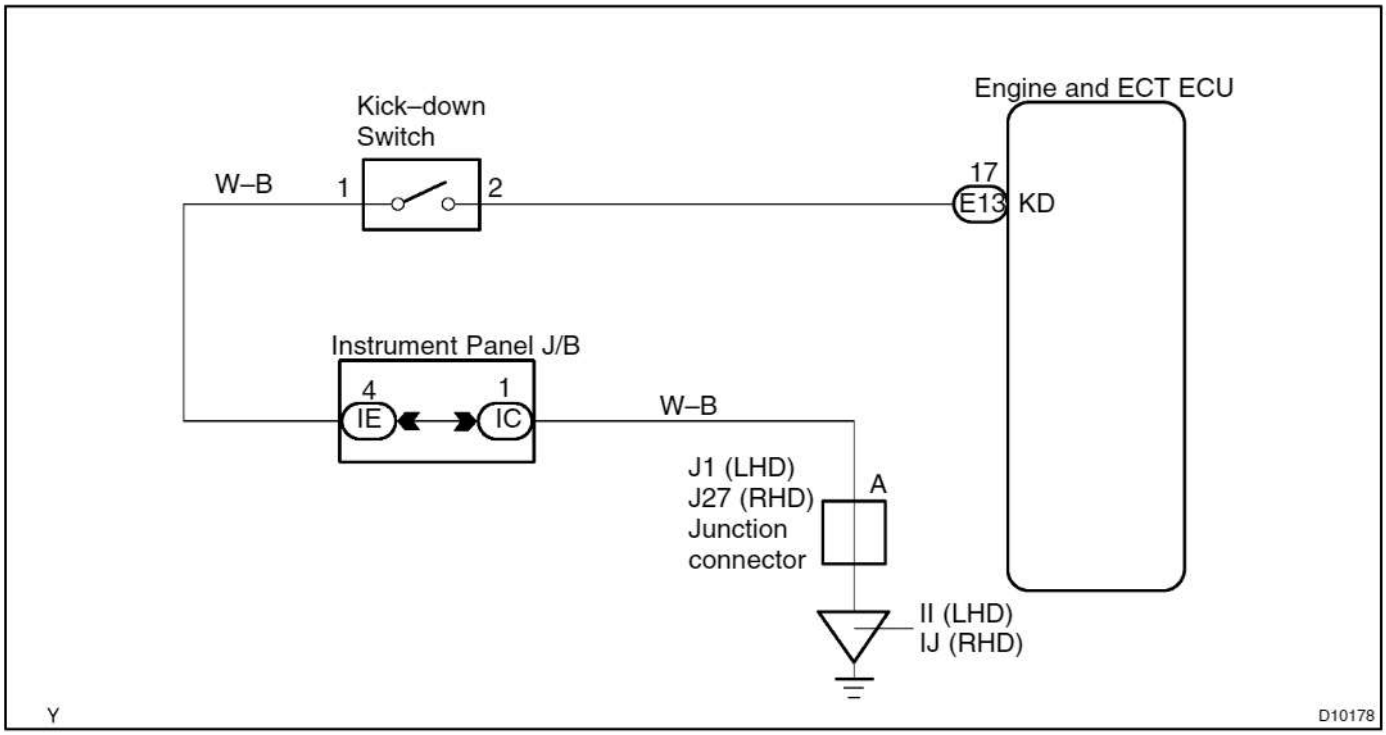
DI703-03

Kick–down Switch Circuit (LHD)

CIRCUIT DESCRIPTION

The kick–down switch is turned ON when the accelerator pedal is depressed beyond the full throttle opening and sends signals to Engine and ECT ECU.
When the kick–down switch is turned ON, the Engine and ECT ECU controls gear shifting according to the programmed shift diagrams.
If a short circuit develops in the kick–down switch, the Engine and ECT ECU disregards the kick–down signals and controls shifting at the normal shift points.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check KICK DOWN SW signal.**

When using hand–held tester:

PREPARATION:

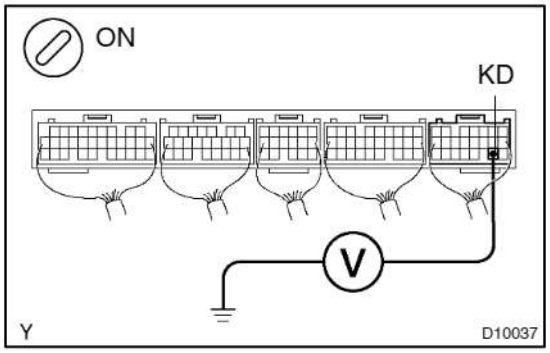
(a) Remove the DLC3 cover.
(b) Connect a hand–held tester to the DLC3.
(c) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the KICK DOWN SW signal on the hand–held tester.

OK:

Accelerator Pedal	KICK DOWN SW signal
Fully depressed (kick–down SW is ON)	ON
Released (kick–down SW is OFF)	OFF



When not using hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminal KD of Engine and ECT ECU connector and body ground when accelerator pedal is fully depressed or not.

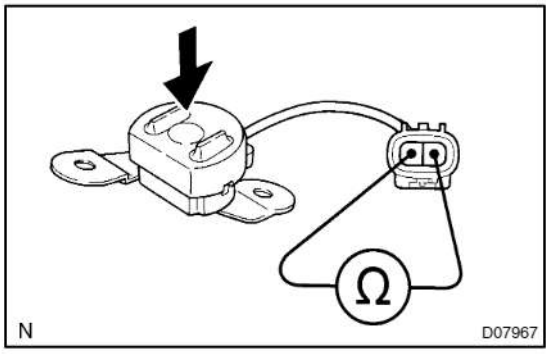
OK:

Accelerator Pedal	Voltage
Fully depressed (kick–down SW is ON)	Below 1 V
Released (kick–down SW is OFF)	10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–79).**

NG

2	Check kick–down switch.



PREPARATION:
Disconnect the kick–down switch connector.
CHECK:
Check continuity at each terminal of kick–down switch connector.
OK:

Kick–down Switch	Specified continuity
ON	Continuity
OFF	No continuity

NG → Replace kick–down switch.

OK

3	Check harness and connector between Engine and ECT ECU and kick–down switch, kick–down switch and body ground (See page IN–30).

NG → Repair or replace the harness or connector.

OK

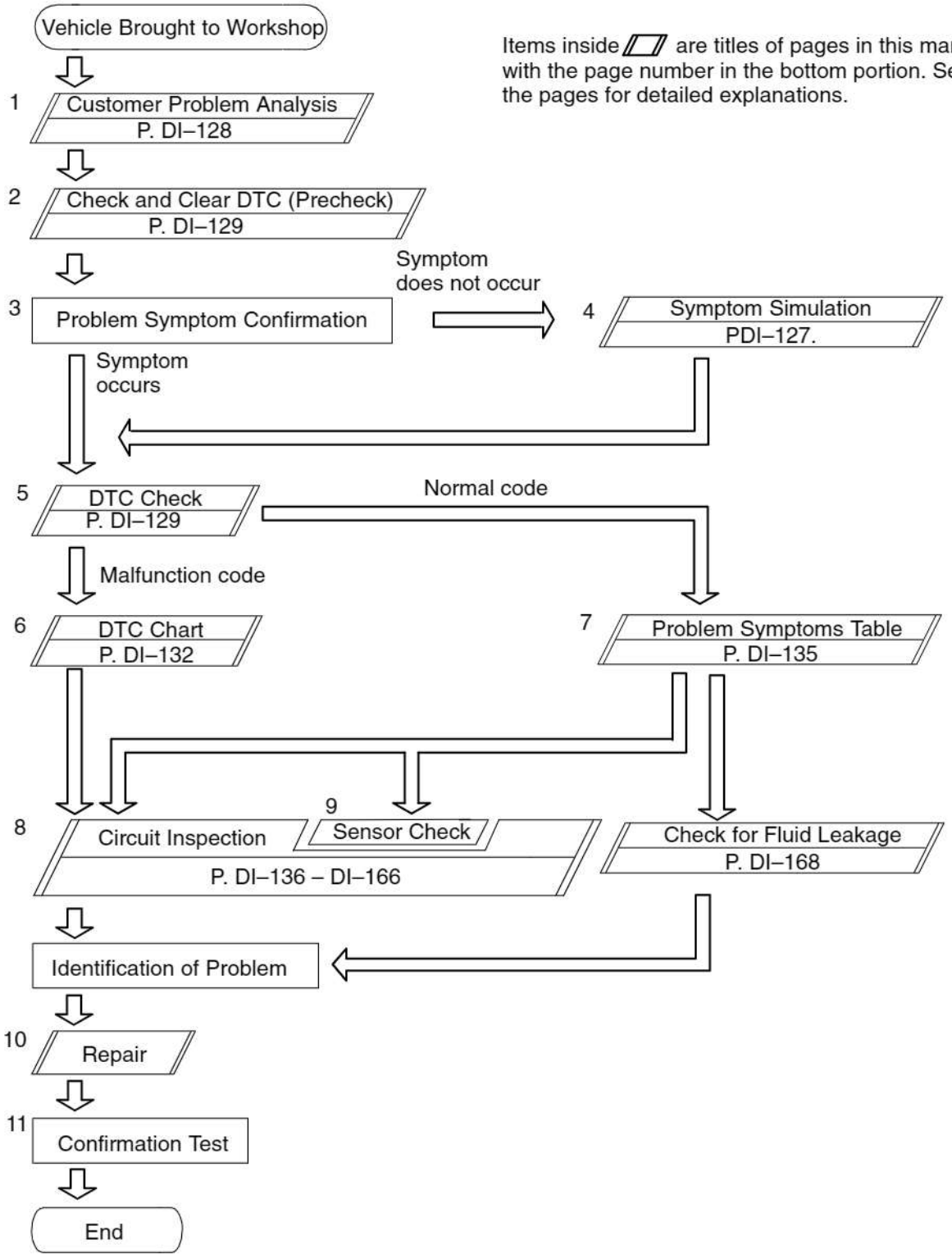
Check and replace Engine and ECT ECU (See page IN–30).

ANTI–LOCK BRAKE SYSTEM WITH ELECTRONIC BRAKE FORCE DISTRIBUTION (EBD)

HOW TO PROCEED WITH TROUBLESHOOTING

DI7YR–01

Troubleshoot in accordance with the procedure on the following pages.



Fail safe function:
When a failure occurs in the ABS system, the ABS warning light is lit and the ABS operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and EBD operation is prohibited.

DI7YS–01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

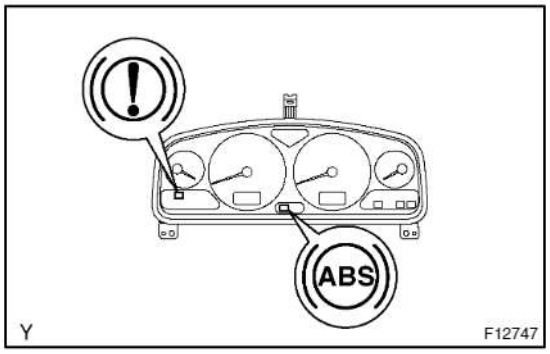
Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate intermittently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	Brake Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

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

DI7YT–01



PRE–CHECK

1. DIAGNOSIS SYSTEM

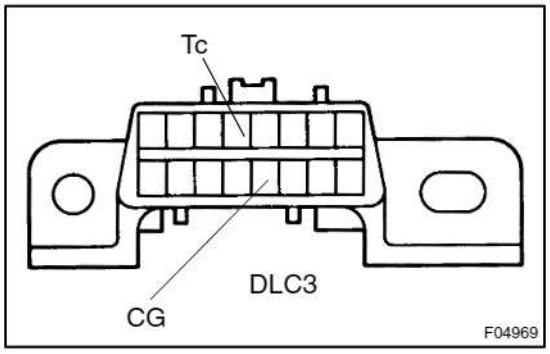
(a) Release the parking brake lever.

(b) Check the indicator.

When the ignition switch is turned ON, check that the ABS warning light and brake warning light goes on for 3 seconds.

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the brake warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit or brake warning light circuit (See page DI–159, DI–161).



(c) Check the DTC

(1) Using SST, connect terminals Tc and CG of DLC3.

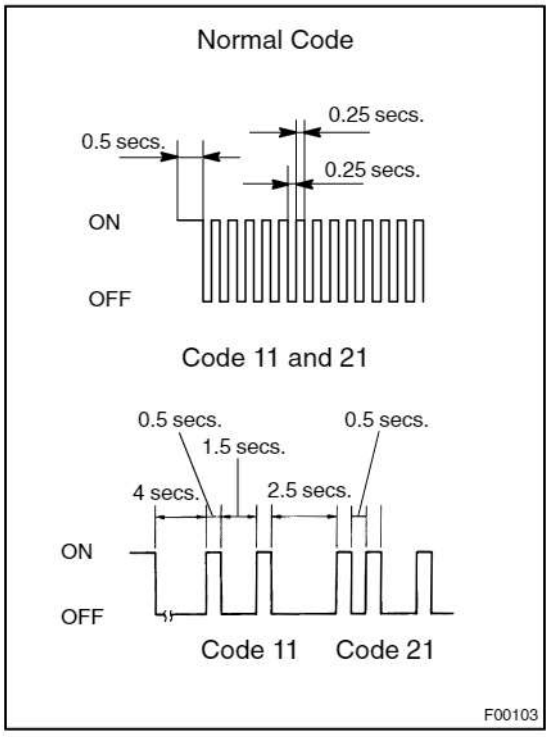
SST 09843 –18040

(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light on the combination meter.

HINT:

- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–164 or DI–159).

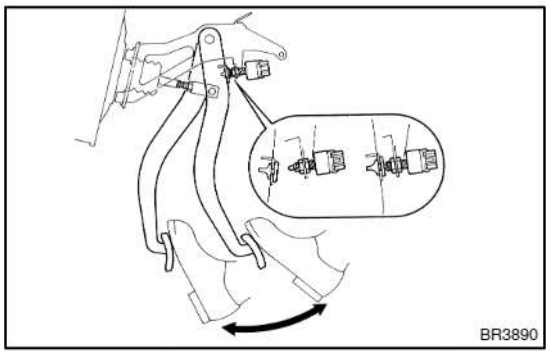


- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI–132.

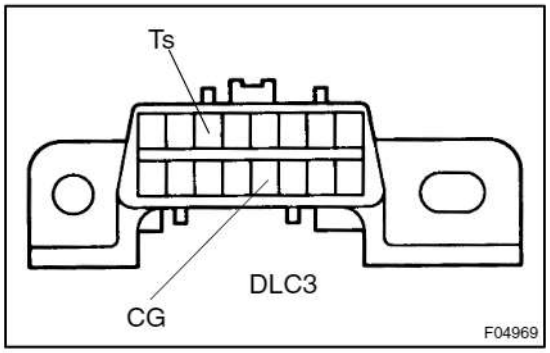
(5) After completing the check, disconnect terminals Tc and CG, and turn off the display.

If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



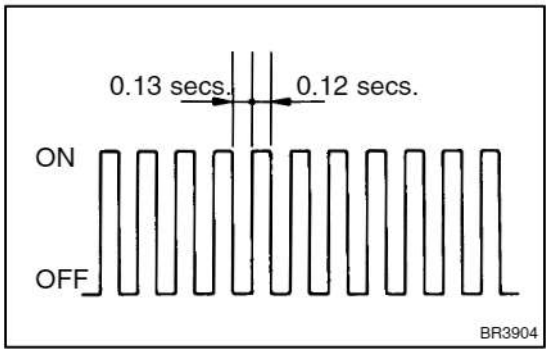
(d) Clear the DTC.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843 – 18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC3.
SST 09843 – 18040

HINT:
Cancellation cannot be done by removing the battery cable or ECU–IG fuse.



2. SPEED SENSOR SIGNAL

(a) Check the speed sensor signal.
(1) When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.
(2) Turn the ignition switch OFF.
(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09843 – 18040
(4) Start the engine.



(5) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI–159).

(6) Drive vehicle straight forward.
Drive vehicle at 45 – 55 km/h (28 – 34 mph) for several seconds.

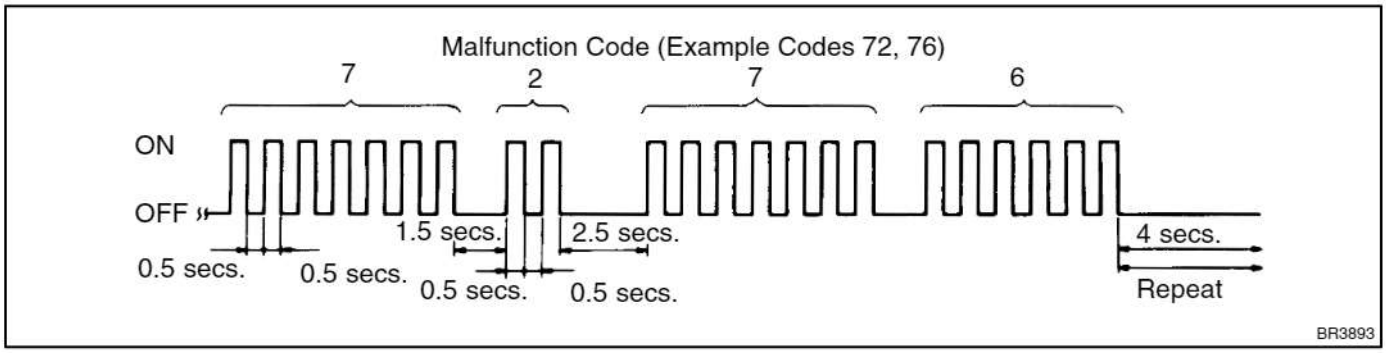
HINT:
If the brake is applied during the check, the check routine must be started again.

(7) Stop the vehicle.
(8) Turn the ignition switch OFF.
(9) Disconnect the SST from terminals Ts and CG, and connect the SST to terminals Tc and CG of DLC3.
SST 09843 – 18040
(10) Turn the ignition switch ON.

(11) Read the number of blinks of the ABS warning light.

HINT:

- See the list of DTC shown below.
- If every sensor is normal, a normal code is output (A cycle of 0.25 secs. ON and 0.25 secs. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(12) After doing the check, disconnect the SST from terminals Tc and CG of DLC3 and turn ignition switch OFF.

SST 09843 –18040

DTC of the speed sensor check function:

Code No.	Diagnosis	Trouble Area
71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Right front speed sensor rotor
72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Left front speed sensor rotor
73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Right rear speed sensor rotor
74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Left rear speed sensor rotor
75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor

DI7YU–01

DIAGNOSTIC TROUBLE CODE CHART

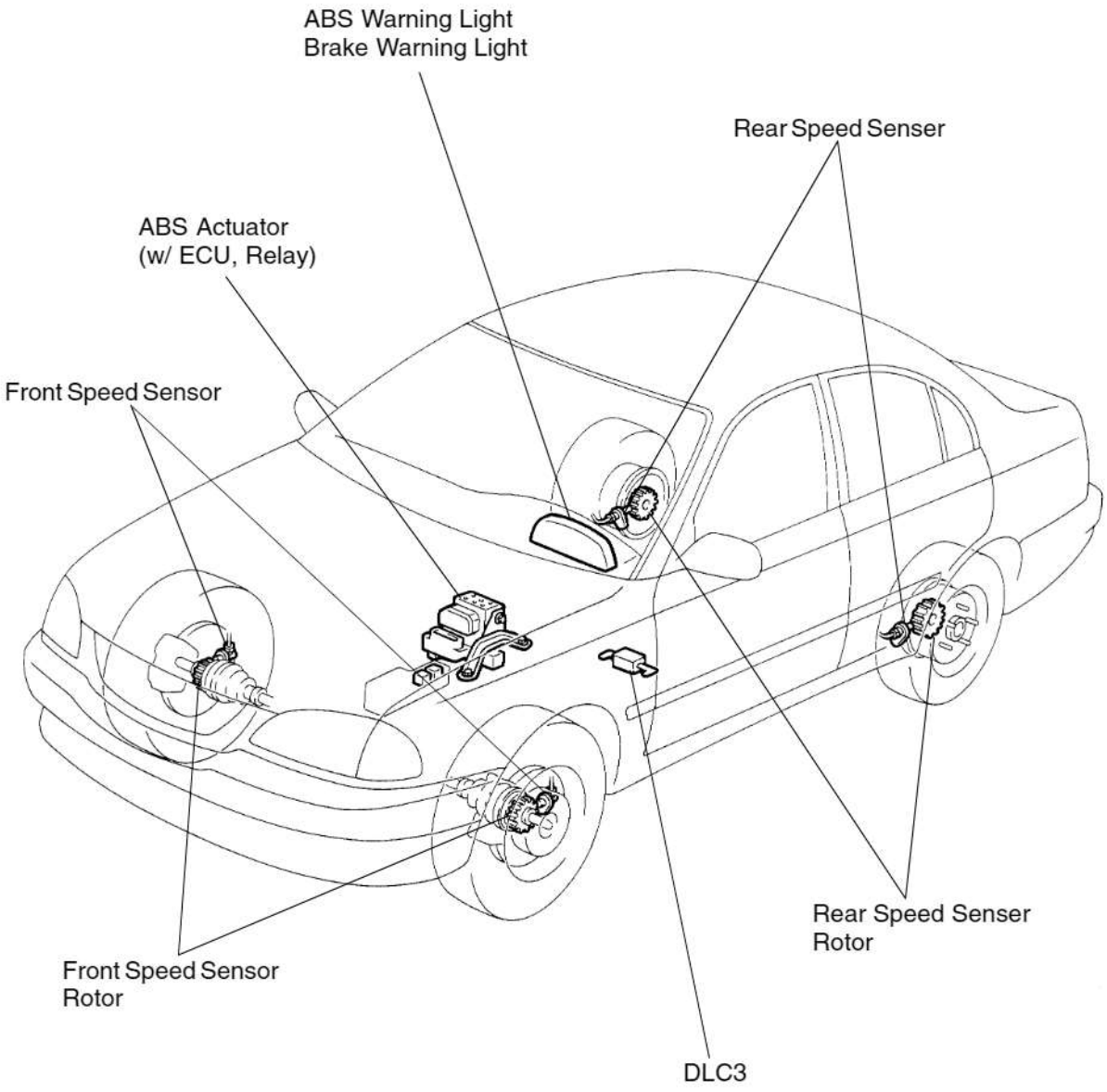
HINT:

- Using SST 09843 –18040, connect the terminals Tc and CG.
- If a malfunction code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
11 (DI–136)	ABS solenoid valve relay faulty	• ABS solenoid valve relay • Valve supply voltage • ECU
13 (DI–138)	ABS pump motor faulty	• ABS motor relay • Pump motor voltage • Pump motor lead disconnected • ECU
21 (DI–140)	Right front solenoid valves faulty	ABS actuator (right front inlet or outlet solenoid valve)
22 (DI–140)	Left front solenoid valves faulty	ABS actuator (left front inlet or outlet solenoid valve)
23 (DI–140)	Right rear solenoid valves faulty	ABS actuator (right rear inlet or outlet solenoid valve)
24 (DI–140)	Left rear solenoid valves faulty	ABS actuator (left rear inlet or outlet solenoid valve)
31 (DI–142)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear and left rear speed sensor • Each speed sensor circuit • Sensor installation • ECU
32 (DI–142)	Left front wheel speed sensor signal malfunction	
33 (DI–142)	Right rear wheel speed sensor signal malfunction	
34 (DI–142)	Left rear wheel speed sensor signal malfunction	
35 (DI–142)	Open circuit in right front wheel speed sensor circuit	• Right front, left front speed sensor • Each speed sensor circuit • ECU
36 (DI–142)	Open circuit in left front wheel speed sensor circuit	
37 (DI–147)	Speed sensor rotor is wrong number of teeth on one of the 4 wheels	• Speed sensor • Sensor rotor • ECU
38 (DI–142)	Open circuit in right rear wheel speed sensor circuit	• Right rear, left rear speed sensor • Each speed sensor circuit • ECU
39 (DI–142)	Open circuit in left rear wheel speed sensor circuit	
41 (DI–149)	Low battery voltage	• Battery • IC regulator • Power source circuit • ECU
58 (DI–153)	Open circuit in stop light switch circuit	• Stop light switch • Stop light switch circuit • ECU
62 (DI–157)	Malfunction in ECU	ECU

DI7YV–01

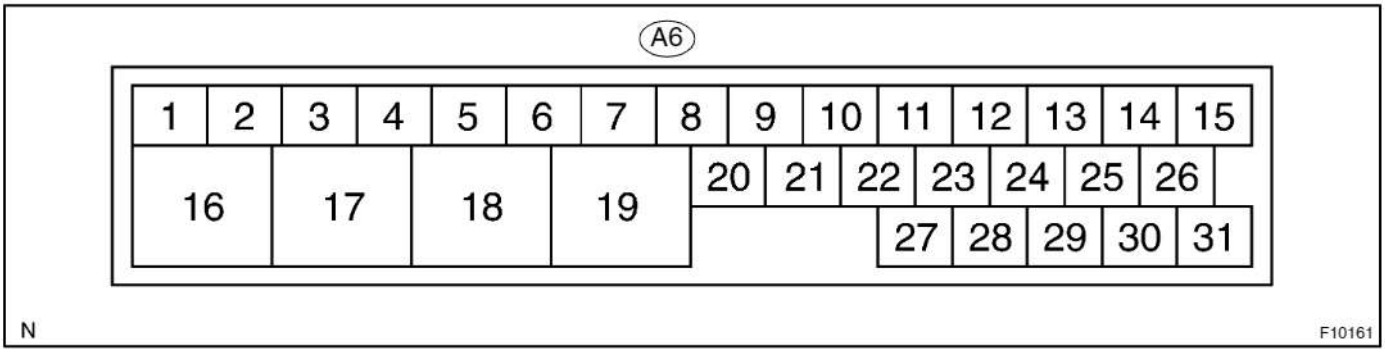
PARTS LOCATION



F04286

DI7YW-01

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
+B (A6 – 17, 18) – GND (A6 – 16, 19)	B ↔ W–B	Constant	10 – 14
IG1(A6 – 15) – GND (A6 – 16, 19)	B–R ↔ W–B	IG switch ON	10 – 14
WA (A6 – 20) – GND (A6 – 16, 19)	P–L ↔ W–B	IG switch ON, ABS warning light ON	10 – 14
		IG switch ON, ABS warning light OFF	Below 2.6
STP (A6 – 14) – GND (A6 – 16, 19)	G–W ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	5 – 14
Tc (A6 – 12) – GND (A6 – 16, 19)	LG–R ↔ W–B	IG switch ON	5.7 – 8.1
Ts (A6 – 11) – GND (A6 – 16, 19)	R–B ↔ W–B	IG switch ON	5.7 – 8.1
FR+ (A6 – 5) – FR– (A6 – 4)	W–R*1 ↔ B	IG switch ON, slowly turn right front wheel	AC generation
	W*2 ↔ B		
FL+ (A6 – 7) – FL– (A6 – 6)	R ↔ L–W	IG switch ON, slowly turn left front wheel	AC generation
RR+ (A6 – 2) – RR– (A6 – 1)	P ↔ L–R*1	IG switch ON, slowly turn right rear wheel	AC generation
	P ↔ L*2		
RL+ (A6 – 9) – RL– (A6 – 8)	Y ↔ BR	IG switch ON, slowly turn left rear wheel	AC generation
SP1 (A6 – 10) – GND (A6 – 16, 19)	L ↔ W–B	Vehicle driveing at about 20 km/h (12 mph)	Pulse generation
PKB (A6 – 13) – GND (A6 – 16, 19)	R–W ↔ W–B	IG switch ON, parking brake switch ON	Below 2.6
		IG switch ON, parking brake switch OFF	10 – 14
PN (A6 – 23) – GND (A6 – 16, 19)	B–W ↔ W–B	IG switch ON, shift lever P or N range	10 – 14
		IG switch ON, except shift lever P or N range	Below 1.6
EBDW (A6 – 21) – GND (A6 – 16, 19)	R–W ↔ W–B	IG switch ON, brake warning light OFF	Below 2.6
		IG switch ON, brake warning light ON	10 – 14

*1: LHD

*2: RHD

DI7YX–01

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptoms	Inspection Circuit	See page
ABS does not operate.	Only when 1.to 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Power source circuit 3. Speed sensor circuit 4. Check the hydraulic circuit for leakage.	 DI–129 DI–149 DI–142 DI–168
ABS does not operate intermittently.	Only when 1. το 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic circuit for leakage.	 DI–129 DI–142 DI–153 DI–168
ABS warning light abnormal.	1. ABS warning light circuit 2. ABS ECU	DI–159
Brake warning light abnormal.	1. Brake warning light circuit 2. ABS ECU	DI–161
DTC check cannot be done.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit 2. Tc terminal circuit	 DI–159 DI–164
Speed sensor signal check cannot be done.	1. Ts terminal circuit 2. ABS ECU	DI–166

DI7YY-01

CIRCUIT INSPECTION

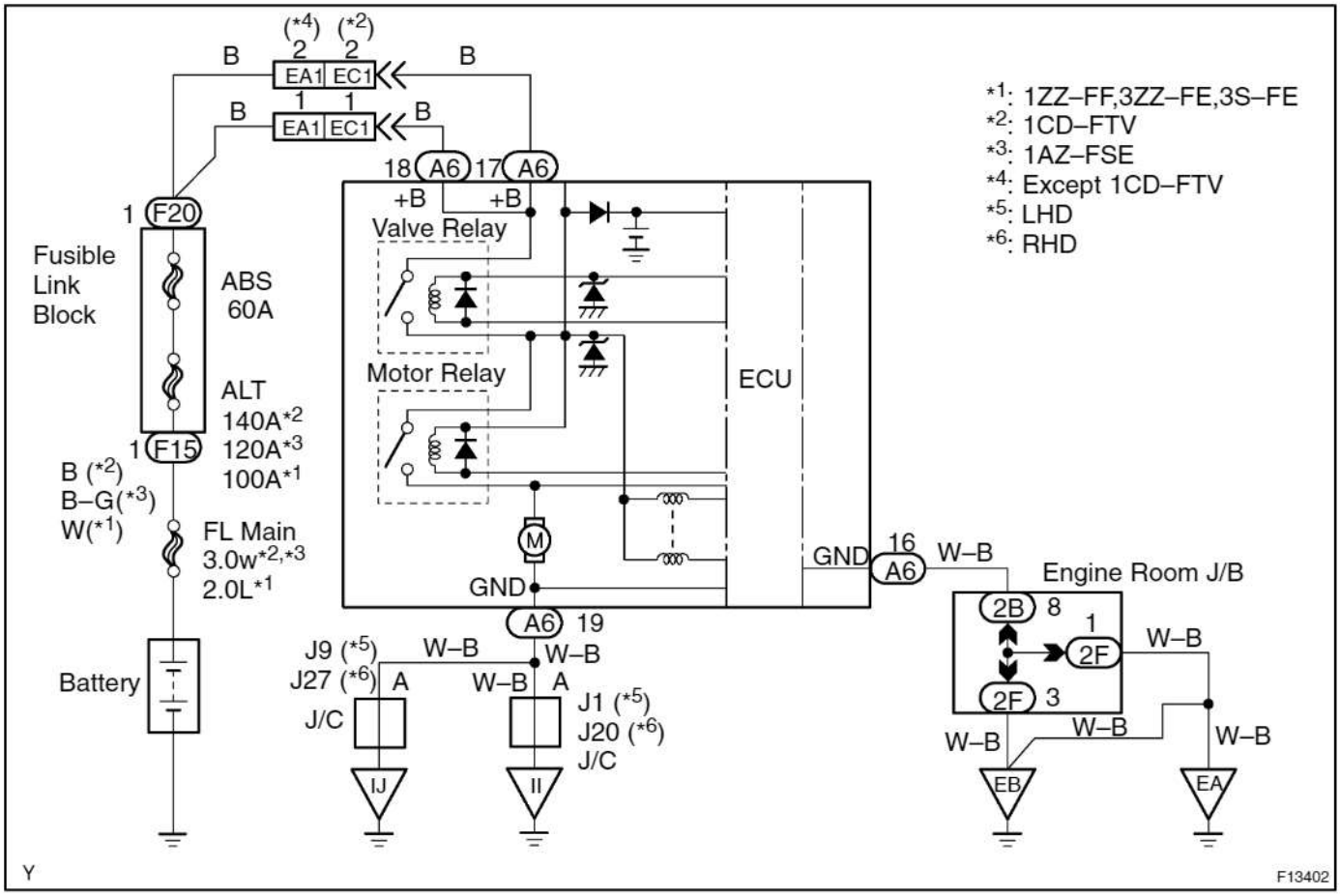
DTC	11	ABS Solenoid Valve Relay Circuit

CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

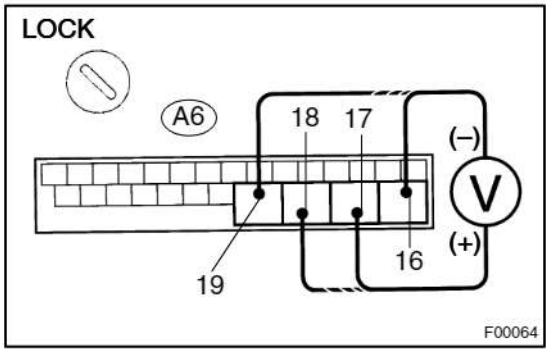
DTC No.	DTC Detecting Condition	Trouble Area
11	Detection of any conditions from 1. through 3.: 3. 3 or more solenoid valves are detected faulty in response and at the same time valve supply voltage is detected faulty. 4. Solenoid valve relay will not be switched OFF. 5. Valve relay is stuck in spite of its high valve relay supply voltage.	• ABS solenoid valve relay • Valve supply voltage • ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator connector.**



PREPARATION:

Disconnect the ABS actuator connector.

CHECK:

Measure the voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator harness side connector.

OK:

Voltage: 10 – 14 V

NG → **Check and replace fuses.**
Check and repair harness or connector.

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7YZ–01

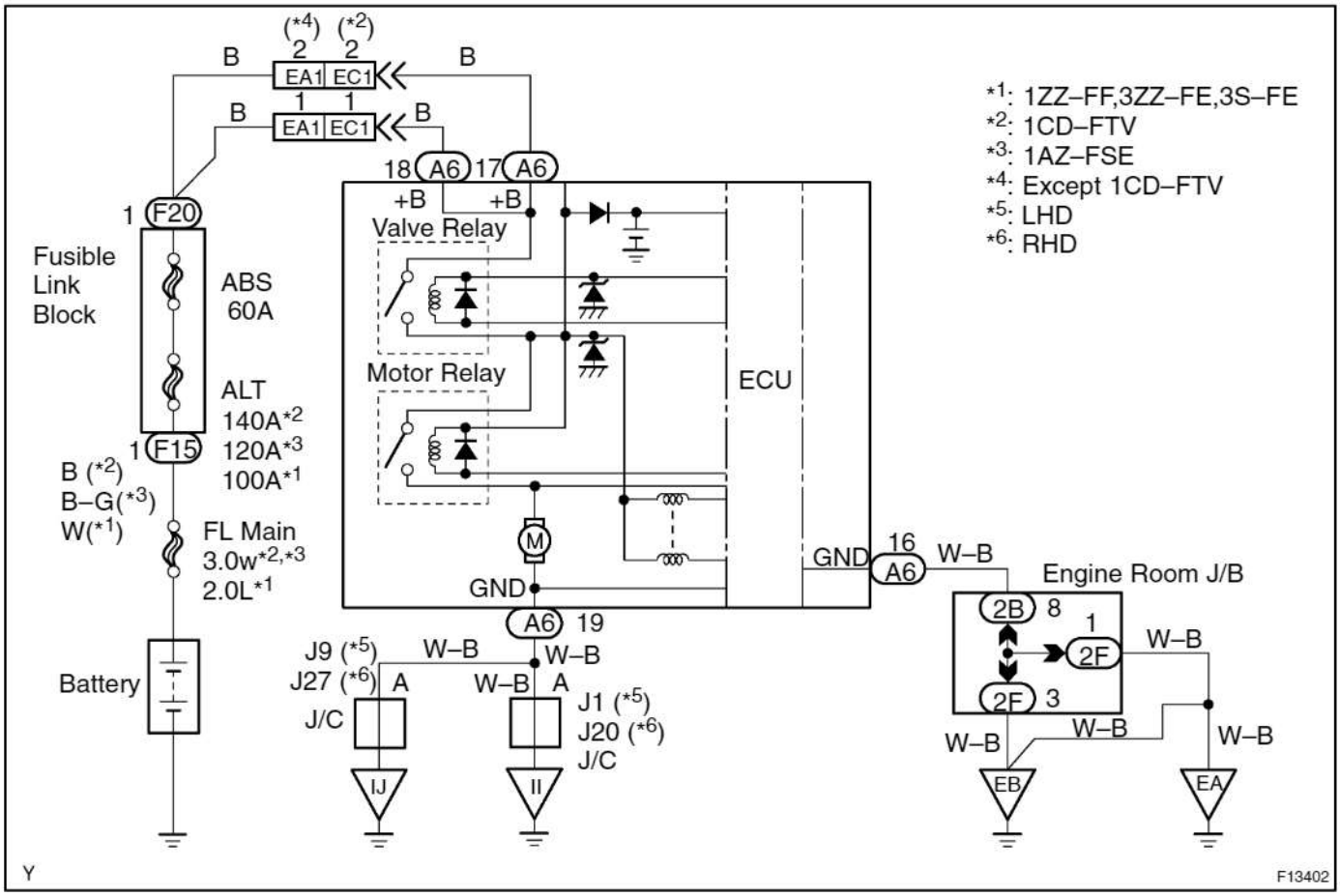
DTC	13	Pump Motor Circuit

CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the ABS motor relay ON and operates the ABS pump motor.

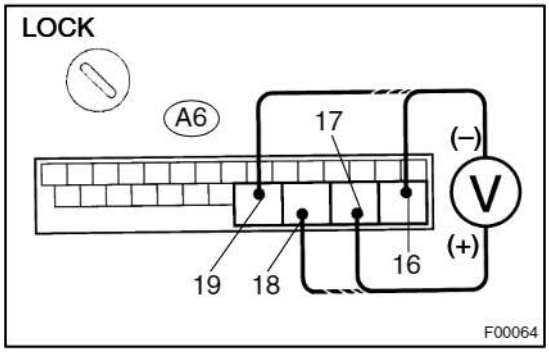
DTC No.	DTC Detecting Condition	Trouble Area
13	Detection of any conditions from 1. through 3.: 1. After actuating the motor relay, voltage will not be supplied to the pump motor within 0.4 secs. 2. Although the voltage supplied to the pump motor is in a high level, motor relay will not actuate for 2.5 secs, or more. 3. The voltage supplied to the pump motor keeps low level for louger than 0.4 secs. and the pump repeats activating for 7 secs. 3times maximally. After the last activation, the pump motor has been gone dead because of short circuit.	• ABS motor relay • Pump motor voltage • Pump motor lead disconnected • ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator connector.**



PREPARATION:

Disconnect the ABS actuator connector.

CHECK:

Measure the voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator harness side connector.

OK:

Voltage: 10 – 14 V

NG → **Check and replace fuses.**
Check and repair harness or connector.

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7Z0-01

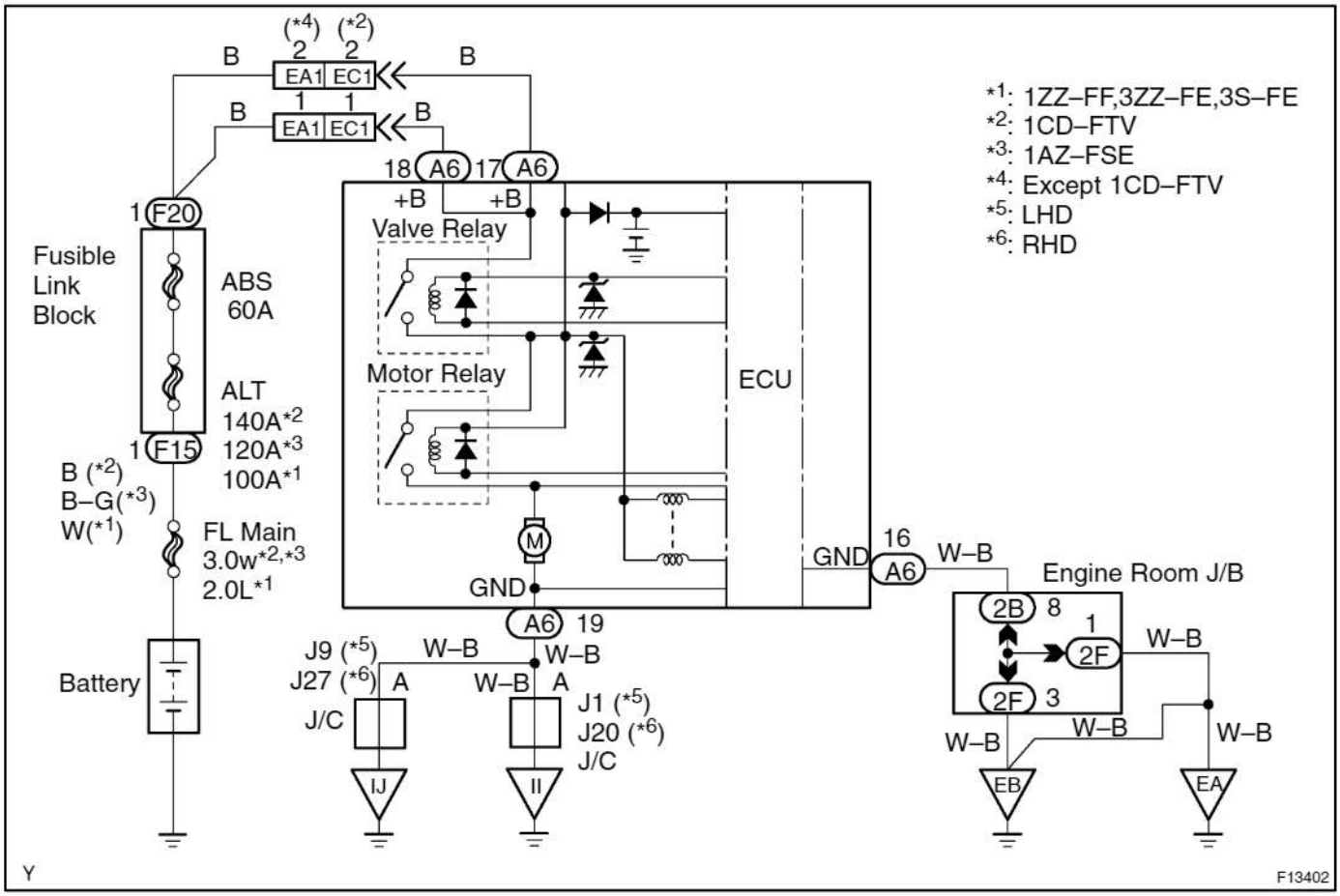
DTC	21, 22, 23, 24	ABS Solenoid Valve Circuit

CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
21, 22, 23, 24	Solenoid valve signal does not match for the check result.	Each solenoid valve

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check the DTC once more.**

PREPARATION:

(a) Clear the DTC (See page DI–129).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch ON, and check if the same DTC is stored in the memory.

NO → **No problem.**

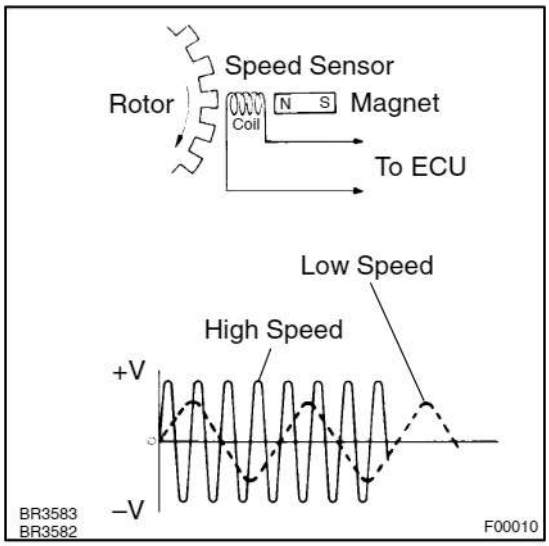
YES

Replace ABS ECU.

DI7Z1-01

DTC	31, 32, 33, 34, 35, 36, 38, 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each have 48 serrations.

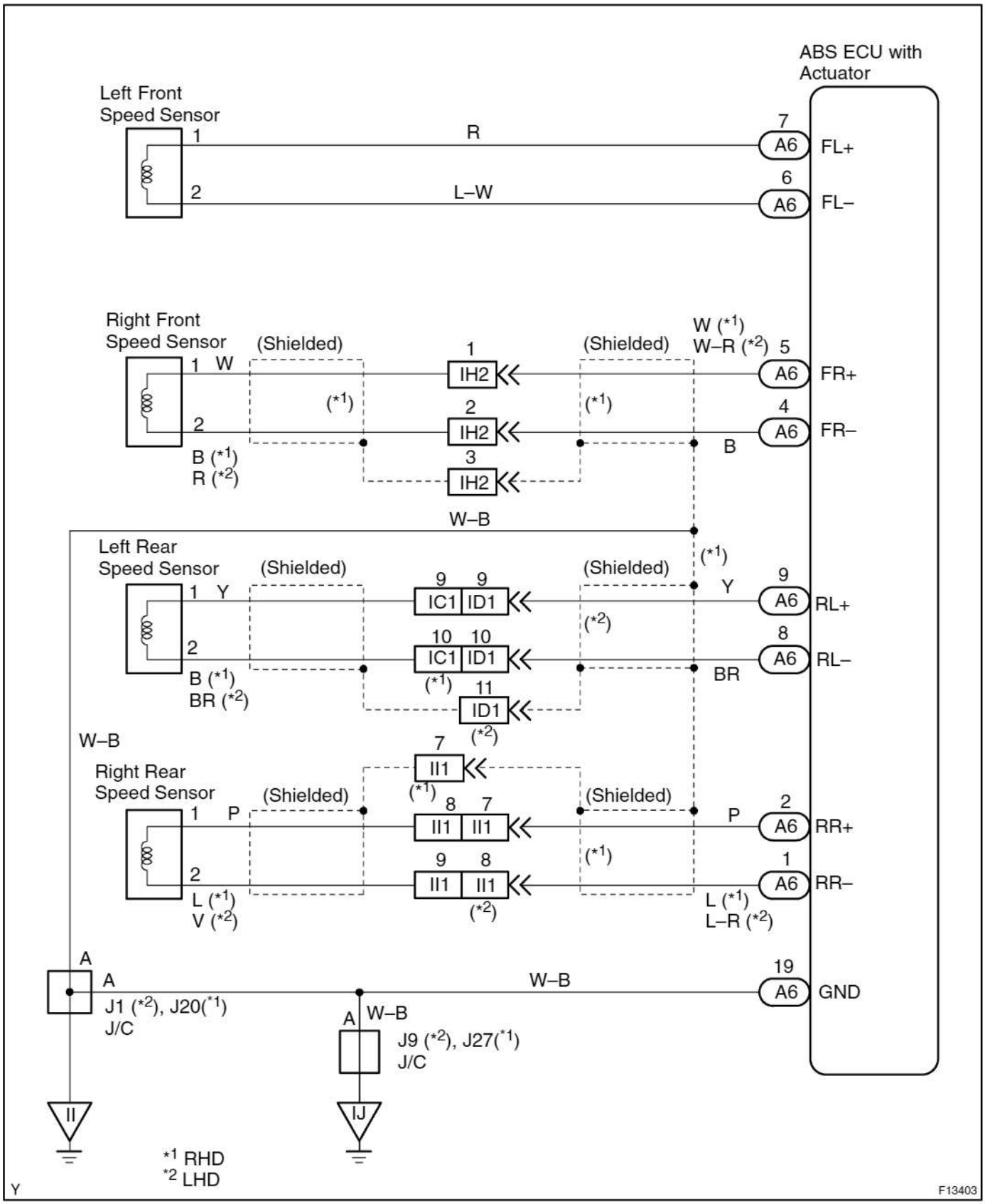
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from 1. through 3.: 1. Vehicle speed is more than 40 km/h (25 mph), pulses are not input for 0.01 secs. 2. After the initial start or restart and when the vehicle speed has reached 12 km/h (7 mph), the wheel with 0 km/h (0 mph) of wheel speed was detected. 3. After the initial start or restart and when the vehicle speed has reached 70 km/h (44 mph), front wheel with 0 km/h (0 mph) of wheel speed was detected. 4. In case that the vehicle equipped with the temporaly tire is driven with high speed but without low pressure in that temporaly tire.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Sensor installation • ECU • Tire pressure
35, 36, 38, 39	Detecting abnormality in the resistance value of each speed sensor.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • ECU

HINT:

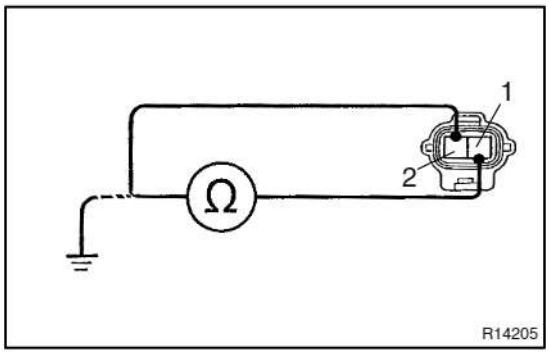
- DTC Nos. 31 and 35 are for the right front speed sensor.
- DTC Nos. 32 and 36 are for the left front speed sensor.
- DTC Nos. 33 and 38 are for the right rear speed sensor.
- DTC Nos. 34 and 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front

PREPARATION:

(a) Remove the front fender liner.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

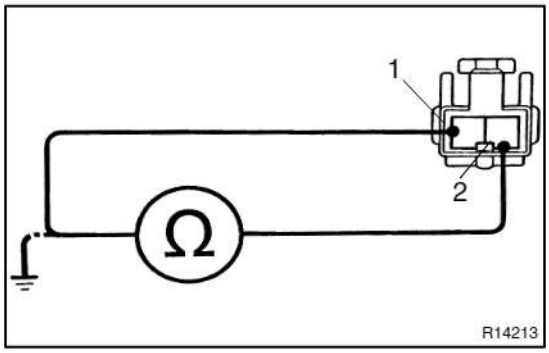
Resistance: 0.6 – 2.5 kΩ (1.6 ± 0.2 kΩ at 20 °C)

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear

PREPARATION:

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ (1.6 ± 0.1 kΩ at 20 °C)

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG → **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–129).

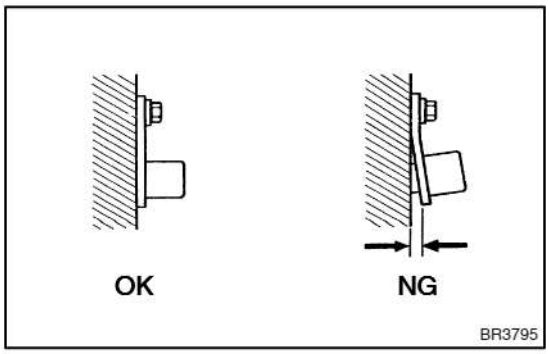
OK

2	Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–30).

NG → Repair or replace harness or connector.

OK

3	Check speed sensor installation.



CHECK:
Check the speed sensor installation.
OK:

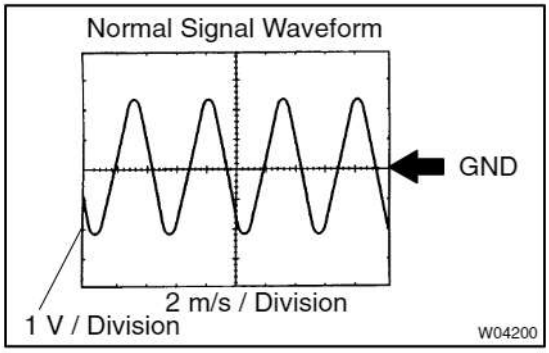
The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

NG → Replace speed sensor.

NOTICE:
Check the speed sensor signal last (See page DI–129).

OK

4	Check speed sensor and sensor rotor serrations.



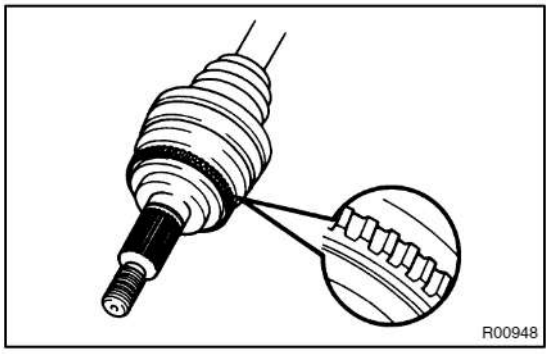
REFERENCE: INSPECTION USING OSCILLOSCOPE
PREPARATION:
(a) Remove the ABS ECU.
(b) Connect the oscilloscope to the terminals FR+, FL+, RR+ or RL+ and GND of the ABS ECU.

CHECK:
Drive the vehicle at about 30 km/h (19 mph), and check the signal waveform.

OK → Check and replace ABS ECU.

NG

5	Check sensor rotor and sensor tip.



Front

PREPARATION:

Remove the front drive shaft (See page SA–3).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

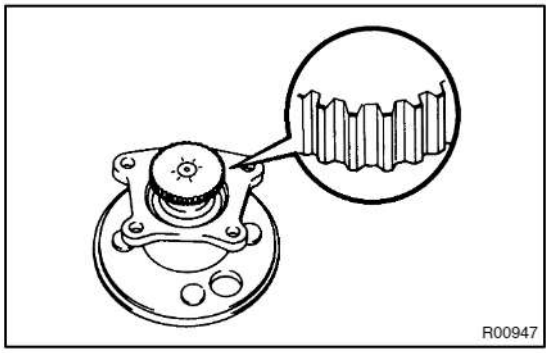
Remove the front speed sensor (See Pub. No. RM599E on page BR–41).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.



Rear

PREPARATION:

Remove the axle hub (See Pub. No. RM599E on page SA–10).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See Pub. No. RM599E on page BR–44).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG → **Replace sensor rotor or speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–129).

OK

Check and replace ABS ECU.

DI7Z2-01

DTC	37	Speed Sensor Rotor Faulty

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
37	Detection of any of conditions from 1. through 3.: 1. Occurrence of differential to some degree in the wheel speed between the front and rear wheels of either left or right side of the vehicle and the front left and right wheels. (Detection of differential in mini tire size, spinning wheel and decelerating wheel.) 2. Continuous ABS control for 60 secs. or more. 3. Interference on 1 or more wheels for 20 secs. with the brake pedal depressed, or for 5 secs. when the brake pedal is not depressed. 4. In case that the vehicle equipped with the temporaly tire is driven with high speed but without low pressure in that temporaly tire.	• Speed sensor • Sensor rotor • ECU • Tire pressure

INSPECTION PROCEDURE

1	Check sensor rotor (See page DI–142).

NG → Replace sensor rotor.

OK

2	Check speed sensor (See page DI–142).

NG → Replace speed sensor.

OK

3	Check for open or short circuit in harness and connector between speed sensor and ECU (See page IN–30).

NG → Repair or replace harness and connector.

OK

Check and replace ABS ECU.

DI7Z3-01

DTC	41	Power Source Circuit

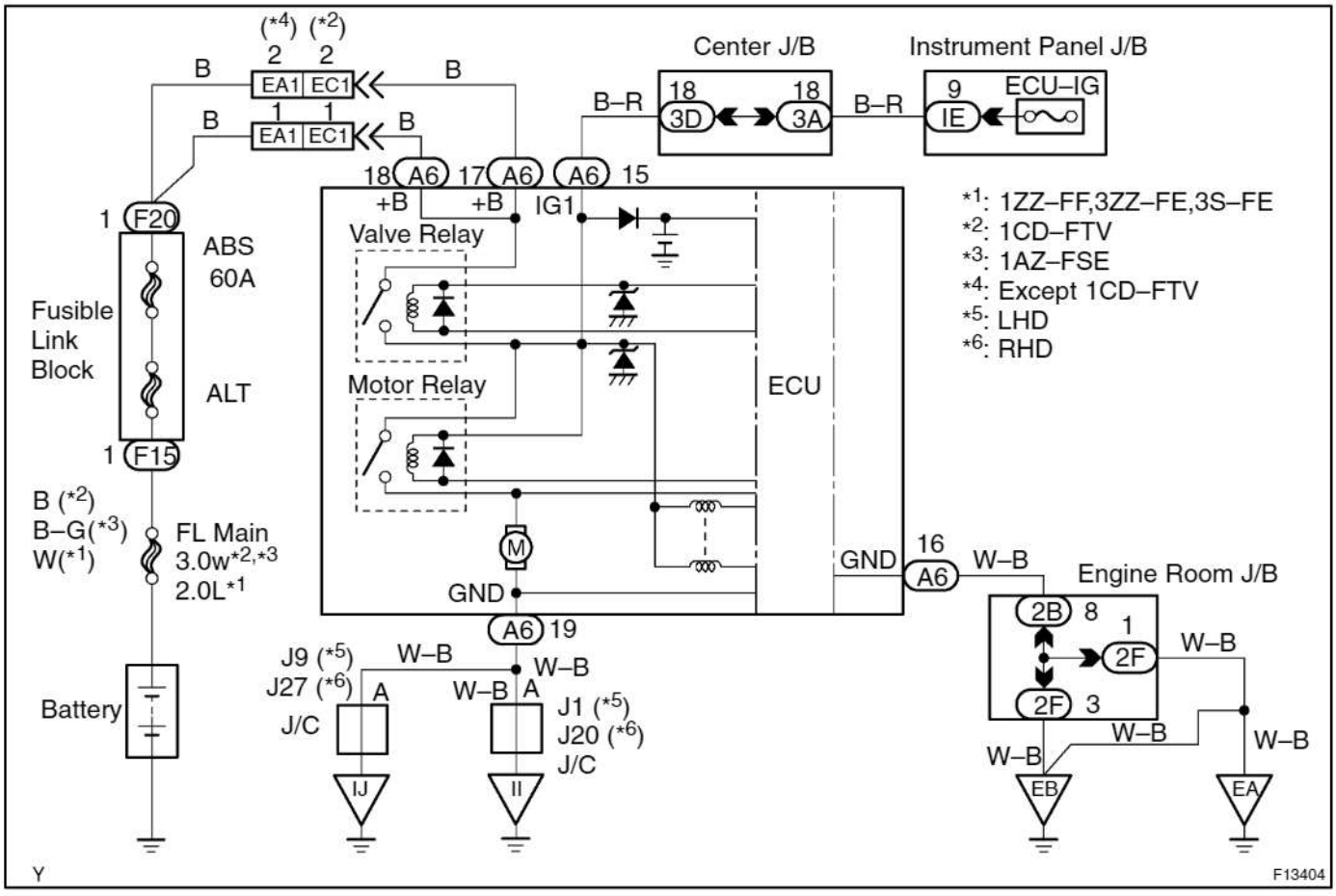
CIRCUIT DESCRIPTION

This circuit is the power source for the ECU, hence the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
41	When the vehicle speed is at aprox. 6 km/h (4 mph), low battery voltage is less than 9.4 V at the time of non–operation of ABS control or less than 8.8 V at the time of operation of ABS control, and high battery voltage is more than 17.4 V.	• Battery • IC regulator • Power source circuit • ECU

Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery voltage.**

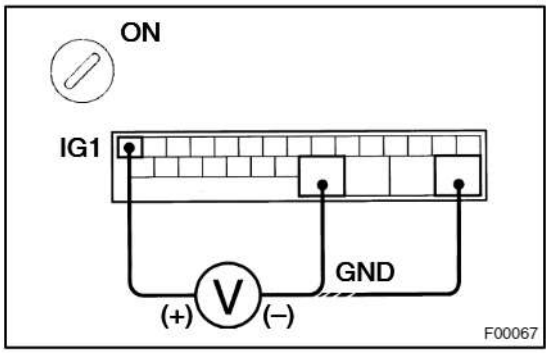
OK:

Voltage: 10 – 14 V

NG → **Check and replace fuses.**
Check and repair the charging system.

OK →

2	**Check voltage between terminals IG1 and GND of ABS actuator connector.**



PREPARATION:

Disconnect ABS actuator connector.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of ABS actuator harness side connector.

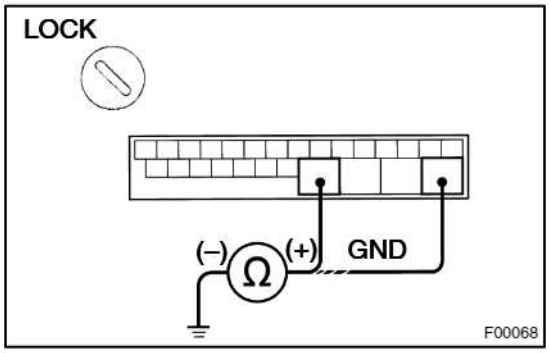
OK:

Voltage: 10 – 14 V

NG → **Check and replace fuses.**
Repair or replace harness or connector.

OK →

3	**Check continuity between terminals GND of ABS actuator connector and body ground.**



CHECK:

Measure resistance between terminals GND of ABS actuator harness side connector and body ground.

OK:

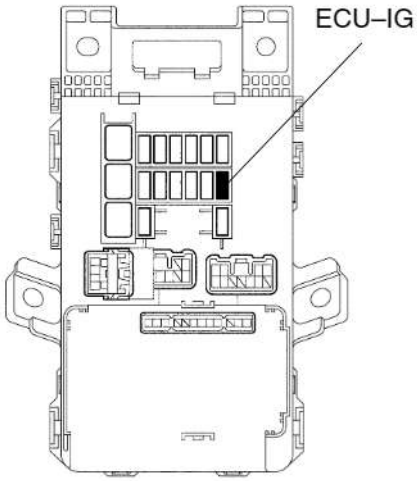
Resistance: 1 Ω or less

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

OK

4	**Check ECU–IG fuse.**

Instrument Panel J/B



PREPARATION:
Remove ECU–IG fuse from instrument panel J/B.
CHECK:
Check continuity of ECU–IG fuse.
OK:
Continuity

NG → **Check for short circuit in all the harness and components connected to ECU–IG fuse (See attached wiring diagram.**

OK

Check and replace ABS ECU.

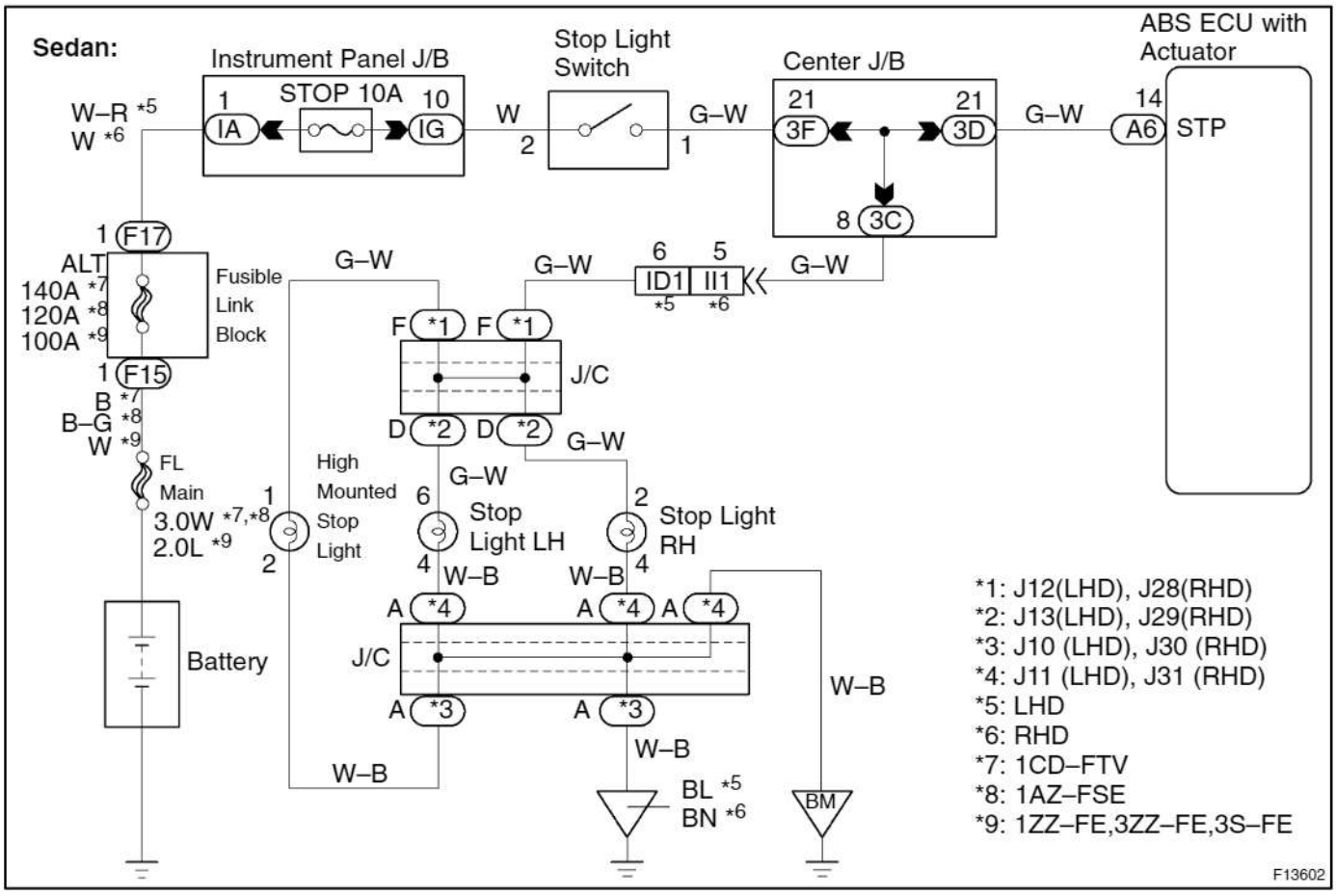
DI7Z4-01

DTC	58	Stop Light Switch Circuit

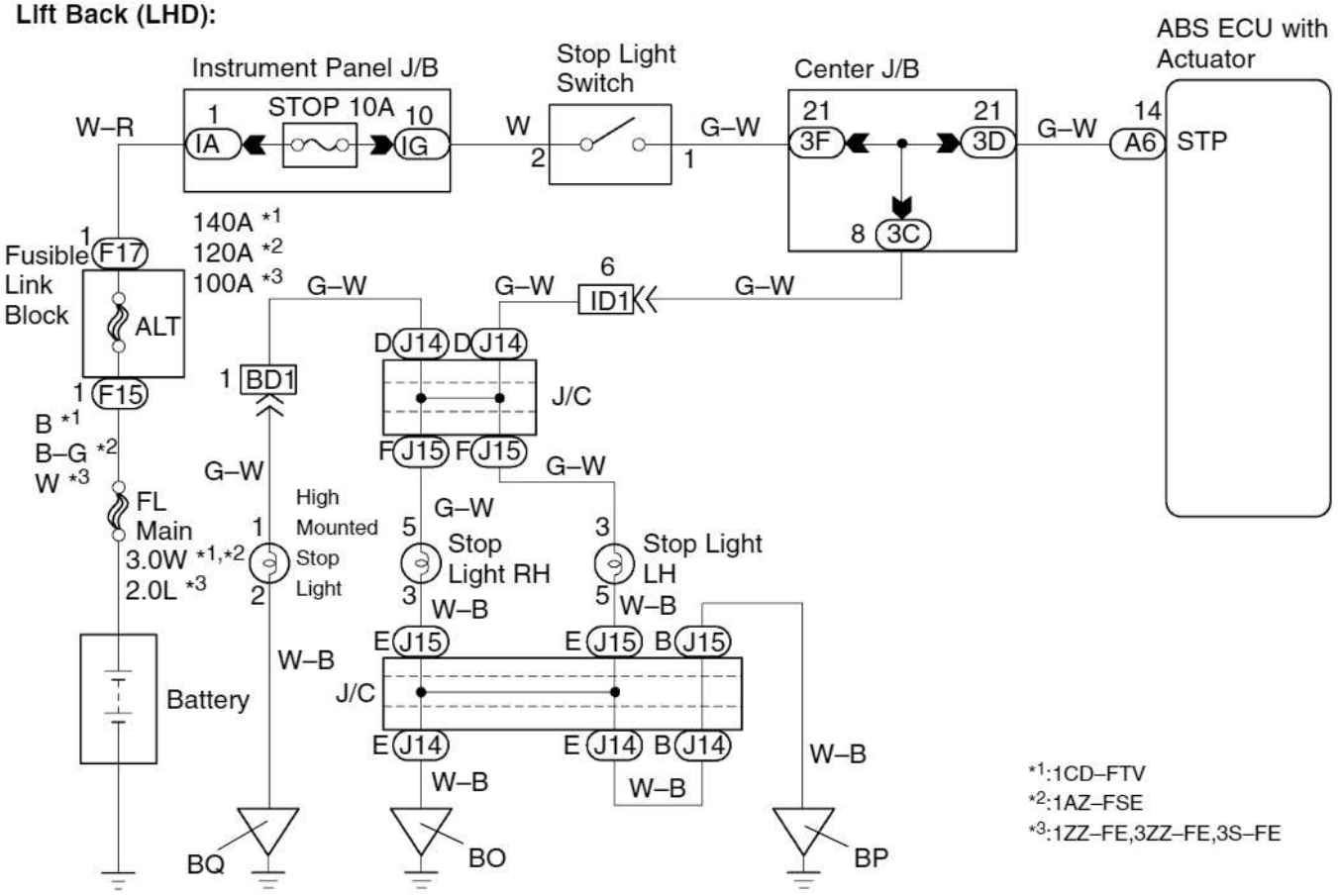
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
58	Stop light switch circuit is open circuit, and stop light switch voltage is in the level between 65 % or more and less than 93 % of the battery voltage.	• Stop light switch • Stop light switch circuit • ECU

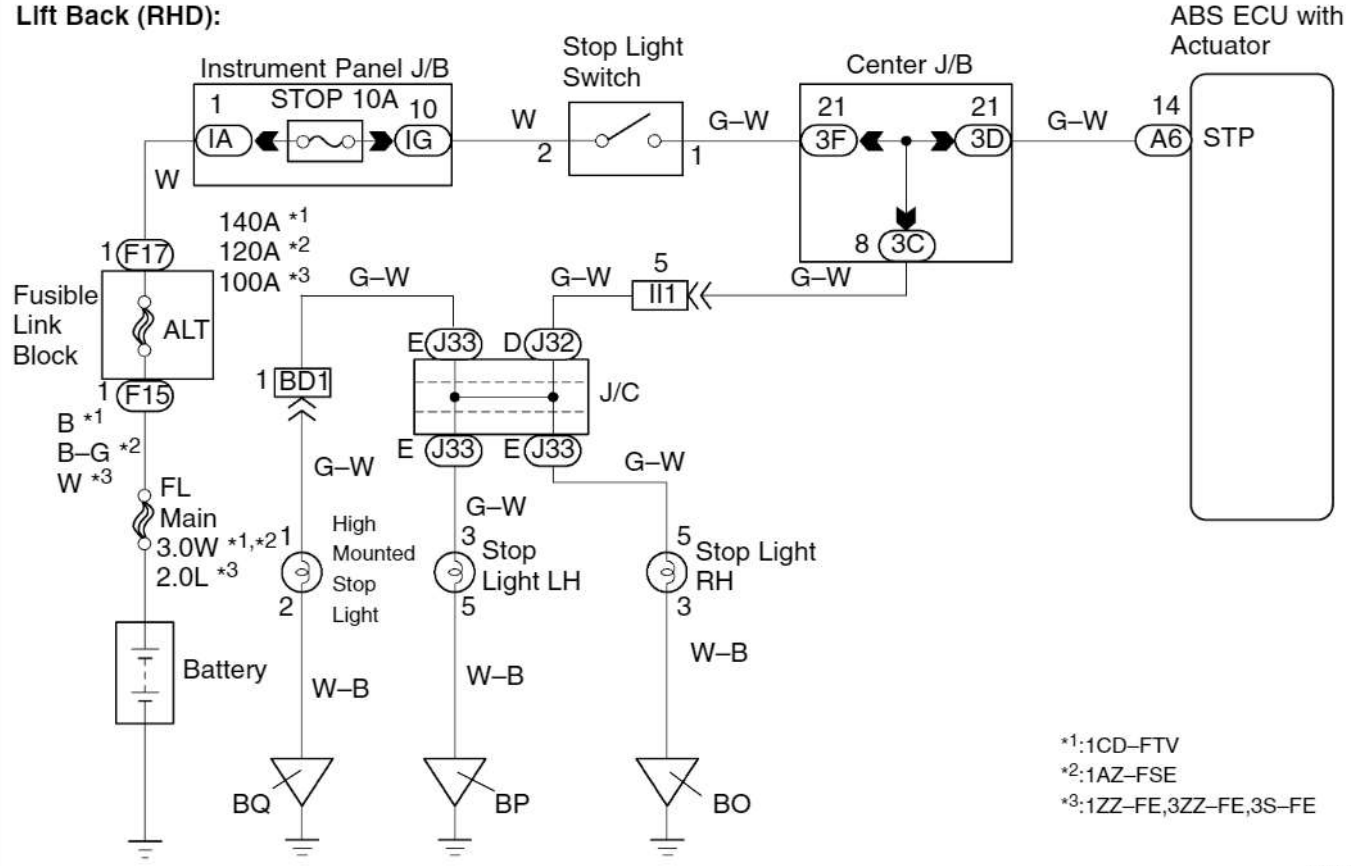
WIRING DIAGRAM



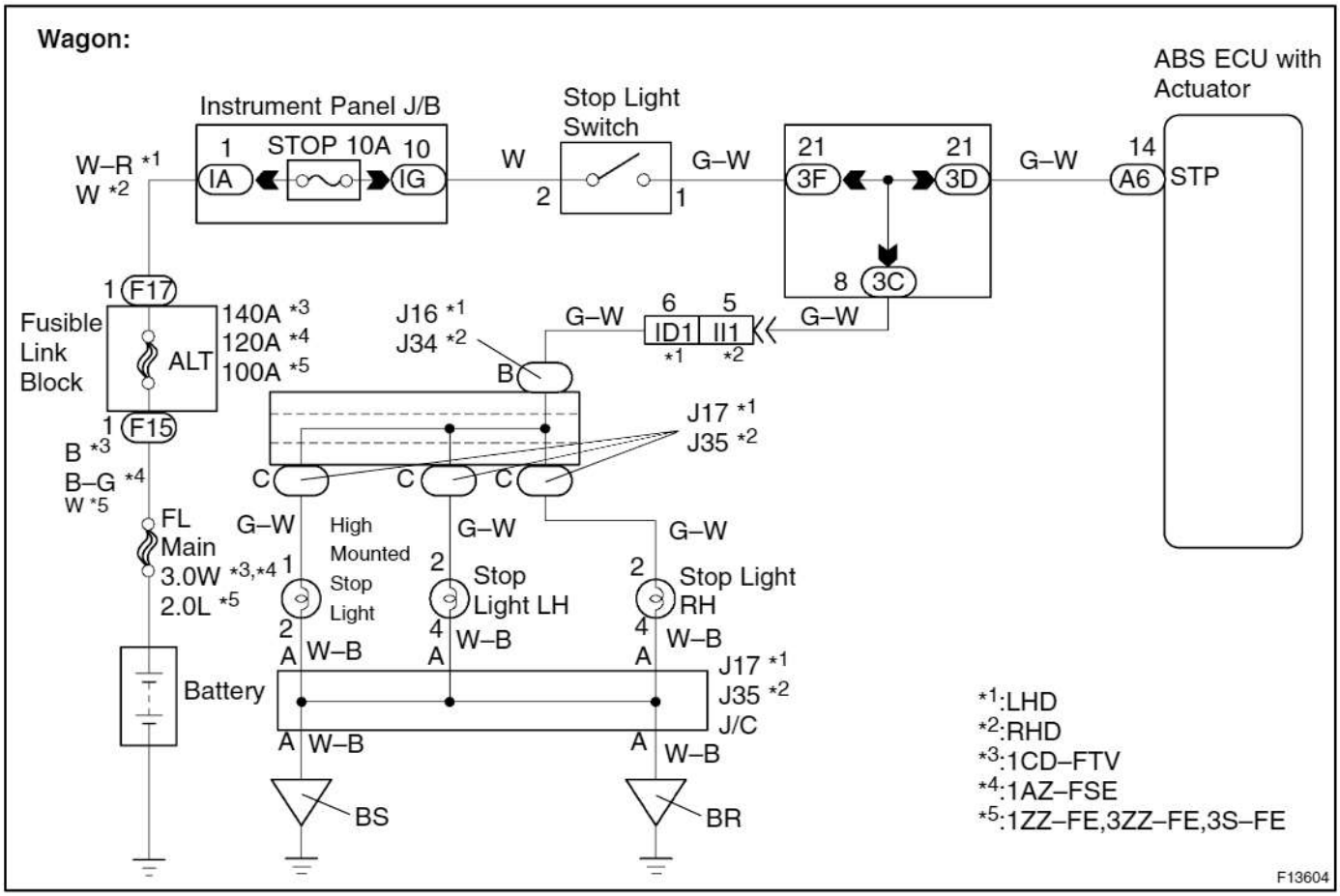
Lift Back (LHD):



Lift Back (RHD):



F13603



INSPECTION PROCEDURE

1	**Check operation of stop light.**

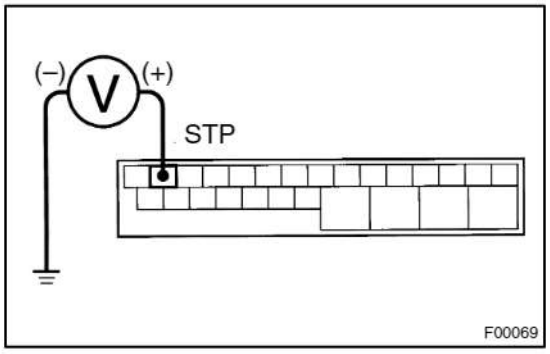
CHECK:

Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

NG → **Repair stop light circuit (See Pub. No. RM599E on BE–57).**

OK

2	**Check voltage between terminal STP of ABS actuator and body ground.**



PREPARATION:

Disconnect ABS actuator connector.

CHECK:

Measure voltage between terminal STP of ABS actuator harness side connector and body ground when brake pedal is depressed.

OK:

Voltage: 8 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–135).**

NG

3	**Check for open circuit in harness and connector between ABS ECU and stop light switch (See page IN–30).**

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

OK

Check and replace ABS ECU.

DI7Z5-01

DTC	62	ABS ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
62	ABS ECU continuously detected the inproper operation of ABS.	• Battery • ECU

INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI–129.

YES → Repair circuit indicated by the output code.

NO

2	Is normal code displayed?

YES → Check for short circuit in harness and connector between DLC3 and ABS ECU (See page IN–30).

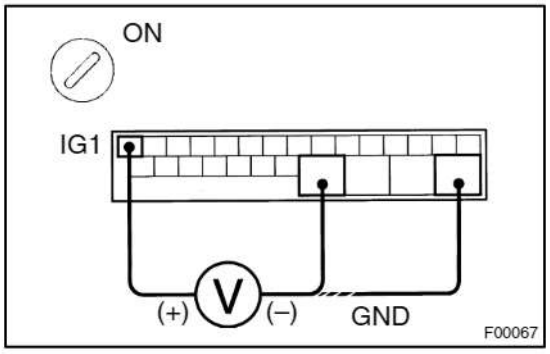
NO

3	Does ABS warning light go off?

YES → Check open and short circuit of the harness and connector in the Tc circuit between ECU and DLC3.

NO

4	Check voltage between terminals IG1 and GND of ABS actuator connector.



PREPARATION:
Disconnect ABS actuator connector.
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of ABS actuator harness side connector.
OK:
Voltage: 10 – 14 V

YES → **Check for open or short circuit in harness and connector between ECU–IG fuse and ABS actuator (See page IN–30).**

OK

5	Check connection of ABS actuator connector.

CHECK:
(a) Check the connection of the ABS actuator connector.
(b) Check the ABS warning light goes off.

OK → **Check and replace ABS ECU.**

NG

Repair or replace harness or connector.

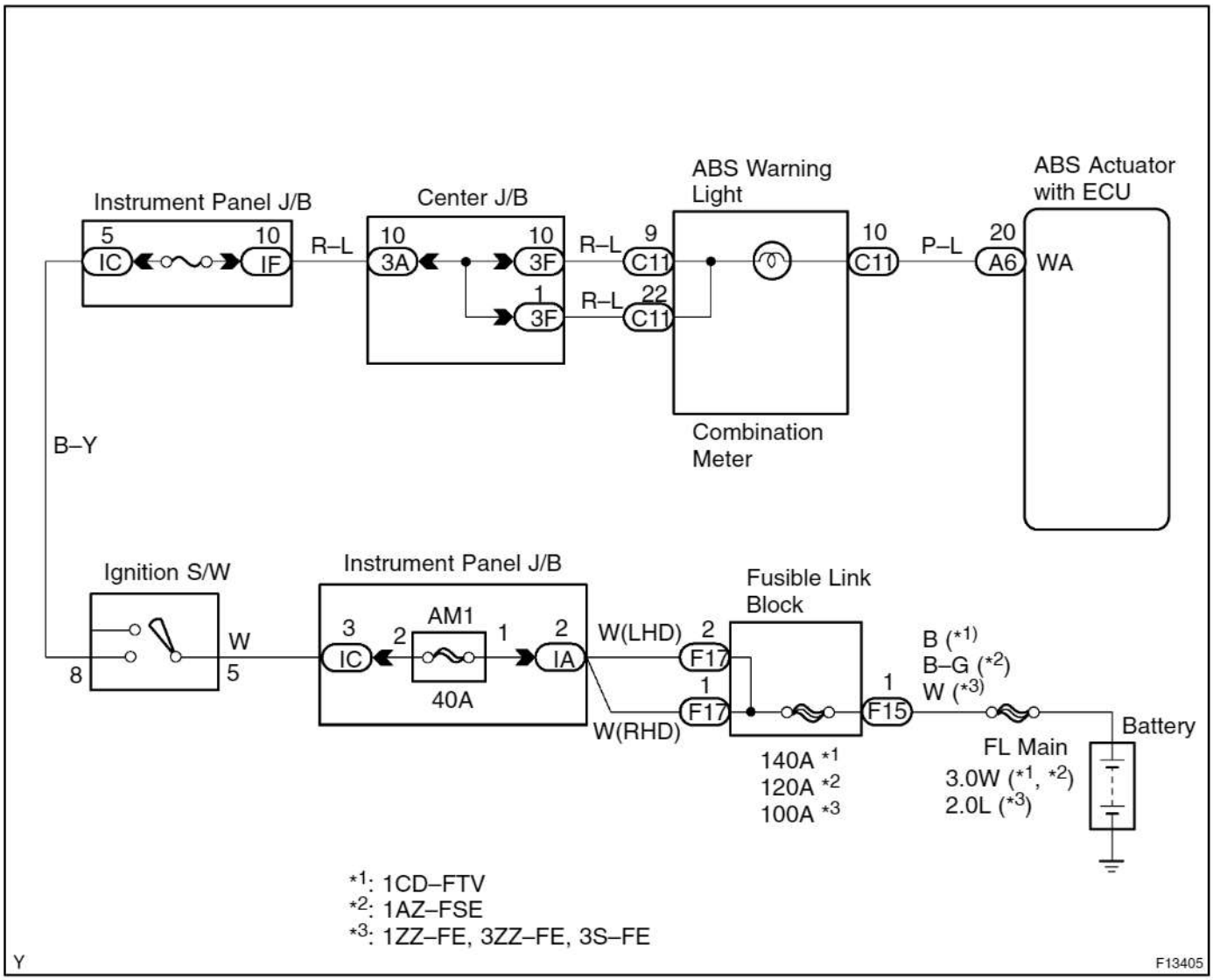
DI7Z6-01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connecting terminals Tc and CG of the DLC3 makes the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains ON	Go to step 2

1	**Check ABS warning light.**

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → **Repair bulb or combination meter assembly.**

OK

Check for open circuit in harness and connector between GAUGE fuse and ABS ECU (See page IN–30).

2	**Is DTC output?**

Check DTC on page DI–129.

YES → **Repair circuit indicated by the output code.**

NO

Check for short circuit in harness and connector between ABS warning light, DLC3 and ECU (See page IN–30).

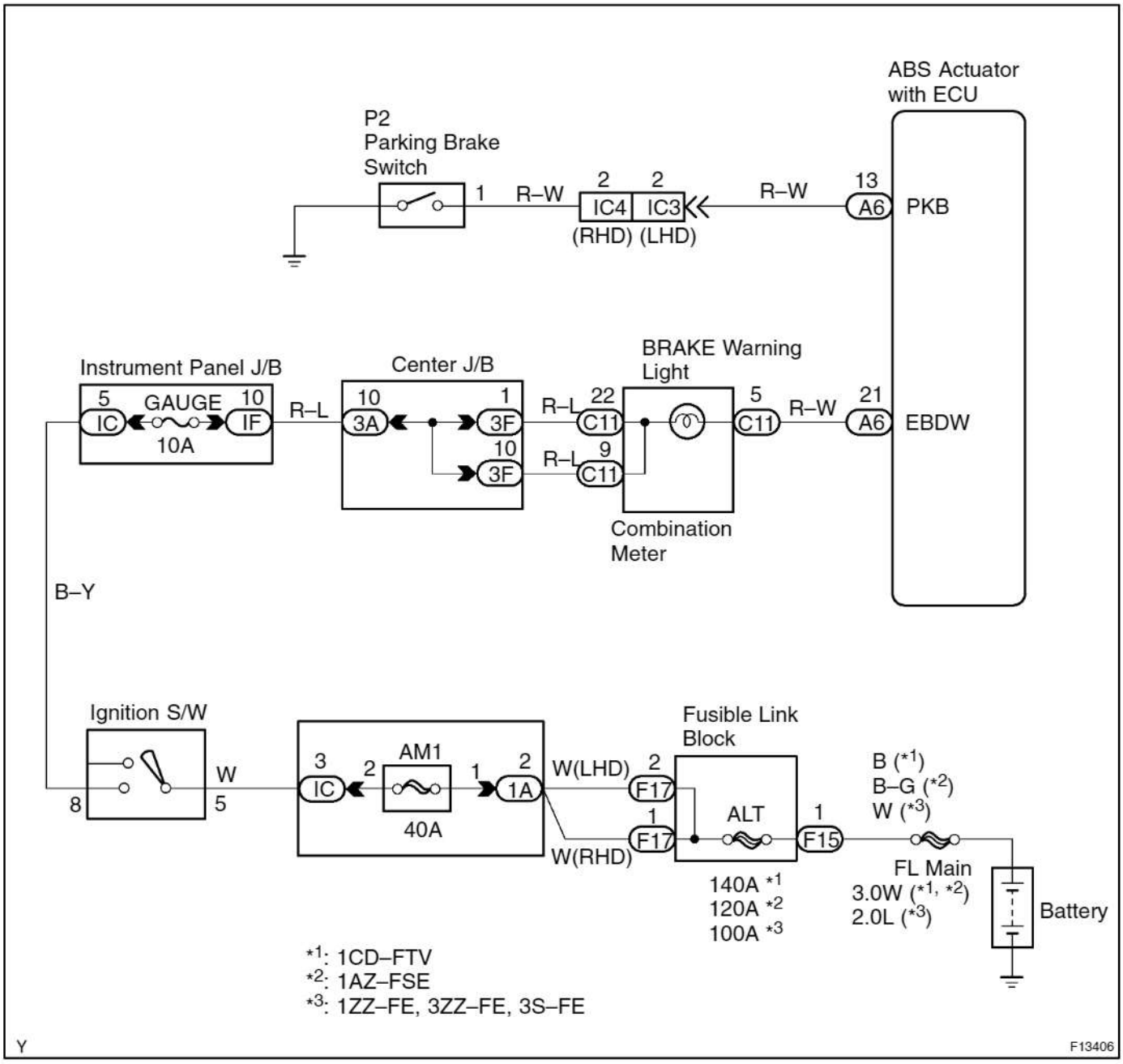
DI7ZF–01

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up when the brake fluid is insufficient, parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check parking brake switch circuit (See Pub. No. RM599E on page BE–45).

NG → Repair or replace parking brake switch circuit.

OK

2	Check brake fluid level warning switch circuit (See Pub. No. RM599E on page BE–45).

NG → Repair or replace brake fluid level warning switch circuit.

OK

3	Is DTC output for ABS ?

Yes → Repair circuit indicated by the output code.

No

4	Check brake warning light.

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → Repair or replace combination meter.

OK

5	Check for open or short circuit in harness and connector (See page IN–30).

NG → Repair or replace harness or connector.

OK →

Check and replace ABS ECU.

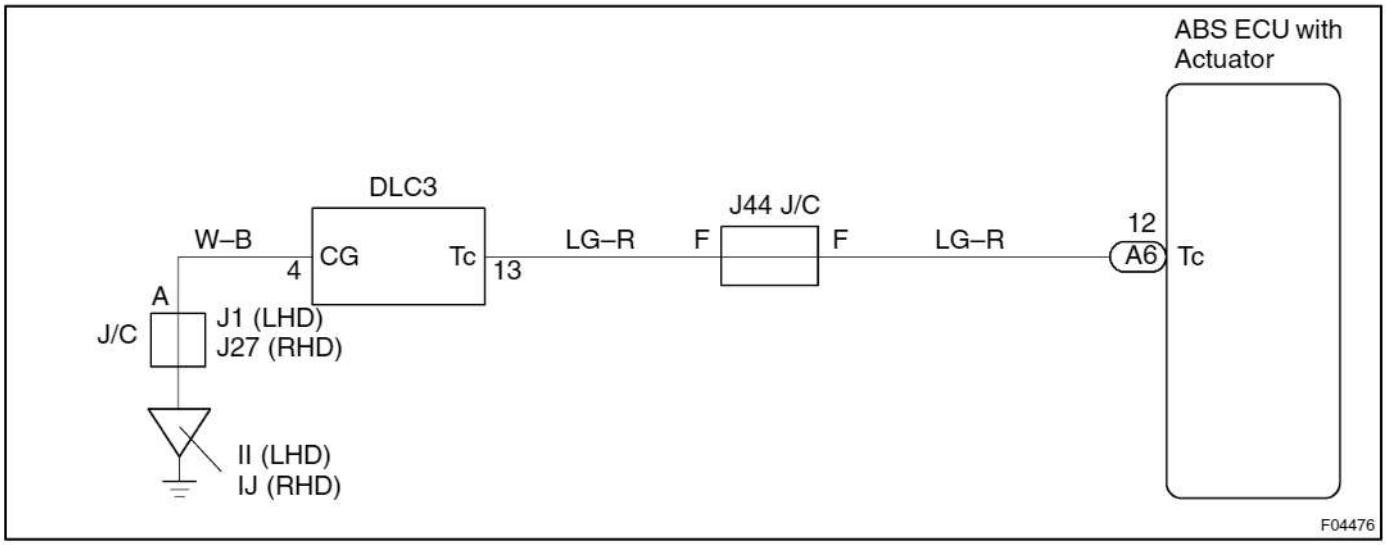
DI7Z8-01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

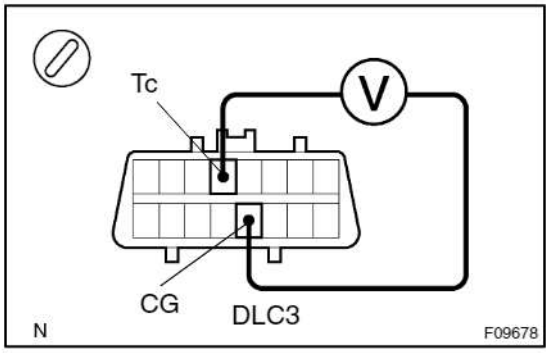
Connecting between terminals Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and CG of DLC3.

OK:

Voltage: 5.7 – 8.1 V

OK	**If ABS warning light does not blink even after Tc and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS ECU and DLC3, DLC3 and body ground (See page IN–30).**

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

OK

Check and replace ABS ECU.

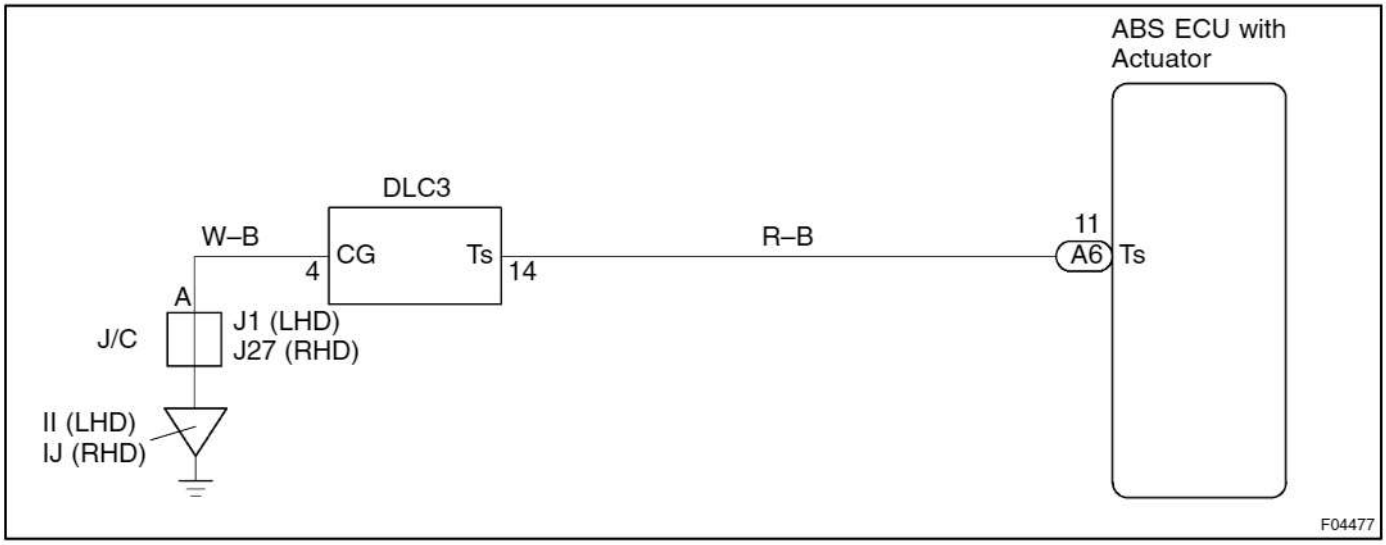
DI7Z9-01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

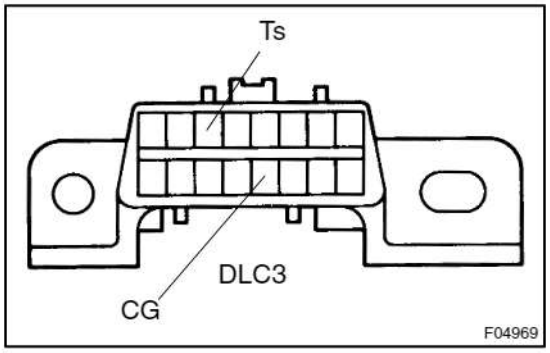
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and CG of the DLC3 on the lower finish panel starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals Ts and CG of DLC3.

OK:

Voltage: 5.7 – 8.1 V

OK → **If ABS warning light does not blink even after Ts and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS ECU and DLC3 and body ground (See page IN–30).**

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

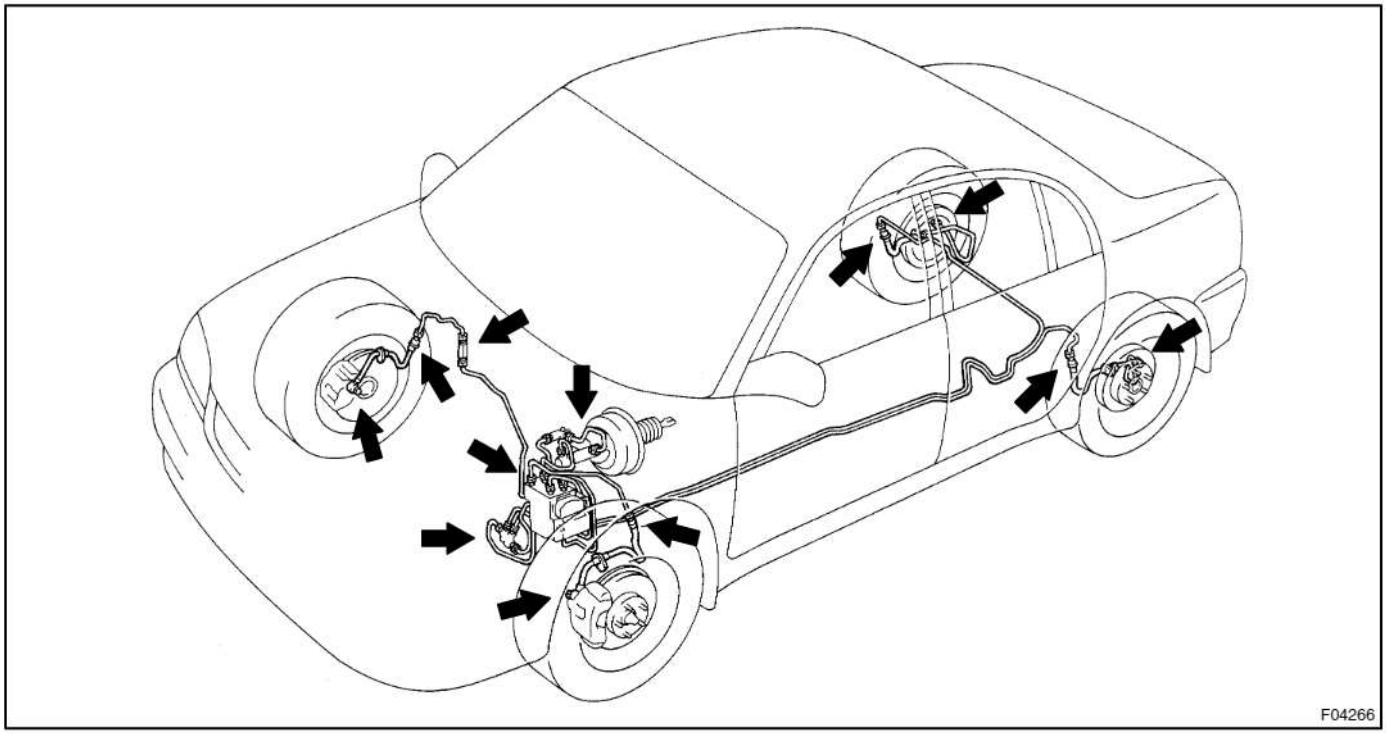
OK

Check and replace ABS ECU.

DI7ZA–01

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

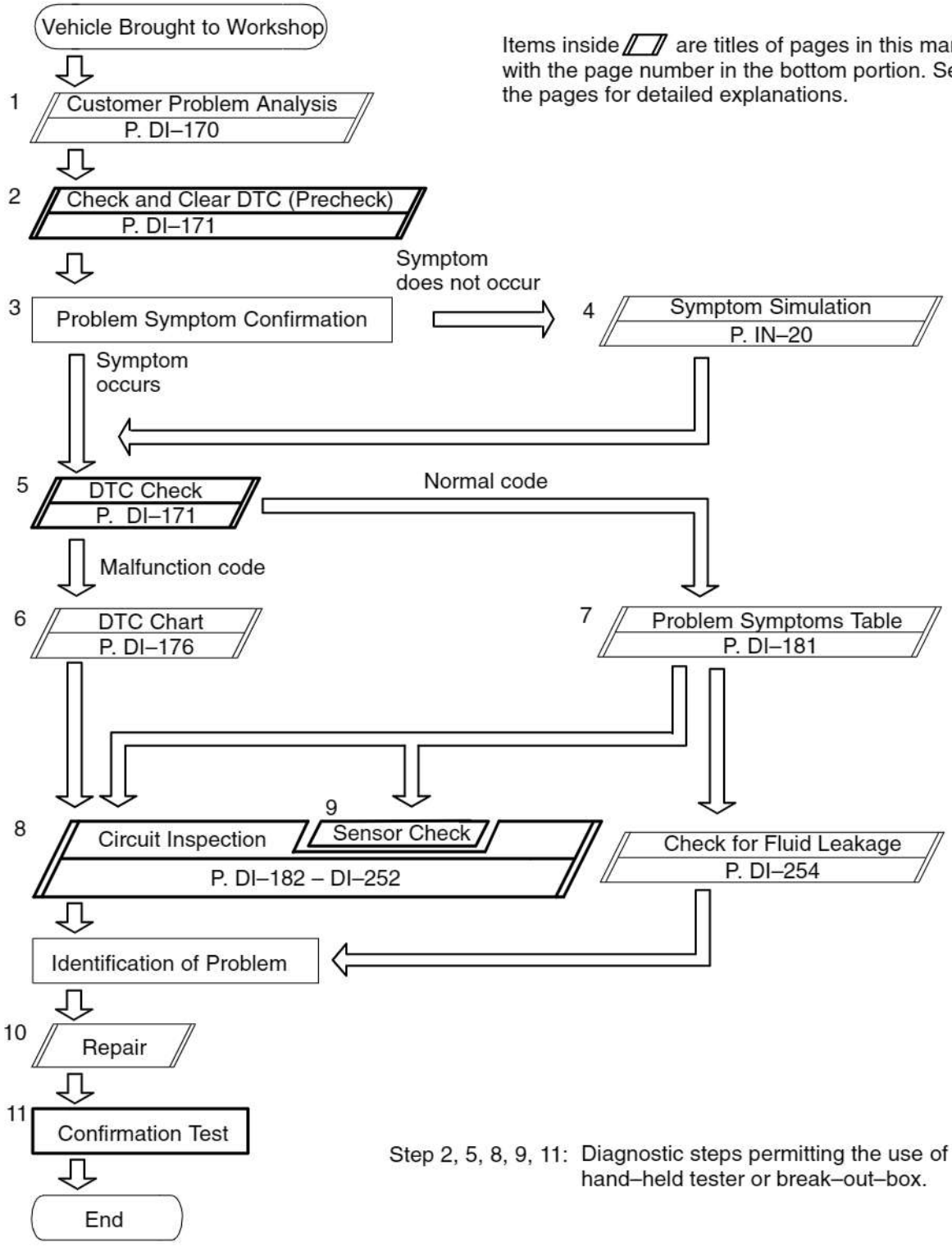


ABS WITH EBD & BA & TRC & VSC SYSTEM

DI7ZB–01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



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

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand–held tester or break–out–box.

Fail safe function:
When a failure occurs in the ABS & BA & TRC & VSC system, the respective warning light (ABS, VSC) is lit and the operation of ABS & BA & TRC & VSC is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.

DI7ZC-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA & TRC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Data	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

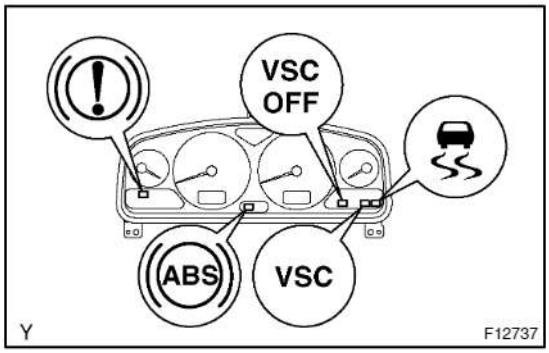
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRC does not operate.	
	☐ VSC does not operate. (Wheels spin when starting rapidly.)	
	☐ BA does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	VSC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	VSC Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**Malfunction Indicator Light**	☐ Normal ☐ Does not Light Up

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

DI7ZD-01



PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights.

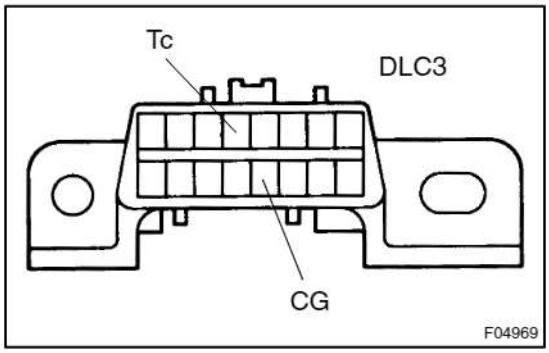
(1) Release the parking brake lever.

(2) When the ignition switch is turned ON, check that the ABS warning light, VSC warning light, VSC OFF indicator light, BRAKE warning light and SLIP indicator light goes on for approx. 2 seconds.

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC warning light circuit, VSC OFF indicator light circuit, BRAKE warning light circuit or SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	DI–231, DI–225
VSC warning light circuit	DI–233, DI–228
VSC OFF indicator light circuit	DI–243
BRAKE warning light circuit	DI–236
SLIP indicator light circuit	DI–240



(b) In case of not using hand–held tester:
Check the DTC of ABS & BA & TRC & VSC ECU.

(1) Using SST, connect terminals Tc and CG of DLC3.

SST 09843–18040

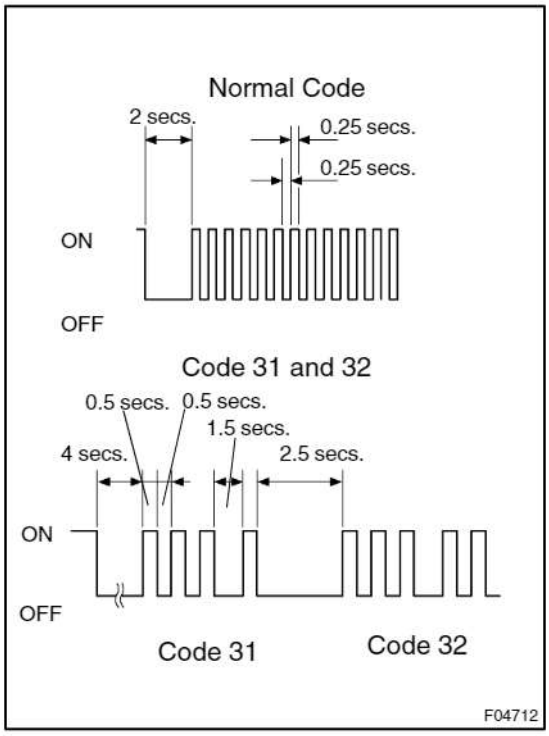
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.

HINT:

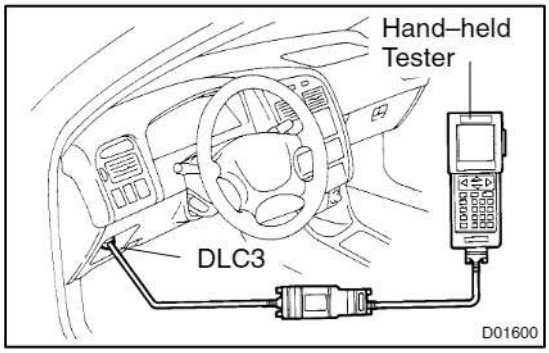
- If no code appears, inspect the diagnostic circuit, ABS warning light circuit or VSC waning light circuit.

Trouble Area	See page
Tc terminal circuit	DI–250
ABS warning light circuit	DI–231
VSC warning light circuit	DI–233



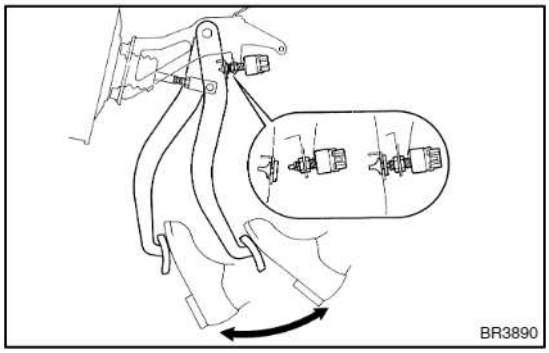
- As an example, the blinking patterns for normal code and code 31 and 32 are shown on the left.
  (4) Codes are explained in the code table on page DI–176.
  (5) After completing the check, disconnect terminals Tc and E_1, and turn OFF the display.

If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC will be displayed 1st.

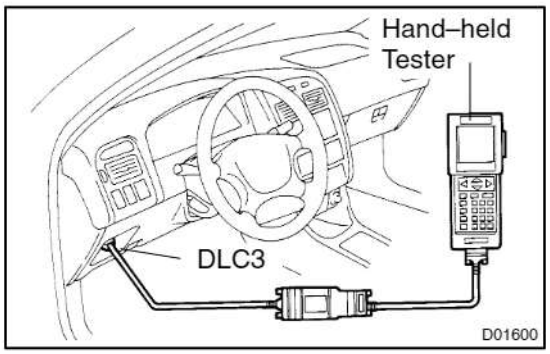


(c) In case of using hand–held tester :
Check the DTC.
(1) Hook up the hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

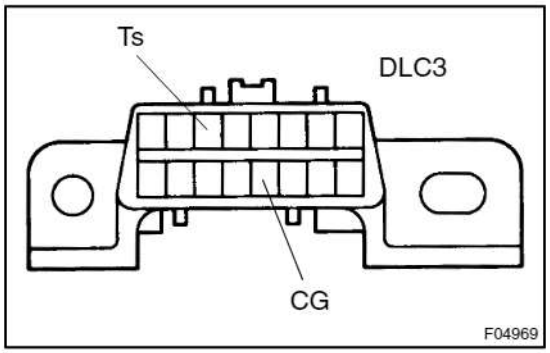
HINT:
Please refer to the hand–held tester operator's manual for further details.



(d) In case of not using hand–held tester:
Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of check connector.
SST 09843 – 18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC 3.
SST 09843 – 18040

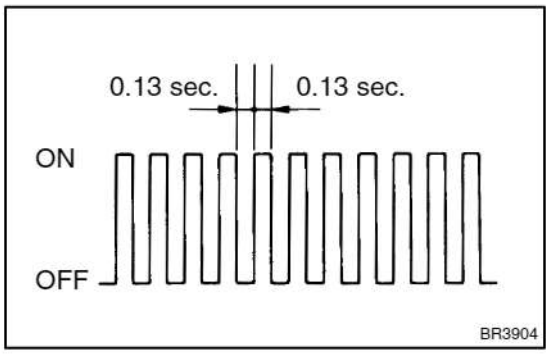


(e) In case of using hand–held tester:
Clear the DTC.
(1) Hook up the hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand–held tester to erase the codes. (See hand–held tester operator's manual.)



2. SPEED SENSOR SIGNAL CHECK (TEST MODE)

(a) In case of not using hand–held tester:
Check the sensor signal.
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040
(3) Start the engine.



(4) Check that the ABS warning light blinks.

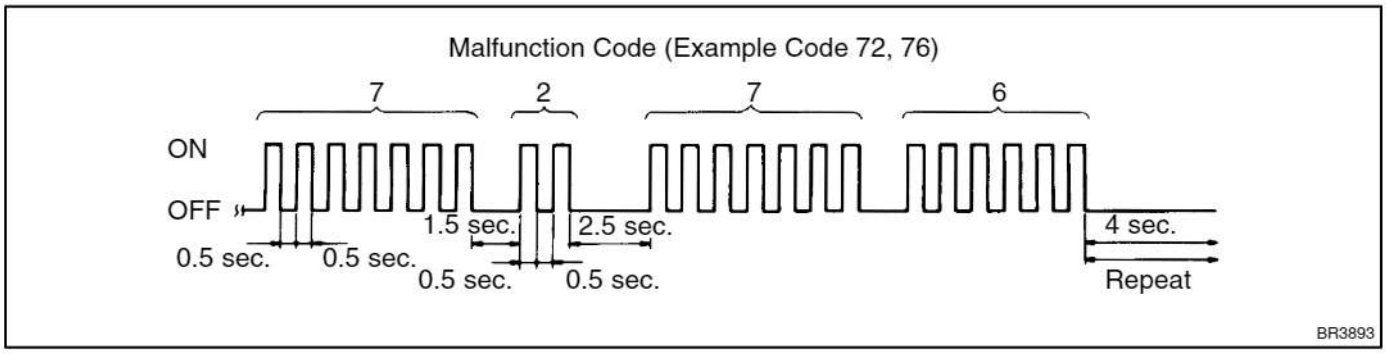
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI–231).

(5) Drive vehicle straight forward.
Drive vehicle at a speed faster than 45 km/h (28 mph) for several seconds.

HINT:
The sensor check may not be completed if the front wheels are spun or the steering wheel is steered during this check.

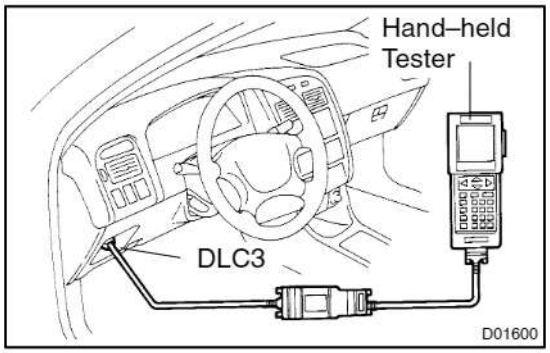
(6) Stop the vehicle.
(7) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(8) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC shown on the next page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunction codes are identified at the same time, the lowest numbered code will be displayed 1st.



(9) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3, and turn the ignition switch OFF.

SST 09843–18040



(b) In case of using hand–held tester:
Check the sensor signal.
(1) Hook up the hand–held tester to the DLC3.
(2) Do step (3) – (6) on the previous page and this page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Right front speed sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Left front speed sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Right rear speed sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Left rear speed sensor rotor
C1275 / 75	Abnormal change in output signal of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output signal of left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output signal of right rear speed sensor	Right rear speed sensor rotor
C1278 / 78	Abnormal change in output signal of left rear speed sensor	Left rear speed sensor rotor

3. STEERING ANGLE SENSOR ZERO POINT CALIBRATION

NOTICE:

When replacing the steering angle sensor with column assembly or ABS & BA & TRC & VSC ECU, Engine and ECT ECU (A/T), Engine ECU (M/T) or when adjusting the front wheel alignment or steering wheel center point in accordance with the removing and installing or replacing the suspension, axle or steering parts, make sure to perform steering angle sensor zero point calibration.

(a) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040

(b) Turn the ignition switch ON.

(c) Make sure the steering off center angle is less than ±3° when assembling of steering wheels (Smaller value is desirable).

(d) Press the VSC OFF switch and hold it.

HINT:

(e) Depress the brake pedal 3 times or more within 2 seconds.

(f) Check that the VSC buzzer sounds for 3 seconds.

HINT:

- Press and hold the VSC OFF switch until VSC buzzer sounds.
  When it starts sounding, turn off the switch.
- When the VSC buzzer starts sounding, turn off the VSC OFF switch.
- If the VSC buzzer sounds, the sensor calibration is in normal completion.
- If the VSC buzzer does not sound, do the sensor calibration again.
- If the VSC buzzer still will not sound, there is malfunction in the steering angle sensor, so check the DTC.

DI7ZE-01

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

- **When removing the part, turn the ignition switch OFF.**
- **When replacing the steering angle sensor or ECU, make sure to perform steering angle sensor zero point calibration.**

HINT:

- Using SST 09843–18040, connect the terminals Tc and CG of the DLC 3.
- If any abnormality is not found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, refer to the page under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS system:

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI–190)	Open or short circuit in ABS solenoid relay circuit	• ABS solenoid relay • ABS solenoid relay circuit
C0273 / 13 (DI–189)	Open or short circuit in ABS motor relay circuit	• ABS motor relay • ABS motor relay circuit
C0226 / 21 (DI–188)	Open or short circuit in brake actuator	• Brake actuator • SFRR or SFRH circuit
C0236 / 22 (DI–188)	Open or short circuit in brake actuator	• Brake actuator • SFLR or SFLH circuit
C0246 / 23 (DI–188)	Open or short circuit in brake actuator	• Brake actuator • SRRR or SRRH circuit
C0256 / 24 (DI–188)	Open or short circuit in brake actuator	• Brake actuator • SRLR or SRLH circuit
C0200 / 31 (DI–182)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear and left rear speed sensor • Each speed sensor circuit • Speed sensor rotor
C0205 / 32 (DI–182)	Left front wheel speed sensor signal malfunction	
C0210 / 33 (DI–182)	Right rear wheel speed sensor signal malfunction	
C0215 / 34 (DI–182)	Left rear wheel speed sensor signal malfunction	
C1330 / 35 (DI–182)	Open circuit in right front speed sensor circuit	• Right front speed sensor • Right front speed sensor circuit
C1331 / 36 (DI–182)	Open circuit in left front speed sensor circuit	• Left front speed sensor • Left front speed sensor circuit
C1237 / 37 (DI–206)	Front tires are different from rear in size.	• Tire size • Speed sensor rotor
C1332 / 38 (DI–182)	Open circuit in right rear speed sensor circuit	• Right rear speed sensor • Right rear speed sensor circuit
C1333 / 39 (DI–182)	Open circuit in left rear speed sensor circuit	• Left rear speed sensor • Left rear speed sensor circuit
C1241 / 41 (DI–208)	Low battery positive voltage or abnormally high battery positive voltage	• Battery • Charging system • Power source circuit
C1249 / 58 (DI–215)	Open circuit in stop light switch circuit	• Stop light switch • Stop light switch circuit

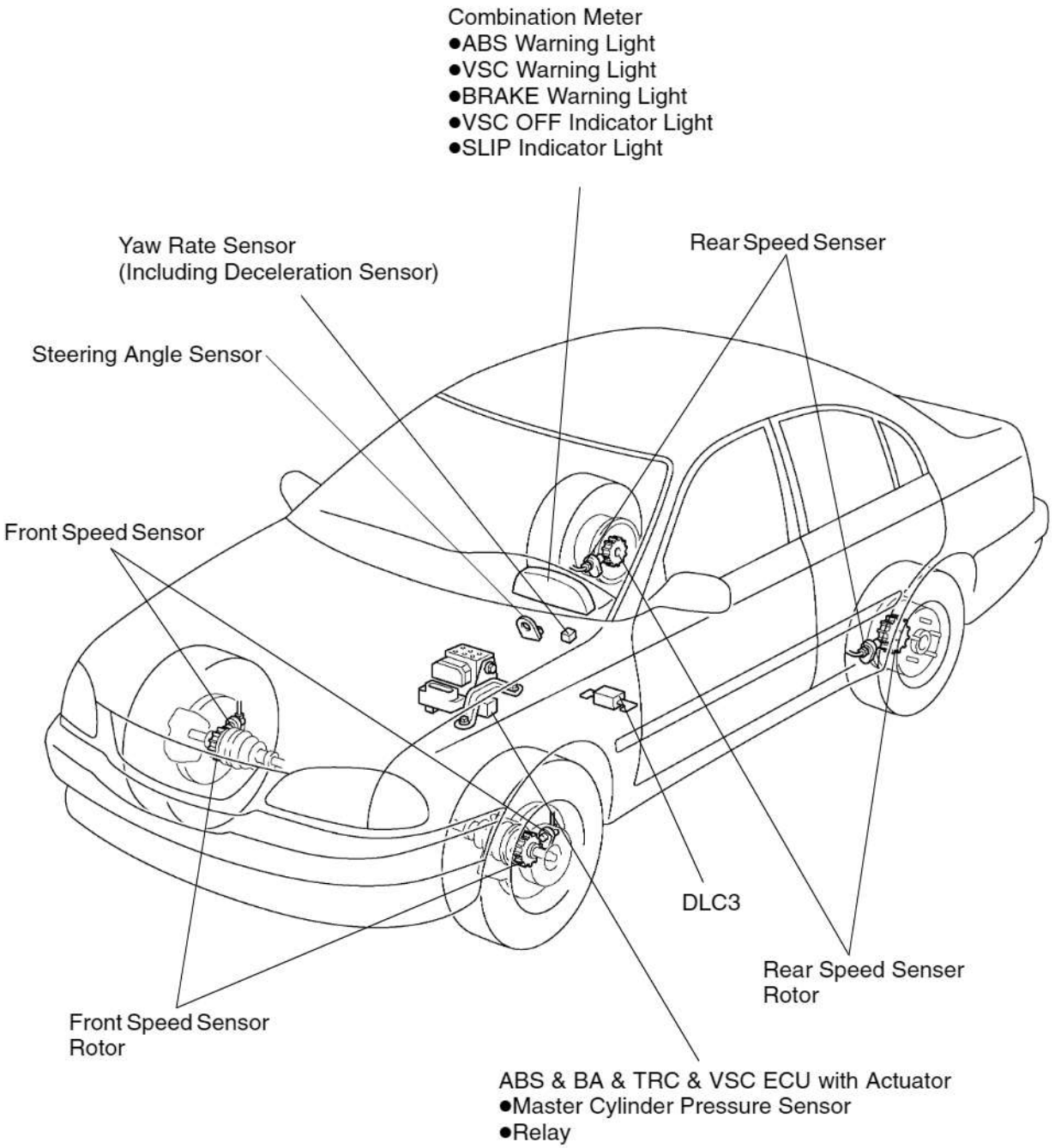
C1300 / 62 (DI–220)	Malfunction in ABS & BA & TRC & VSC ECU	ABS & BA & TRC & VSC ECU
Always ON (DI–225)	Malfunction in ABS & BA & TRC & VSC ECU Open circuit in ABS warning light circuit	• Charging system • ABS warning light circuit

DTC chart of VSC system:

DTC No. (See Page)	Detection Item	Trouble Area
C1225 / 25 (DI–188)	Open or short circuit in brake actuator solenoid circuit (SMC1 circuit)	• Brake actuator • SMC1 circuit
C1226 / 26 (DI–188)	Open or short circuit in brake actuator solenoid circuit (SMC2 circuit)	• Brake actuator • SMC2 circuit
C1227 / 27 (DI–188)	Open or short circuit in brake actuator solenoid circuit (SRC1 circuit)	• Brake actuator • SRC1 circuit
C1228 / 28 (DI–188)	Open or short circuit in brake actuator solenoid circuit (SRC2 circuit)	• Brake actuator • SRC2 circuit
C1301 / 42 (DI–222)	Malfunction in CAN communication (steering angle circuit, yaw rate sensor circuit)	• Steering angle sensor circuit • Yaw rate sensor circuit • ABS & BA & TRC & VSC ECU
C0365 / 43 (DI–191)	Malfunction in deceleration sensor (combined in yaw rate sensor)	• Deceleration sensor • Deceleration sensor circuit
C1202 / 44 (DI–197)	Open or short circuit in NE signal circuit	• NEO circuit • Engine and ECT ECU (A/T) or Engine ECU (M/T) • ABS & BA & TRC & VSC ECU
C1350 / 51 (DI–221)	Pump motor is locked Open circuit in pump motor ground	• Brake actuator pump motor • Brake actuator pump motor circuit
C1246 / 53 (DI–212)	Malfunction in master cylinder pressure sensor	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1208 / 54 (DI–202)	Malfunction in steering angle sensor	• Steering angle sensor • Steering angle sensor circuit
C0371 / 55 (DI–194)	Malfunction in yaw rate sensor circuit	• Yaw rate sensor • Yaw rate sensor circuit
Always ON (DI–228)	Malfunction in ABS & BA & TRC & VSC ECU Open circuit in VSC warning light circuit	• Charging system • VSC warning light circuit
C1203 / 59 (DI–200)	Malfunction in ENGINE and ECT ECU (A/T) or ENGINE ECU (M/T) and ABS & BA & TRC & VSC ECU circuit	• ENGINE and ECT ECU (A/T) or ENGINE ECU (M/T) • ABS & BA & TRC & VSC ECU • Serial communication circuit
C1288 / 88 (DI–219)	Malfunction in ENGINE and ECT ECU (A/T) or ENGINE ECU (M/T) version	• ABS & BA & TRC & VSC ECU • Steering angle sensor zero point calibration

DI7ZF–01

PARTS LOCATION



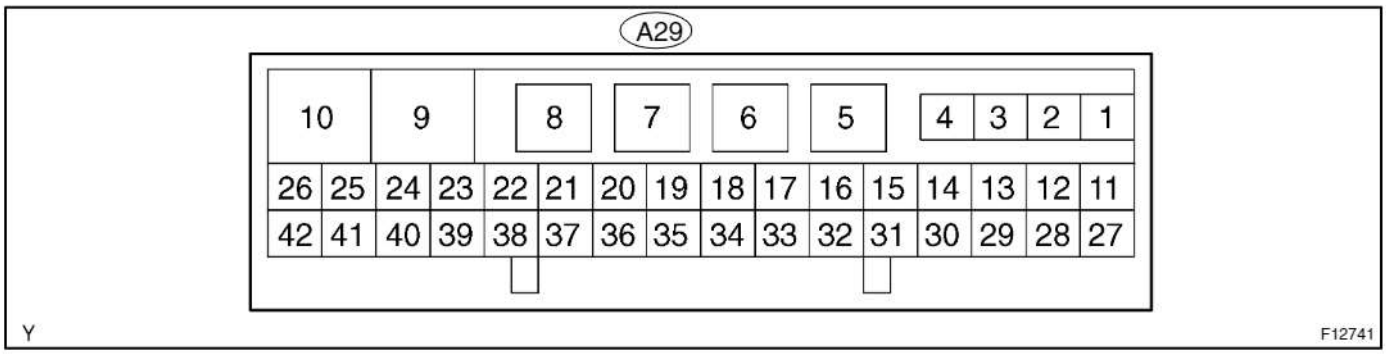
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DI7ZG-01

TERMINALS OF ECU

ABS & BA & TRC & VSC ECU:



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
WT (A29 – 2) – GND (A29 – 6, 10)	O ↔ W–B	IG switch ON, VSC OFF indicator light ON	Below 2.0
		IG switch ON, VSC OFF indicator light OFF	10 – 14
IND (A29 – 4) – GND (A29 – 6, 10)	L ↔ W–B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 – 14
+BS (A29 – 5) – GND (A29 – 6, 10)	B ↔ W–B		10 – 14
ENG+ (A29 – 8) – ENG– (A29 – 7)	R ↔ L	Engine idling	Pulse generation
+BM (A29 – 9) – GND (A29 – 6, 10)	B ↔ W–B		10 – 14
PMC (A29 – 11) – GND (A29 – 6, 10)	LG ↔ W–B	IG switch ON, brake pedal released	0.3 – 0.8
E2 (A29 – 12) – GND (A29 – 6, 10)	BR ↔ W–B	IG switch OFF	continuity
SS1 (A29 – 13) – GND (A29 – 6, 10)	W ↔ W–B	IG switch ON	Pulse generation
IG1 (A29 – 14) – GND (A29 – 6, 10)	B–R ↔ W–B	IG switch ON	10–14
BZ (A29 – 15) – GND (A29 – 6, 10)	G ↔ W–B	IG switch ON, VSC buzzer sounds	Below 1.0 ↔ 10–14
		IG switch ON, VSC buzzer does not sound	10–14
YGND (A29 – 16) – YIGA (A29 – 30)	BR–W ↔ LG–R	Engine idling, slowly turn steering wheel	Pulse generation
TC (A29 – 17) – GND (A29 – 6, 10)	LG–R ↔ W–B	IG switch ON	10 – 14
TRC+ (A29 – 18) – TRC– (A29 – 19)	Y ↔ B	Engine idling	Pulse generation
EBDW (A29 – 20) – GND (A29 – 6, 10)	R–W ↔ W–B	IG switch ON, BRAKE warning light ON	Below 1.5
		IG switch ON, BRAKE warning light OFF	10 – 14
FR+ (A29 – 21) – FR– (A29 – 22)	W–R *1 ↔ B	IG switch ON, slowly turn right front wheel	AC generation
	W *2 ↔ B		
RL+ (A29 – 23) – RL– (A29 – 40)	Y ↔ BR	IG switch ON, slowly turn left rear wheel	AC generation
D/G (A29 – 26) – GND (A29 – 6, 10)	LG–R ↔ W–B	IG switch ON	10 – 14
VCM (A29 – 27) – GND (A29 – 6, 10)	L–Y ↔ W–B	IG switch ON	4.5 – 5.5
TS (A29 – 28) – GND (A29 – 6, 10)	R–B ↔ W–B	IG switch ON	10 – 14
SS2 (A29 – 29) – GND (A29 – 6, 10)	B ↔ W–B	IG switch ON	Pulse generation
PKB (A29 – 31) – GND (A29 – 6, 10)	R–W ↔ W–B	IG switch ON, parking brake switch ON	Below 2.0
		IG switch ON, parking brake switch OFF	10 – 14
NEO (A29 – 32) – GND (A29 – 6, 10)	P ↔ W–B	Engine idling	Pulse generation
VSCW (A29 – 34) – GND (A29 – 6, 10)	R ↔ W–B	IG switch ON, VSC warning light ON	Below 2.0
		IG switch ON, VSC warning light OFF	10 – 14

*1: LHD
*2: RHD

WA (A29 – 35) – GND (A29 – 6, 10)	P–L ↔ W–B	IG switch ON, ABS warning light ON	10 – 14
		IG switch ON, ABS warning light OFF	Below 2.0
SP1 (A29 – 36)*3 – GND (A29 – 6, 10)	L ↔ W–B	Vehicle driving at about 20 km/h (12 mph)	Pulse generation
STP (A29 – 37) – GND (A29 – 6, 10)	G–W ↔ W–B	Stop light switch ON (Brake pedal pushed)	8 – 14
		Stop light switch OFF (Brake pedal released)	Below 1.5
RR+ (A29 – 38) – RR– (A29 – 39)	P ↔ L–R*1	IG switch ON, slowly turn right rear wheel	AC generation
	P ↔ L*2		
FL+ (A29 – 41) – FL– (A29 – 24)	R ↔ L–W	IG switch ON, slowly turn left front wheel	AC generation
CSW (A29 – 42) – GND (A29 – 6, 10)	G–W*1 ↔ W–B	IG switch ON, VSC OFF switch pushed in	Below 1.5
	G–R*2 ↔ W–B	IG switch ON, VSC OFF switch released	8–14

*1: LHD
*2: RHD
*3: A/T vehicle only

DI7ZH-01

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing ABS & BA & TRC & VSC ECU, sensor, etc., turn the IG switch OFF.

Symptom	Suspect Area	See page
ABS does not operate	Only when 1. – 4. are all normal and the problem is still occurring, replace the ABS & BA & TRC & VSC ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the brake actuator with a hand–held tester. If abnormal, check the hydraulic circuit for leakage.	 DI–171 DI–208 DI–182 DI–182
ABS does not operate efficiently	Only when 1. – 4. are all normal and the problem is still occurring, replace the ABS & BA & TRC & VSC ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the brake actuator with a hand–held tester. If abnormal, check the hydraulic circuit for leakage.	 DI–171 DI–182 DI–215 DI–215
ABS warning light abnormal	1. ABS warning light circuit 2. ABS & BA & TRC & VSC ECU	DI–231
DTC check cannot be done	Only when 1. – 3. are all normal and the problem is still occurring, replace the ABS & BA & TRC & VSC ECU. 1. ABS warning light circuit 2. VSC warning light circuit 3. Tc terminal circuit	 DI–231 DI–233 DI–250
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. ABS & BA & TRC & VSC ECU	DI–252
VSC does not operate	Only when circuits inspected for each problem symptom are all normal and the problem is still occurring, replace the ABS & BA & TRC & VSC ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Hydraulic circuit for leakage 4. Speed sensor circuit	 DI–171 DI–208 DI–254 DI–182
BA does not operate	Stop light switch circuit	DI–215
SLIP indicator light abnormal	SLIP indicator light circuit	DI–240
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. ABS & BA & TRC & VSC ECU	DI–236
VSC OFF indicator light abnormal	Only when circuits inspected for each problem symptom are all normal and the problem is still occurring, replace the ABS & BA & TRC & VSC ECU. 1. VSC OFF indicator light circuit 2. VSC OFF switch circuit	 DI–243 DI–243

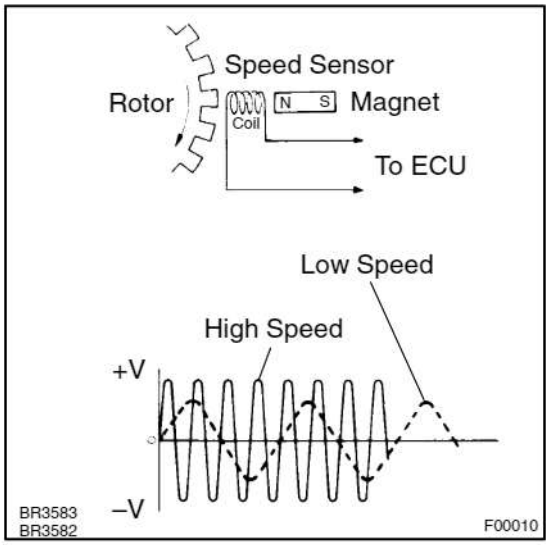
DI7ZI-01

CIRCUIT INSPECTION

DTC	C0200 / 31 – C1331 / 36	Speed Sensor Circuit

DTC	C1332 / 38, C1333 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects a wheel speed and sends the appropriate signals to the ECU. These signals are used to control of the ABS and VSC system. Each of the front and rear rotors has 48 serrations.

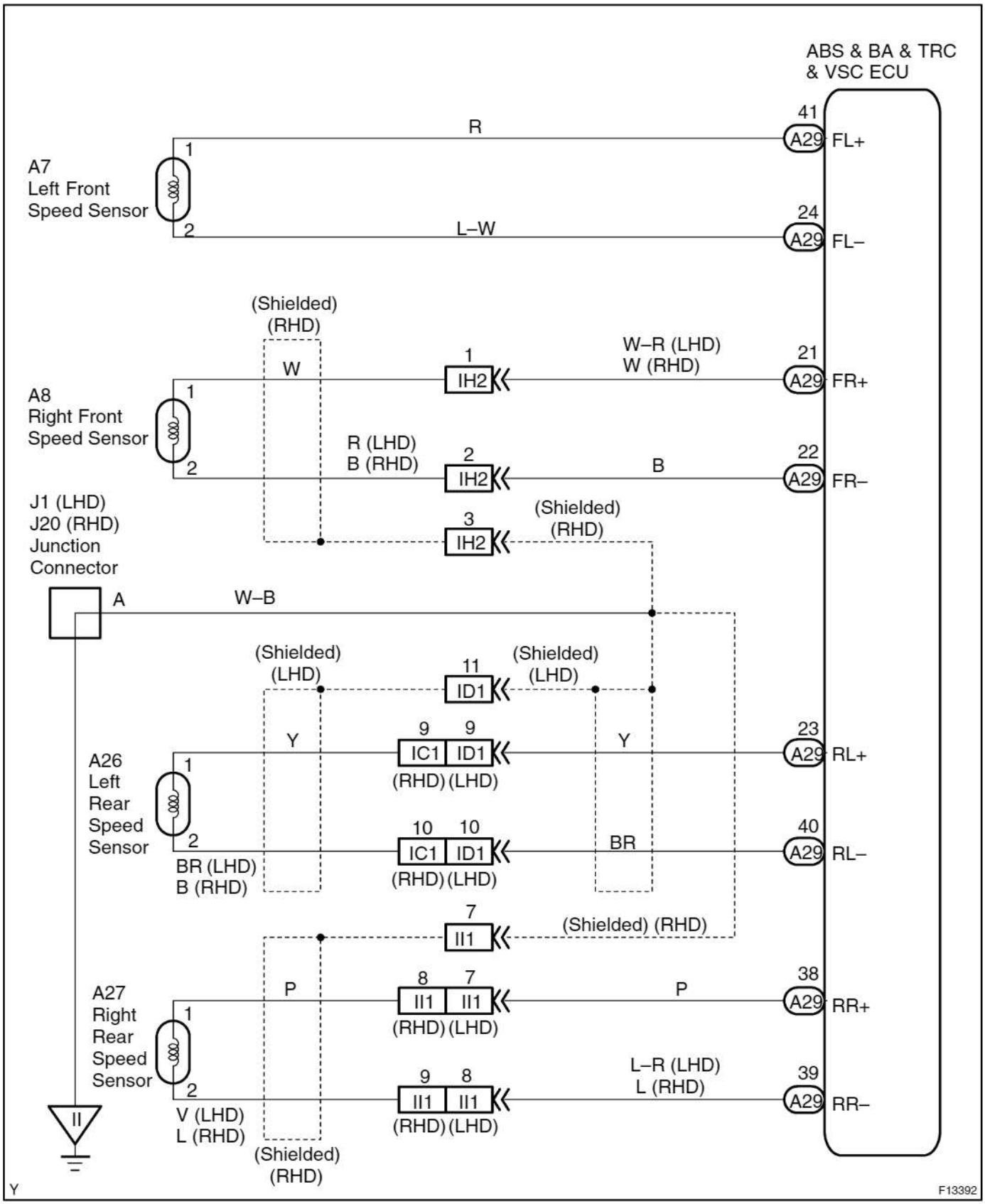
When the rotors rotate, a magnetic field emitted by a permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	When any of the following 1. to 3. is detected : 1. Vehicle speed is more than 40 km/h (25 mph), pulses are not input for 0.01 sec. 2. After the initial start or restart and when the vehicle speed has reached 12 km/h (7 mph), the wheel speed of 0 km/h (0 mph) is detected. 3. After the initial start or restart and when the vehicle speed has reached 18 km/h (11 mph), the front wheel speed of 0 km/h (0 mph) is detected.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Sensor installation • Tire size
C1330 / 35 C1331 / 36 C1332 / 38 C1333 / 39	Detecting abnormality in the resistance value of each speed sensor.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit

HINT:

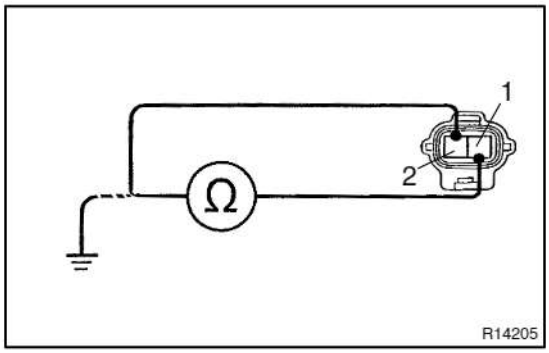
- DTC No. C0200 / 31 and C1330 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1331 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1332 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1333 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front:

PREPARATION:

(a) Remove the front fender liner.

(b) Disconnect the speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of speed sensor connector.

OK:

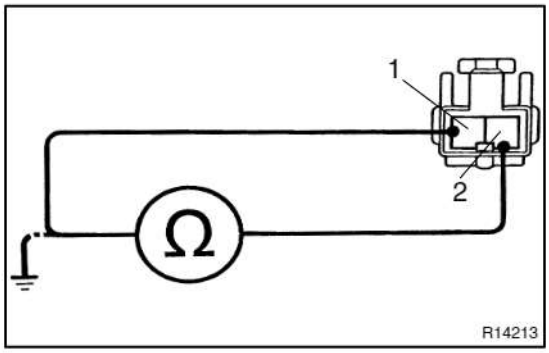
Resistance: 0.6 – 2.5 kΩ (1.6 ± 0.2 kΩ at 20 °C)

CHECK:

Measure the resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the seat cushion and seatback.

(b) Disconnect the speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ (1.6 ± 0.1 kΩ at 20 °C)

CHECK:

Measure the resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–171).

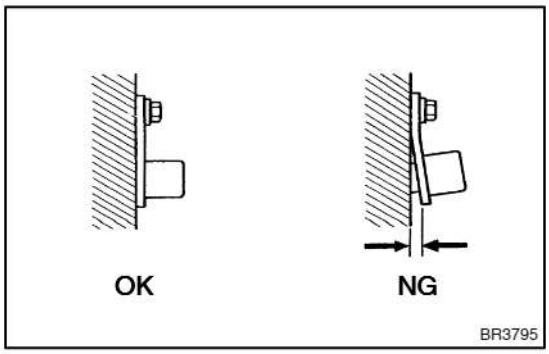
OK

2	**Check for open and short circuit in harness and connector between each speed sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

3	**Check speed sensor installation.**



CHECK:
Check the speed sensor installation.
OK:

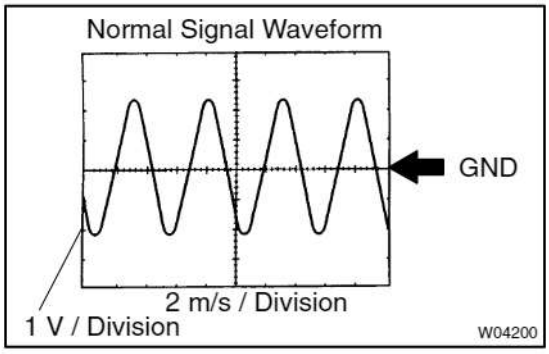
The installation bolt shall be tightened properly and no clearance is allowed between the sensor and front steering knuckle or rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI–171).

OK

4	Check speed sensor and sensor rotor serrations.



REFERENCE: INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Disconnect the connector from the ABS & BA & TRC & VSC ECU.

(b) Connect the oscilloscope to the terminals FR+, FL+, RR+ or RL+ and GND of the ECU harness side connector.

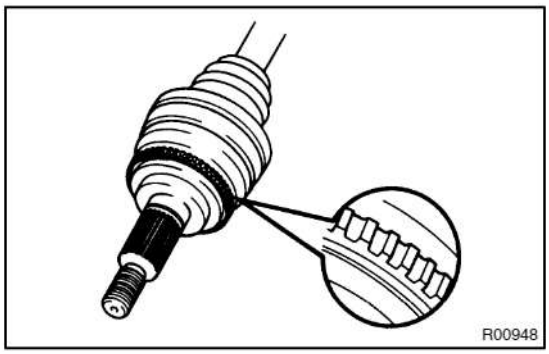
CHECK:

Drive the vehicle at about 30 km/h (19 mph), and check the signal waveform.

OK	Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

NG

5	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front drive shaft (See page SA–3).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

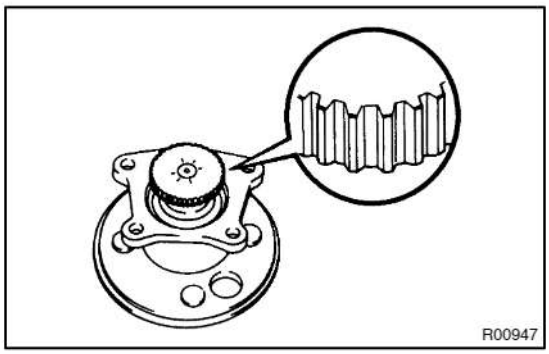
Remove the front speed sensor (See Pub. No. RM599E on page BR–41).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.



Rear:

PREPARATION:

Remove the axle hub (See Pub. No. RM599E on page SA–10).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See Pub. No. RM599E on page BR–44).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG → **Replace sensor rotor or speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–171).

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZJ-01

DTC	C0226 / 21 – C1228 / 28	Brake Actuator Solenoid Circuit

CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	1. Solenoid signal does not match the check result. 2. Solenoid open & short.	• Brake actuator • SFRR or SFRH circuit
C0236 / 22	Solenoid signal does not match the check result.	• Brake actuator • SFLR or SFLH circuit
C0246 / 23		• Brake actuator • SRRR or SRRH circuit
C0256 / 24		• Brake actuator • SRLR or SRLH circuit
C1225 / 25		• Brake actuator • SMC 1 circuit
C1226 / 26		• Brake actuator • SMC 2 circuit
C1227 / 27		• Brake actuator • SRC 1 circuit
C1228 / 28		• Brake actuator • SRC 2 circuit

INSPECTION PROCEDURE

1	Check the DTC once more.

PREPARATION:

(a) Clear the DTC (See page DI–171).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch ON, and check if the same DTC is stored in the memory.

NO → **No problem.**

YES

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZK-01

DTC	C0273 / 13	ABS Motor Relay Circuit

CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. When the ABS is activated, the ECU switches the ABS motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following 1. through 2. is detected: 1. Pump motor voltage is high, and the motor relay will not actuate . 2. Pump motor voltage remains low for longer 0.4 sec. or more and the pump repeats activating for 0.7 sec. 3 times maximally. After the last activation, the pump motor is deactivated gone dead because of short circuit.	• ABS motor relay • ABS motor relay circuit

INSPECTION PROCEDURE

1	**Check the DTC once more.**

PREPARATION:

(a) Clear the DTC (See page DI–171).
(b) Turn the ignition switch OFF.
(c) Turn the ignition switch ON.

CHECK:

Vehicle speed is more than 6 km/h (4 mph), and check if the same DTC is stored in the memory.

NO → **No problem.**

YES

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZL-01

DTC	C0278 / 11	ABS Solenoid Relay Circuit

CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Detection of any conditions from 1. through 2.: 1. 3 or more solenoids are show faulty in response and simultaneously solenoid supply voltage is detected faulty. 2. Solenoid relay will not be switched OFF.	• ABS solenoid relay • ABS solenoid relay circuit

INSPECTION PROCEDURE

1	**Check the DTC once more.**

PREPARATION:

(a) Clear the DTC (See page DI–171).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch ON, and check if the same DTC is stored in the memory.

NO → **No problem.**

YES

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZM-01

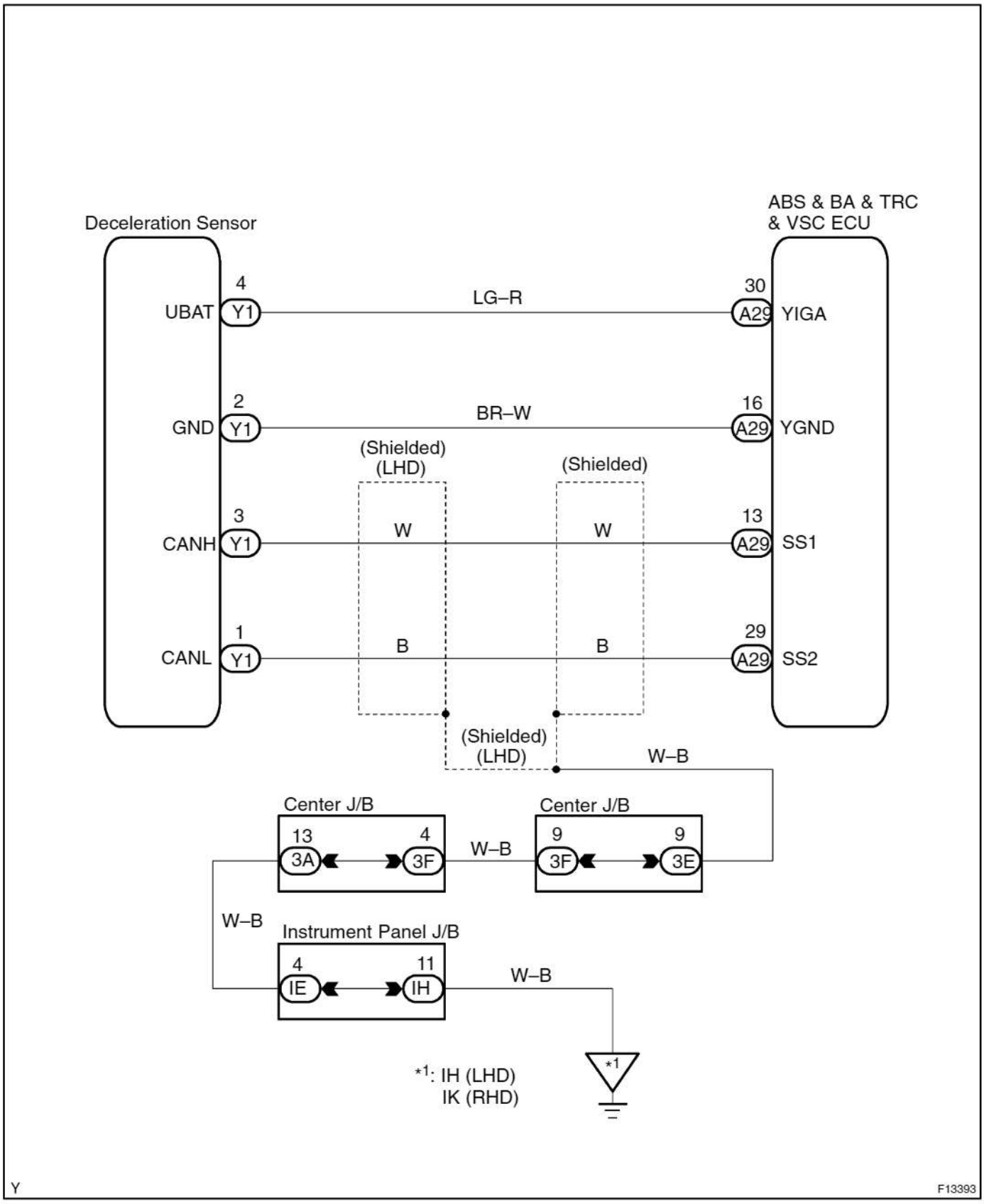
DTC	C0365 / 43	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

Deceleration sensor is combined with yaw rate sensor.

DTC No.	DTC Detecting Condition	Trouble Area
C0365 / 43	Detection of any of conditions from 1. through 2.: 1. Deceleration difference between sensor signal and reference value is large. 2. Offset value of sensor signal is higher than the standard value.	• Deceleration sensor • Deceleration sensor circuit • ABS & BA & TRC & VSC ECU

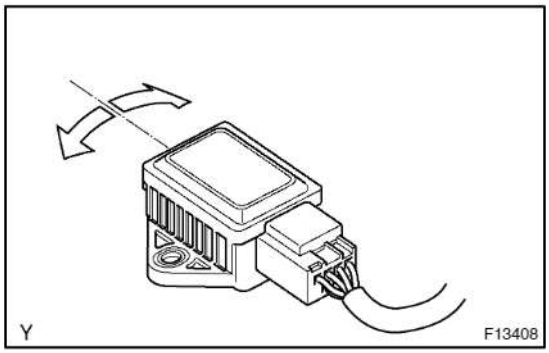
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check output value of the deceleration sensor.**



PREPARATION:

(a) Remove the 2 bolts and deceleration sensor with connector still connected.
(b) Connect the hand–held tester to the DLC3
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
(d) Select the DATALIST mode on the hand–held tester.
(e) Check the deceleration value 0 ± 0.23 G.

CHECK:

Check that the yaw rate value of the deceleration sensor displayed on the hand–held tester is changing: Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Deceleration value must be changing.

OK	**Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

2	**Check for open and short circuit in harness and connector between deceleration sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

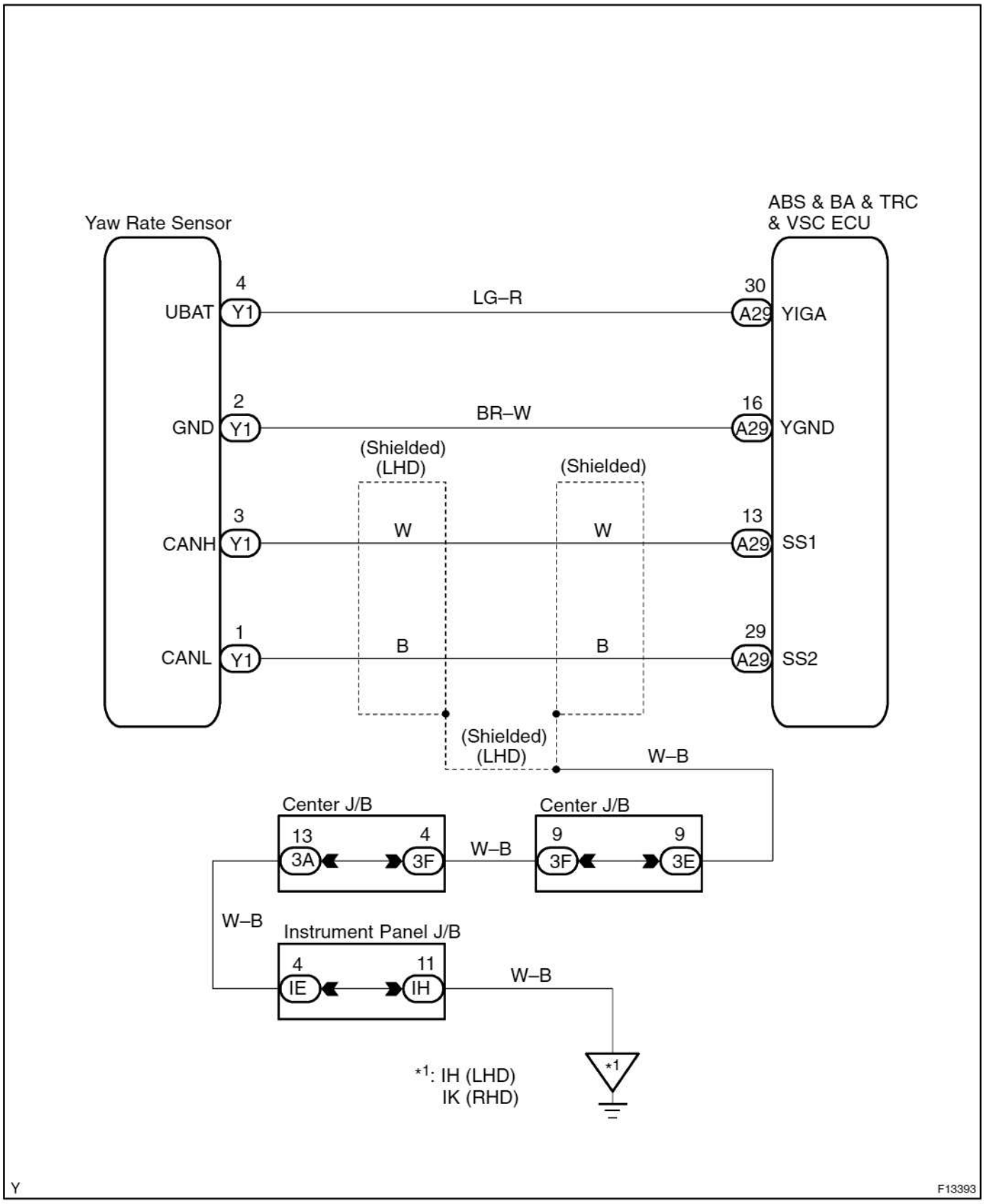
DI7ZN–01

DTC	C0371 / 55	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C0371 / 55	Detection of any of conditions from 1. through 4.: 1. The voltage of sensor signal is out of range. 2. The offset value of sensor signal is outside the plausible range. 3. Sensor signal change rapidly under normal driving. 4. Sensor is more or worse sensitivity than reference yaw rate during cornering.	• Yaw rate sensor • Yaw rate sensor circuit • ABS & BA & TRC & VSC ECU

WIRING DIAGRAM

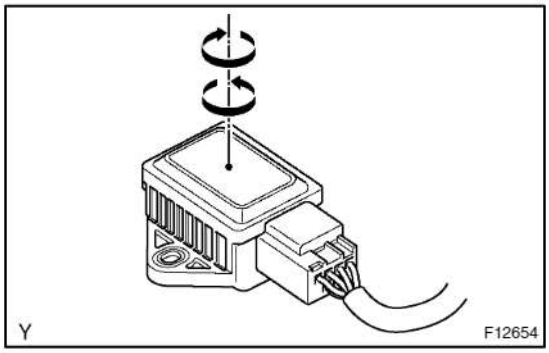


INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check output value of the yaw rate sensor.**



PREPARATION:

(a) Remove the 2 bolts and yaw rate sensor with connector still connected.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
(d) Select the DATALIST mode on the hand–held tester.
(e) Check the yaw rate value 0 ± 5 deg/s.

CHECK:

Check that the yaw rate value of the yaw rate sensor displayed on the hand–held tester is changing: Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Yaw rate value must be changing.

OK	**Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

2	**Check for open and short circuit in harness and connector between yaw rate sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZO-01

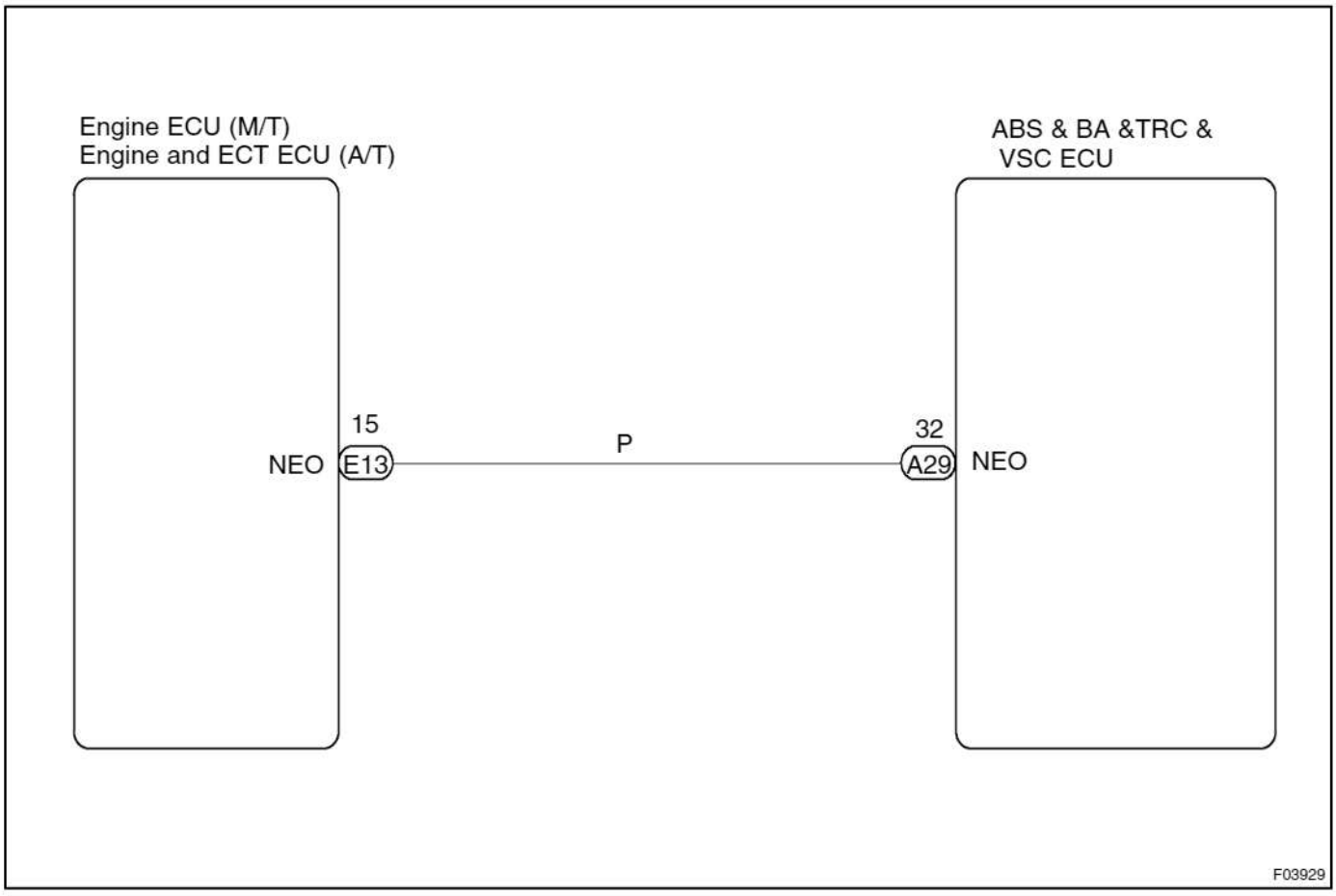
DTC	C1202 / 44	NE Signal Circuit

CIRCUIT DESCRIPTION

The ABS & BA & TRC & VSC ECU receives engine revolution speed signals (NE signals) from the Engine and ECT ECU (A/T) or Engine ECU (M/T).

DTC No.	DTC Detecting Condition	Trouble Area
C1202 / 44	At vehicle speed of 30 km/h (19 mph) or more, and when data received from the Engine and ECT ECU (A/T) or Engine ECU (M/T) is in normal condition, and open or short circuit for engine revolution signal circuit continues for 5 secs. or more.	• NEO circuit • Engine and ECT ECU (A/T) or Engine ECU (M/T) • ABS & TRC & VSC ECU

WIRING DIAGRAM



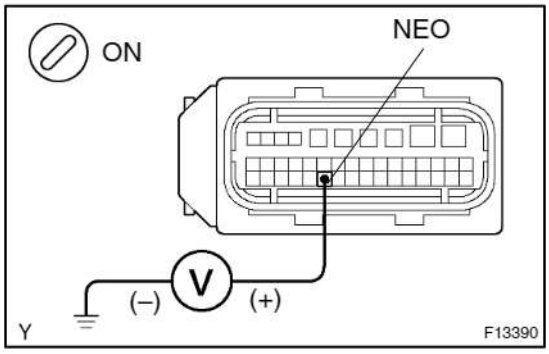
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminal NEO of ABS & BA & TRC & VSC ECU and terminal NEO of Engine and ECT ECU (A/T) or Engine ECU (M/T) (See page IN–30).**

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

OK

2	**Check voltage between terminal NEO of ABS & BA & TRC & VSC ECU and body ground.**



PREPARATION:

(a) Remove ABS & BA & TRC & VSC ECU with connectors still connected.

(b) Turn ignition switch ON.

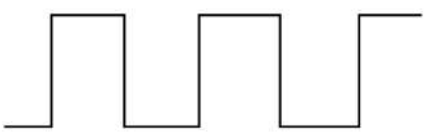
CHECK:

Measure voltage between terminal NEO of ABS & BA & TRC & VSC ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 – 6 V or below 1 V
ON (Idling)	3 – 6 V ↔ below 1 V (Pulse)

(Reference)



NG → Check and replace ABS & BA & TRC & VSC ECU with actuator assembly or Engine and ECT ECU (A/T) or Engine ECU (M/T).

OK

If the same codes is still output after the DTC is deleted, check the contact condition of each connection.

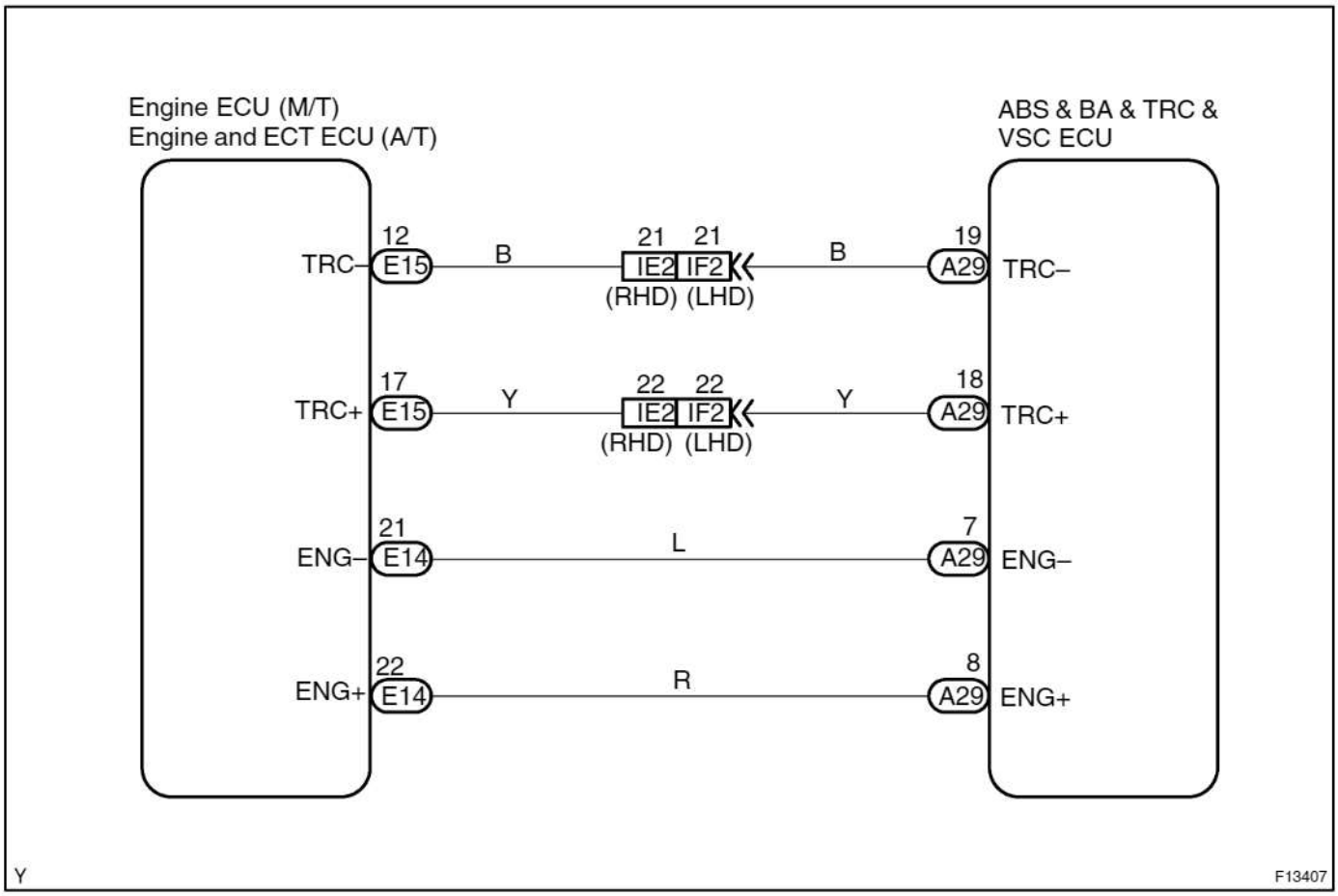
DTC	C1203 / 59	EFI Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC & VSC control information from the ABS & BA & TRC & VSC ECU to the Engine and ECT ECU (A/T) or Engine ECU (M/T) (TRC+, TRC–), and engine control information from the Engine and ECT ECU (A/T) or Engine ECU (M/T) to the ABS & BA & TRC & VSC ECU (ENG+, ENG–).

DTC No.	DTC Detecting Condition	Trouble Area
53	When any of the following 1. through 3. is detected : 1. IG1 voltage is 8.5 V or more, and the condition that data can not be sent to Engine ECU (M/T) or Engine and ECT ECU (A/T) continues for 1.2 sec. or more. 2. IG1 voltage is 8.5 V or more, engine speed is 500 r.p.m or more, vehicle speed is 60 km/h (38 mph) or more, and the condition that data can not be received from Engine ECU (M/T) or Engine and ECT ECU (A/T) continues for 5 sec. or more. 3. The condition that data can not be transmitted between the ABS & BA & TRC & VSC ECU and Engine ECU (M/T) or Engine and ECT ECU (A/T) occurs at least once within 5 sec. continues 10 consecutive times.	• TRC+ or TRC– circuit • ENG+ or ENG– circuit • Engine ECU (M/T) or Engine and ECT ECU (A/T) • ABS & BA & TRC & VSC ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between each of terminals ENG+, ENG–, TRC+ and TRC– of ABS & BA & TRC & VSC ECU and Engine ECU (M/T) or Engine and ECT ECU (A/T) (See page IN–30).

NG → Repair or replace harness or connector.

OK ↓

2	Check operation of the malfunction indicator.

NG → Check and replace Engine and ECT ECU (A/T) or Engine ECU (M/T).

OK ↓

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

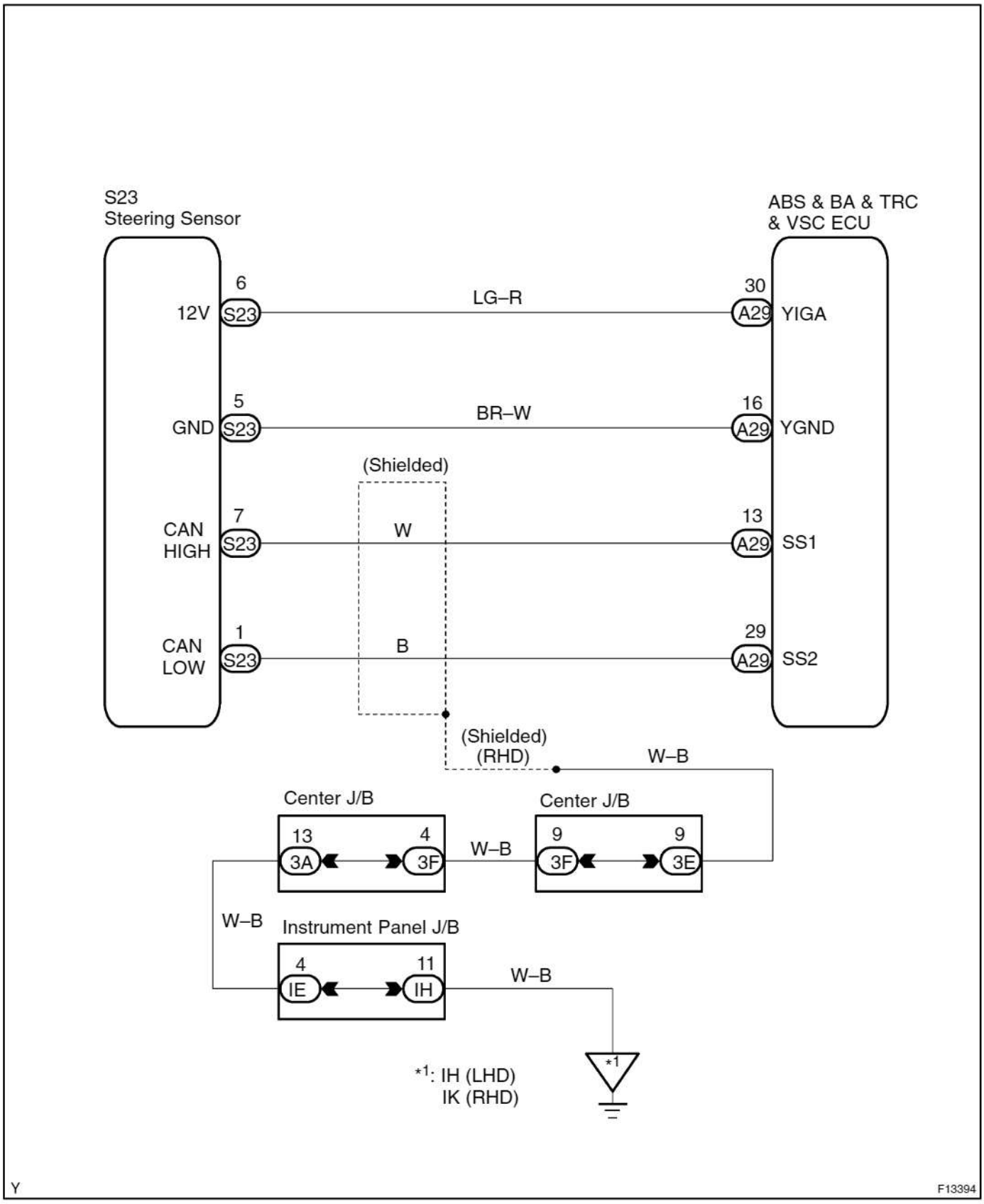
DI7ZQ-01

DTC	C1208 / 54	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1208 / 54	Detection of any of conditions 1. through 7: 1. When the condition that ECU terminal IG1 voltage is 9.8 V or more, and does not receive data from steering angle sensor continues. 2. Sensor internal failure. 3. The offset value is out of range. 4. Sensor signal change higher. 5. Steering angle value difference between measured and reference is out of range. 6. Steering sensor is not centered. 7. Steering sensor signal is out of range. 8. Steering sensor is not calibration.	• Steering angle sensor • Steering angle sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check output value of the steering angle sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the DATALIST mode on the hand–held tester.

CHECK:

Check that the steering wheel turning angle value of the steering angle sensor displayed on the hand–held tester is appropriate when turning the steering wheel.

OK:

Steering wheel turning angle value must be appropriate.

OK → **Go to step 4.**

NG

2	**Check the installation condition of steering angle sensor.**

NG → **Repair or replace steering angle sensor with column Assembly (See page SR–6).**

OK

3	**Check for open and short circuit in harness and connector between steering angle sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

4	Calibrate the steering angle sensor (See page DI–171).

NG → Replace steering angle sensor with colum Assembly (See page SR–6).

OK

5	Replace the ECU and check whether or not the trouble occurs again.

YES → Replace steering angle sensor with colum Assembly (See page SR–6).

NO

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DTC	C1237 / 37	Wrong Number of Teeth at 1 of 4 Wheels

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1237 / 37	Detection of any of conditions from 1. through 4.: 1. When the ignition switch is ON, the speed difference between the rear right and rear left wheels is 5 km/h (3mph) or more (vehicle speed: 100 km/h (62 mph) or less). 2. When the ignition switch is ON, the slip difference between the reference wheel and any other wheels is 6% or more (vehicle speed: 100 km/h (62 mph) or more). 3. Continuous ABS control for 60 sec. or more. 4. Interference on 1 or more wheels for 20 sec. with the brake pedal depressed, or for 5 sec. when the brake pedal is not depressed.	• Tire size • Speed sensor rotor

INSPECTION PROCEDURE

1	Check tire size.

NG → Replace tires so that all 4 tires are the same in size.

OK

2	Check sensor rotor (See page DI–182).

NG → Replace speed sensor rotor.

OK

3	Check speed sensor (See page DI–182).

NG → Replace speed sensor.

OK

4	**Check for open and short circuit in harness and connector between front speed sensor, rear speed sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator.

DI7ZS-01

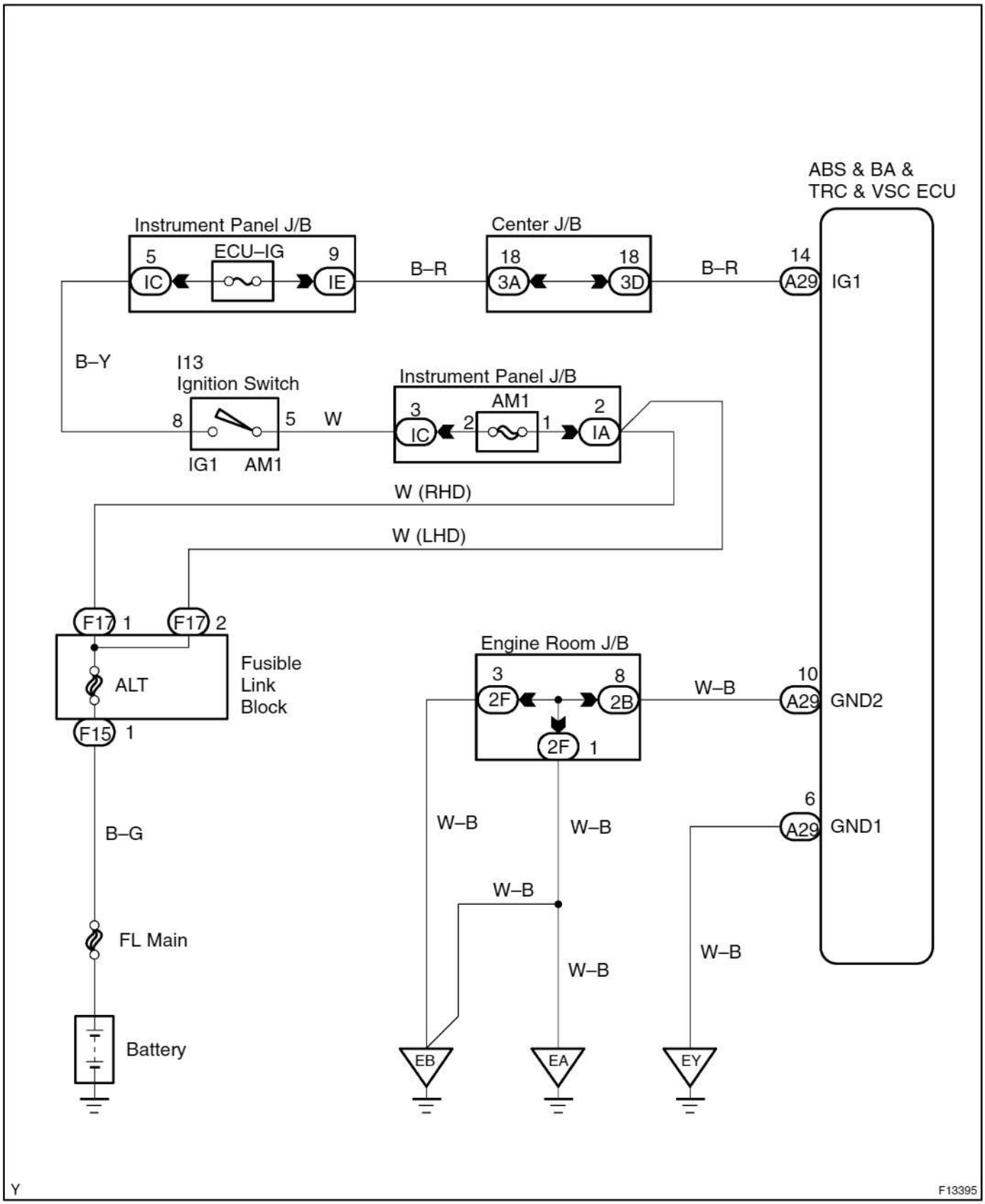
DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the brake actuators.

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	At a vehicle speed of 6 km/h (4 mph) or more, the condition that low battery voltage is 10 V or less and high battery voltage is more than 17.4 V.	• Battery • Charging system • Power source circuit

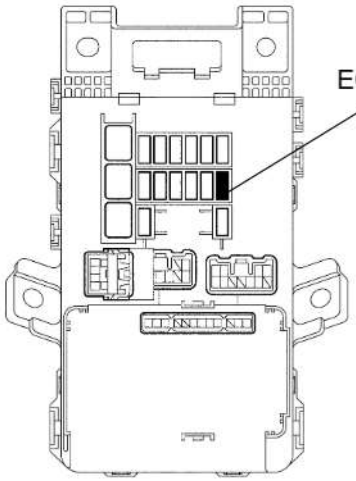
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**

Instrument Panel J/B



PREPARATION:
Remove the ECU–IG fuse from the instrument panel J/B.
CHECK:
Check continuity of the ECU–IG fuse.
OK:
Continuity

NG → **Check for short circuit in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

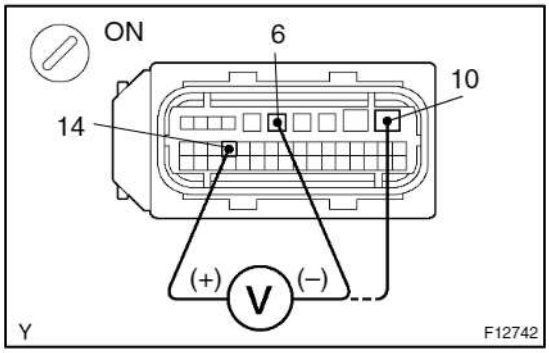
2	**Check battery voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair the charging system.**

OK

3	Check voltage between terminals IG1 (14) and GND (6, 10) of ABS & BA & TRC & VSC ECU.



PREPARATION:
Disconnect the connector from the ABS & BA & TRC & VSC ECU.

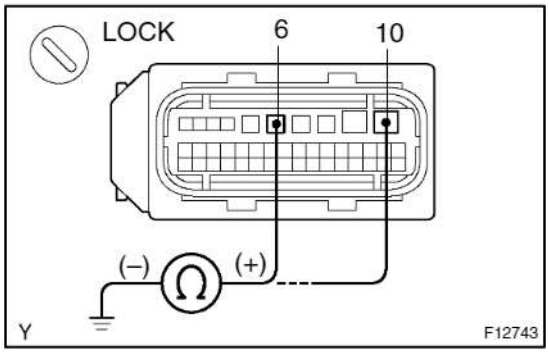
CHECK:
(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals 14 and 6, 10 of ABS & BA & TRC & VSC ECU harness side connector.

OK:
Voltage: 10 – 14 V

OK	Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

NG

4	Check continuity between terminals GND (6, 10) of ABS & BA & TRC & VSC ECU and body ground.



CHECK:
Measure the resistance between terminal 6, 10 of ABS & BA & TRC & VSC ECU harness side connector and body ground.

OK:
Resistance: 1 Ω or less

NG	Repair or replace harness or connector.

OK

Check for open circuit in harness and connector between ABS & BA & TRC & VSC ECU and ECU–IG fuse (See page IN–30).

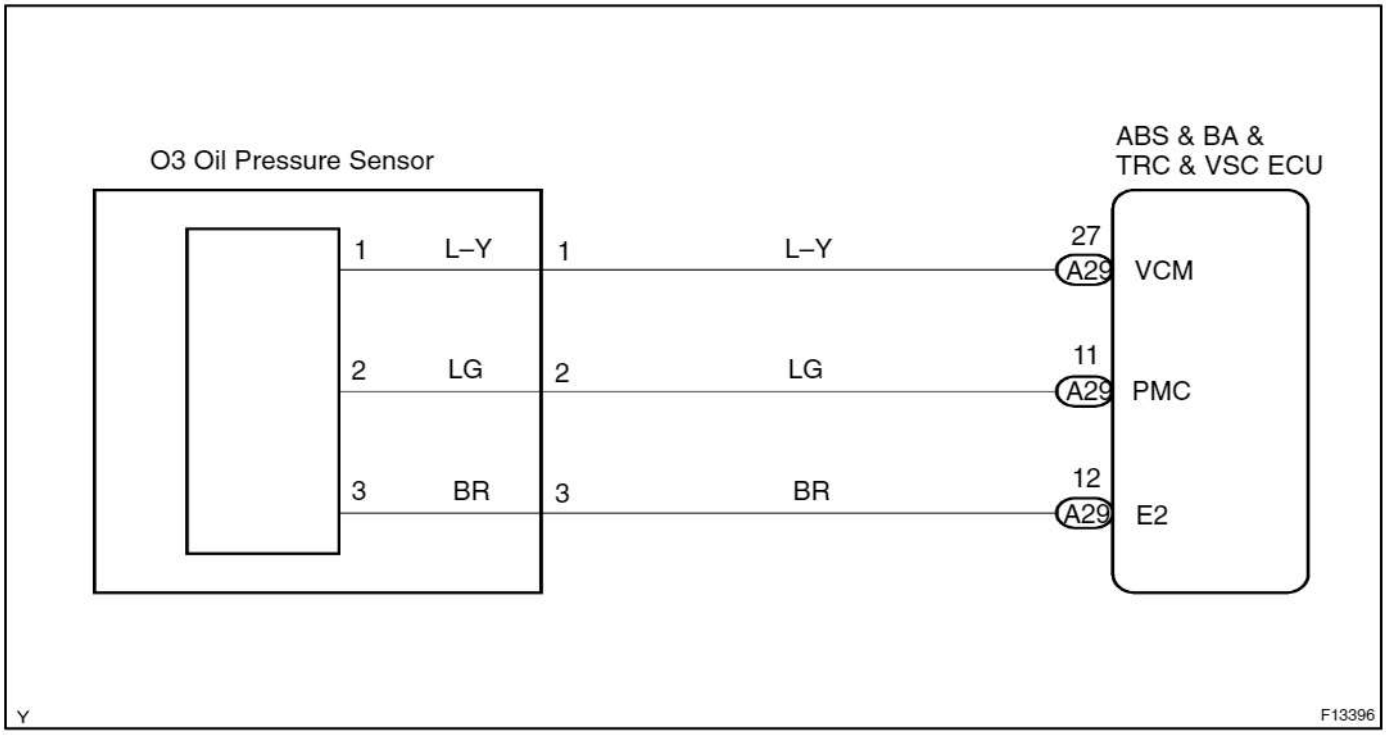
DI7ZT-01

DTC	C1246 / 53	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 53	When any of the following 1. through 3. is detected: 1. The voltage of sensor signal is out of range (less than 0.25 V, more than 4.75 V). 2. The sensor supply voltage is out of range (above 5.6 V, below 4.4 V). 3. The sensor signal offset value is out of range. 4. Stop light fuse is open.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit • Stop light FUSE

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1, in case of using the hand–held tester and start from step 2, in case of not using the hand–held tester.

1	**Check the stop light FUSE and stop light bulb.**

NG → **Check the stop light switch circuit (See Pub. No. RM599E on page BE–45)**

OK

2	**Check output value of the master cylinder pressure sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the DATALIST mode on the hand–held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand–held tester is changing when depressing the brake pedal.

OK:

Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

3	**Check for open and short circuit in harness and connector between master cylinder pressure sensor and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

4	**Check whether or not the ECU terminal STP input voltage is changed when the stop light switch is turned on and off.**

NO → **Check the stop light switch circuit (See Pub. No. RM599E on page BE–45).**

YES

Check and replace ABS & BA & TRC & VSC ECU with actuator.

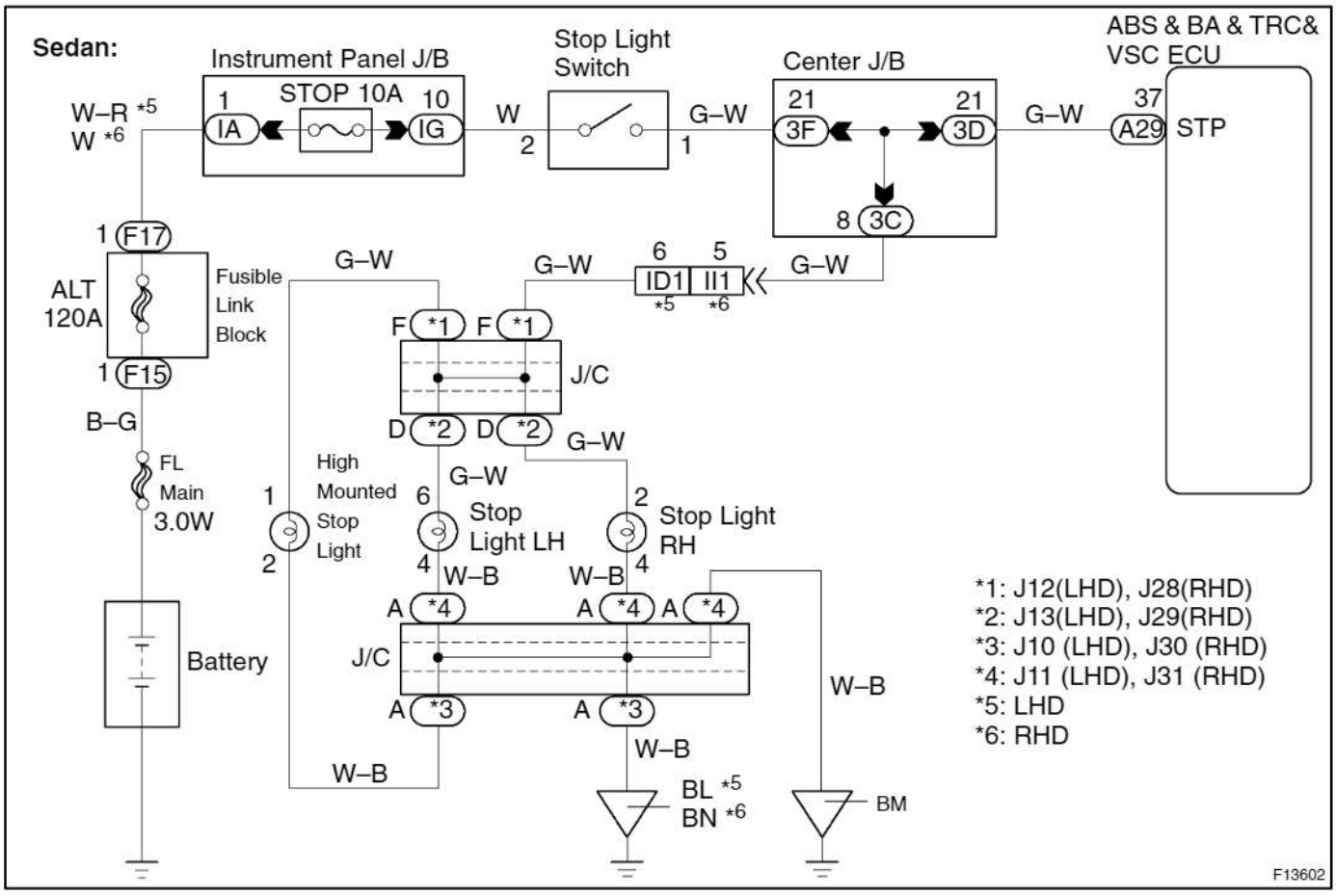
DI7ZU-01

DTC	C1249 / 58	Stop Light Switch Circuit

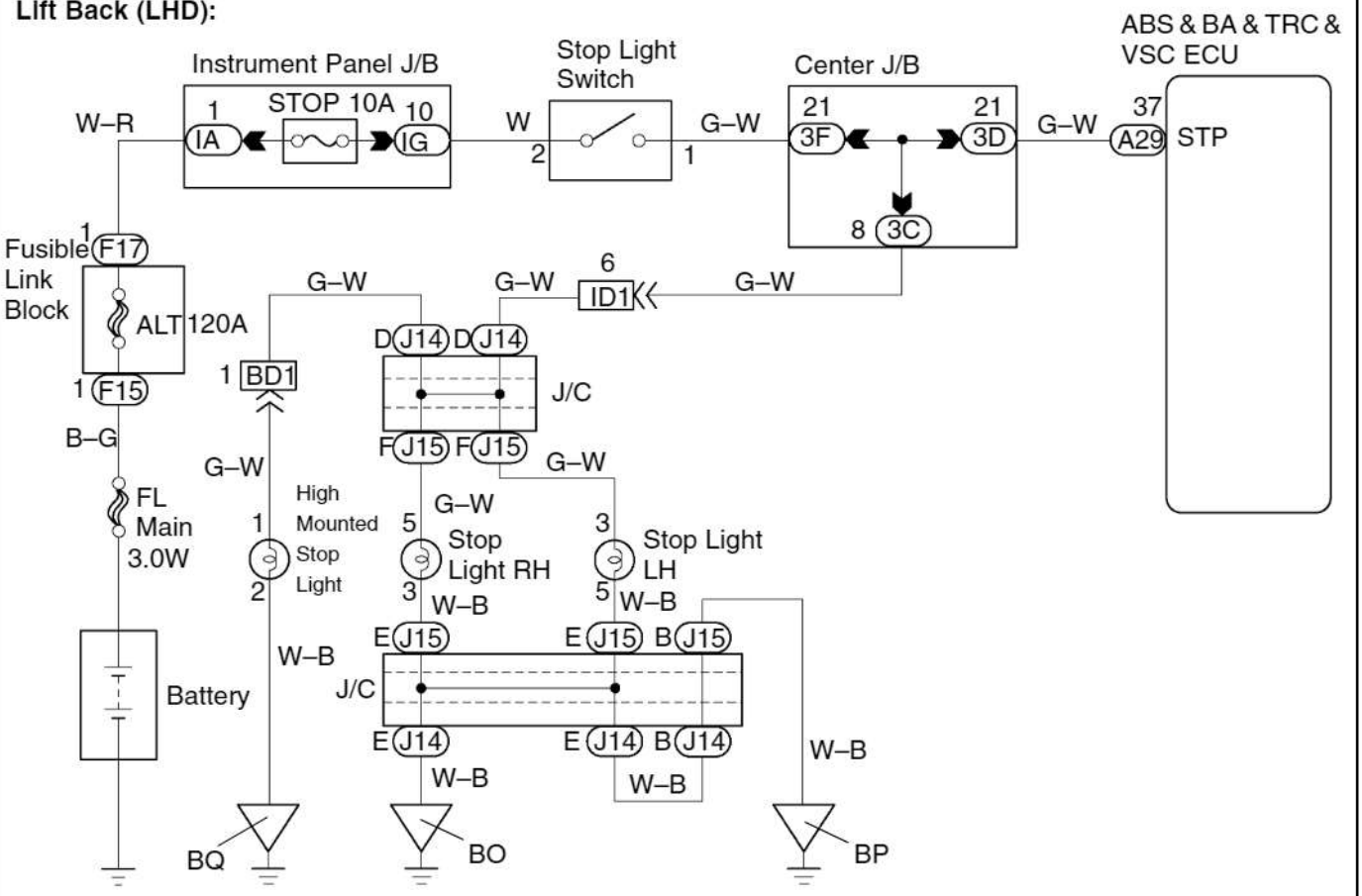
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 58	After the ignition switch is turned ON, the condition that the STP terminal voltage of ECU is 55 % to 75 % of supplied voltage, continues for 1 sec. or more.	• Stop light switch • Stop light switch circuit • Stop light blub

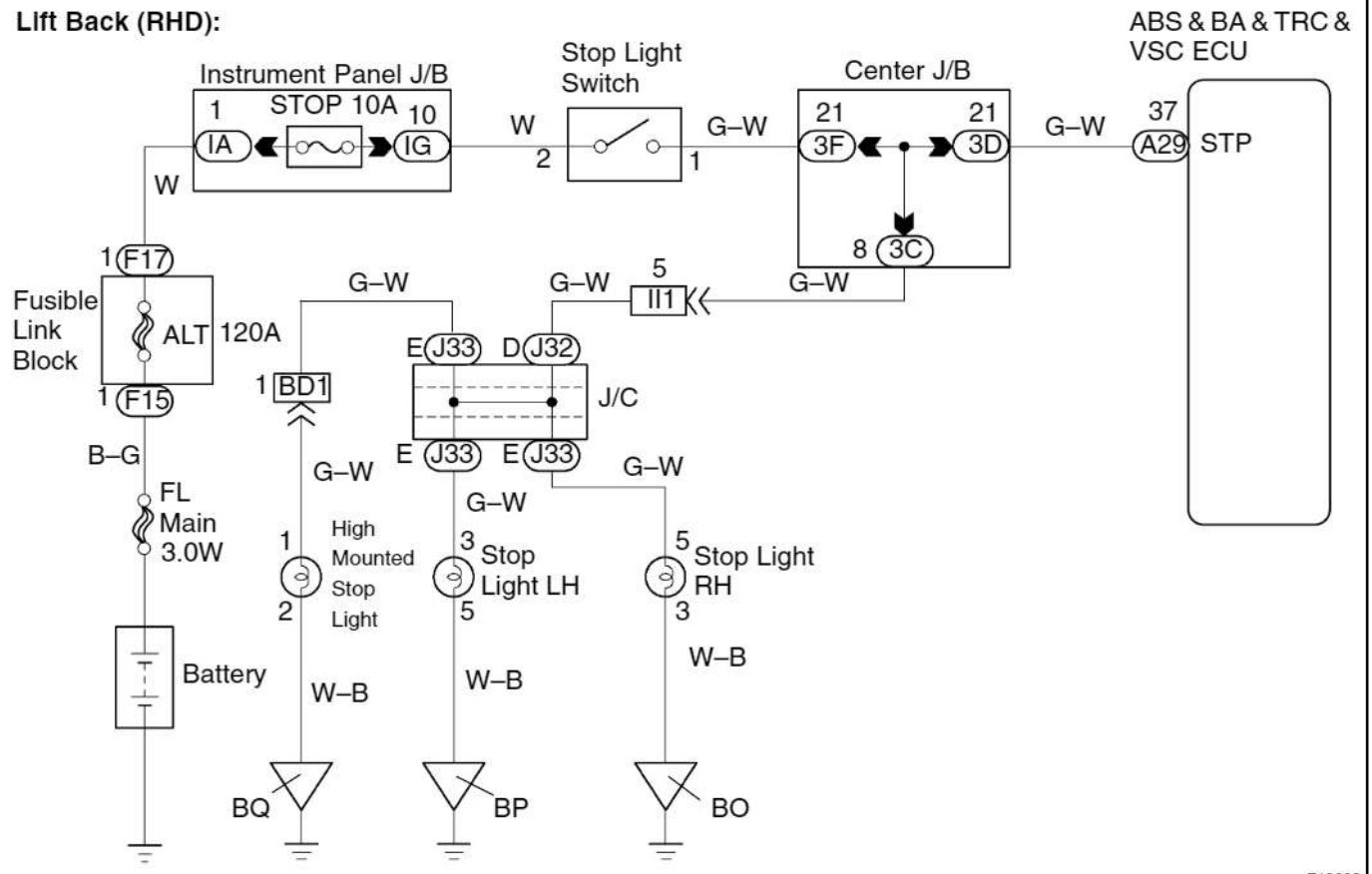
WIRING DIAGRAM



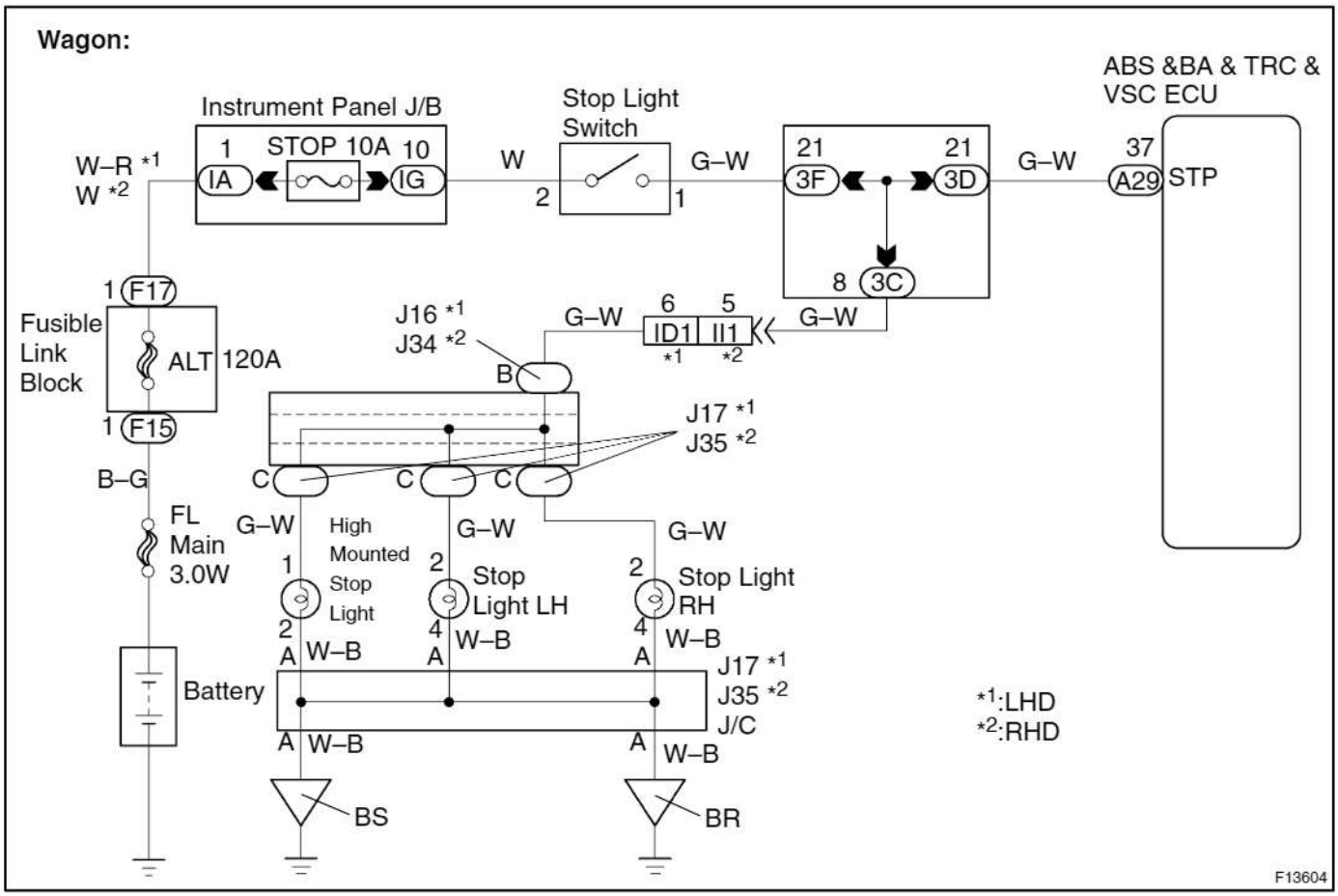
Lift Back (LHD):



Lift Back (RHD):



F13603



INSPECTION PROCEDURE

1	**Check operation of stop light.**

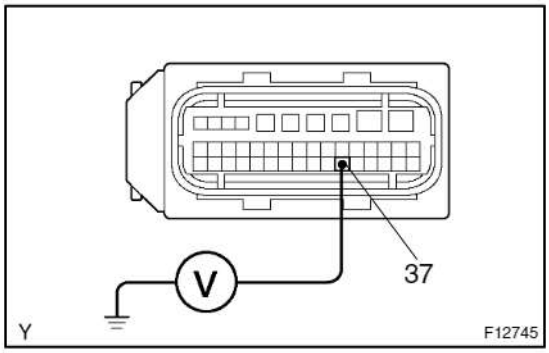
CHECK:

Check that the stop light lights up when the brake pedal is depressed and turns off when the brake pedal is released.

NG → **Repair stop light circuit (See Pub. No. RM599E on page BE–45).**

OK

2	**Check voltage between terminal STP (37) of ABS & BA & TRC & VSC ECU and body ground.**



PREPARATION:
Disconnect the connector from the ABS & BA & TRC & VSC ECU.

CHECK:
Measure the voltage between terminal 37 of ABS & BA & TRC & VSC ECU harness side connector and body ground when the brake pedal is depressed.

OK:

Voltage: 7.5 – 14 V

OK	**Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

NG

3	**Check for open circuit in harness and connector between terminal STP of ABS & BA & TRC & VSC ECU and stop light switch (See page IN–30).**

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

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–181).

DI7ZV-01

DTC	C1288 / 88	ECU Version Miss Match

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1288 / 88	When any of the following 1, through 2, is detecte: 1, Engine ECU (M/T) or Engine and ECT ECU (A/T) does not match. 2, Steering angle sensor is not calibration.	• ABS & BA & TRC & VSC ECU • Engine ECU (M/T) or Engine and ECT ECU (A/T) • Steering angle sensor calibration.

INSPECTION PROCEDURE

1	**Check the steering angle sensor calibration.**

NG → **Steering angle sensor calibration (See page DI–171).**

OK →

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZW–02

DTC	C1300 / 62	ABS & BA & TRC & VSC ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1300 / 62	ABS & BA & TRC & VSC ECU internal malfunction is detected.	ABS & BA & TRC & VSC ECU

INSPECTION PROCEDURE

1	**Check the DTC for the ABS and VSC (See page DI–171).**

*1 → **Repair ABS and VSC control system according to the code output.**

*2

Check for ECU is connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI7ZX-01

DTC	C1350 / 51	Brake Actuator Pump Motor Failure

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1350 / 51	When any of the following 1. through 3. is detected. 1. No motor voltage supply after ABS & BA & TRC & VSC ECU of the motor relay. 2. A high level of motor voltage with no ABS & BA & TRC & VSC ECU of the motor relay. 3. The pump motor voltage is high level for a certain time after the motor relay has elapsed.	• Brake actuator pump motor • Brake actuator pump motor circuit

INSPECTION PROCEDURE

1	**Check the DTC once more.**

PREPARATION:

(a) Clear the DTC (See page DI–171).
(b) Turn the ignition switch OFF.
(c) Turn the ignition switch ON.

CHECK:

Vehicle speed is more than 6 km/h (4 mph), and check if the same DTC is stored in the memory.

NO → **No problem.**

YES

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZY-01

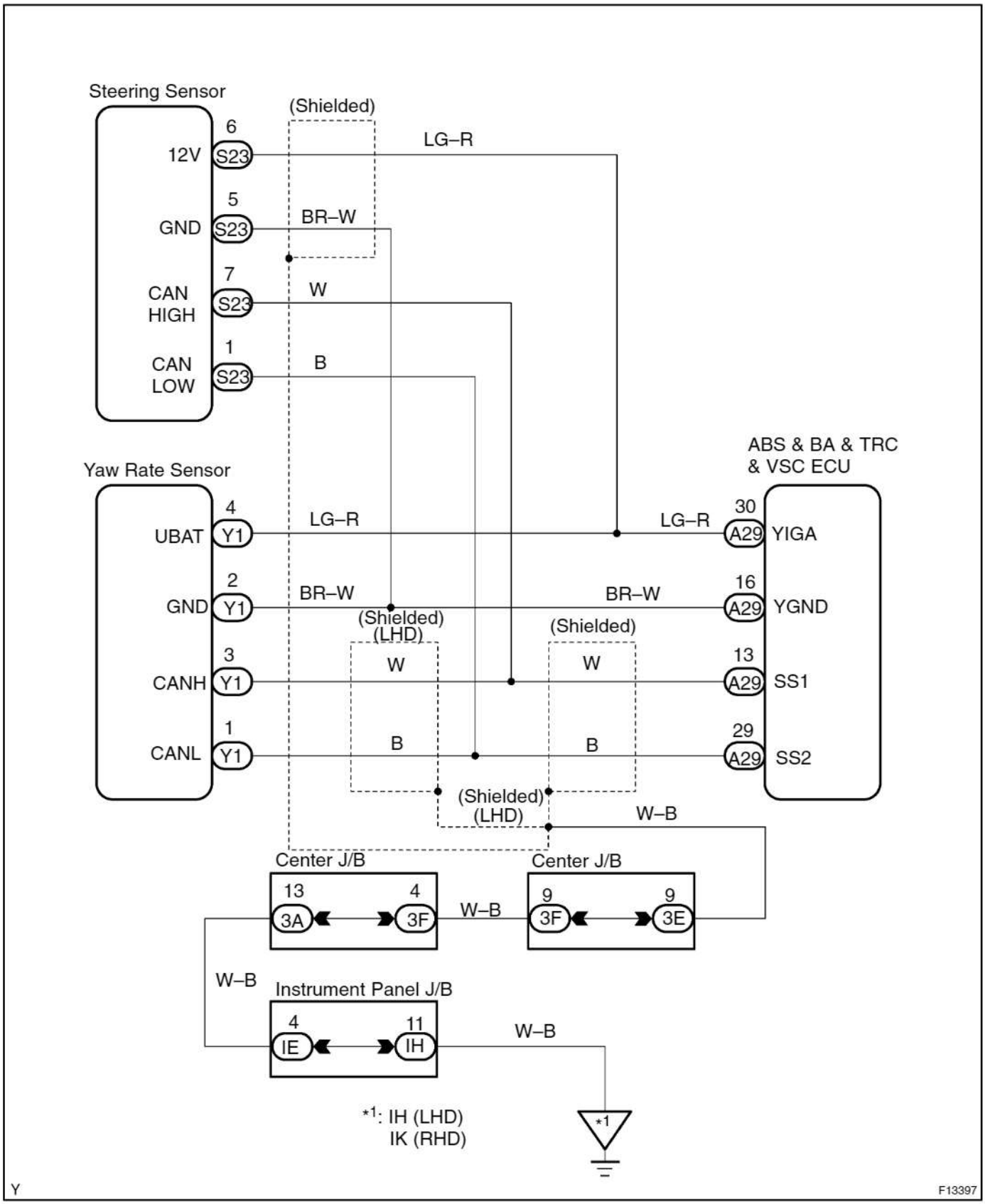
DTC	C1352 / 42	CAN Communication System Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRC & VSC control information from yaw rate sensor and steering angle sensor information to ABS & BA & TRC & VSC ECU

DTC No.	DTC Detecting Condition	Trouble Area
C1352 / 42	IG1 voltage is 9.5 V or more, and the condition that data from ECU can not be received continues for 1.2 sec. or more.	• Yaw rate sensor circuit • Steering angle sensor circuit • ABS & BA & TRC & VSC ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between each of terminals CANLOW and CANHIGH of steering angle sensor, CANL and CANH of yaw rate sensor and ABS & BA & TRC & VSC ECU (See page IN–30).

NG → Repair or replace harness or connector.

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI7ZZ-01

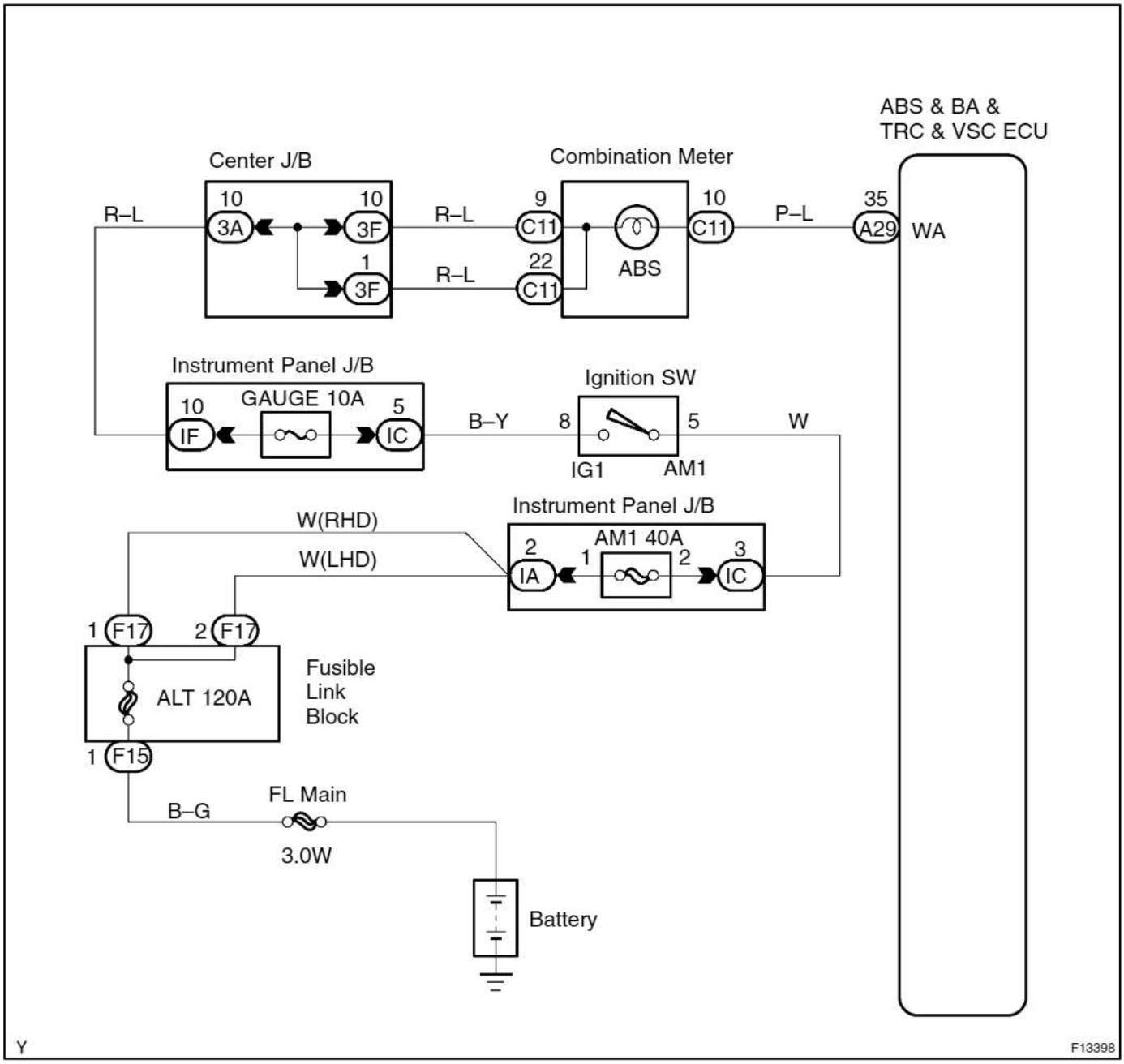
DTC	Always ON	Malfunction in ECU ABS Warning Light Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following 1., 2. or 3. is detected: 1. The ECU connectors are OFF the ECU. 2. There is a malfunction in the ECU internal circuit. 3. There is a malfunction in ABS warning light circuit.	• Charging system • ABS warning light circuit

HINT:
Hand–held tester may not be able to be used when the ECU is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

2	**Is DTC output?**

Check DTC on page DI–171.

YES → **Repair circuit indicated by the output code .**

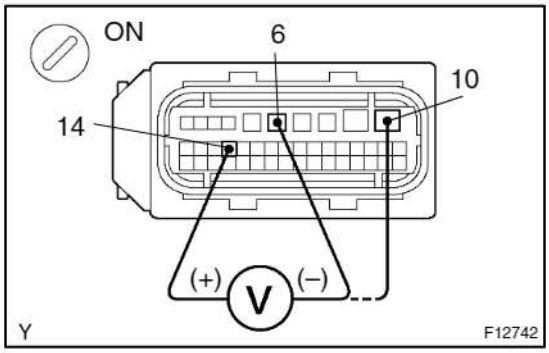
NO

3	**Check for open or short circuit in harness and connector between combination meter and ABS & BA & TRC & VSC ECU (WA).**

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

OK

4	**Check voltage between terminals IG1 (14) and GND (6,10)or ABS & BA & TRC & VSC ECU.**



PREPARATION:

Disconnect the connector from the ABS & BA & TRC & VSC ECU.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure the voltage between terminals 14 and 6, 10 of ABS & BA & TRC & VSC ECU harness side connector.

OK:

Voltage: 10 – 14 V

OK → **Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

NG

Repair or replace harness or connector.

DI800-01

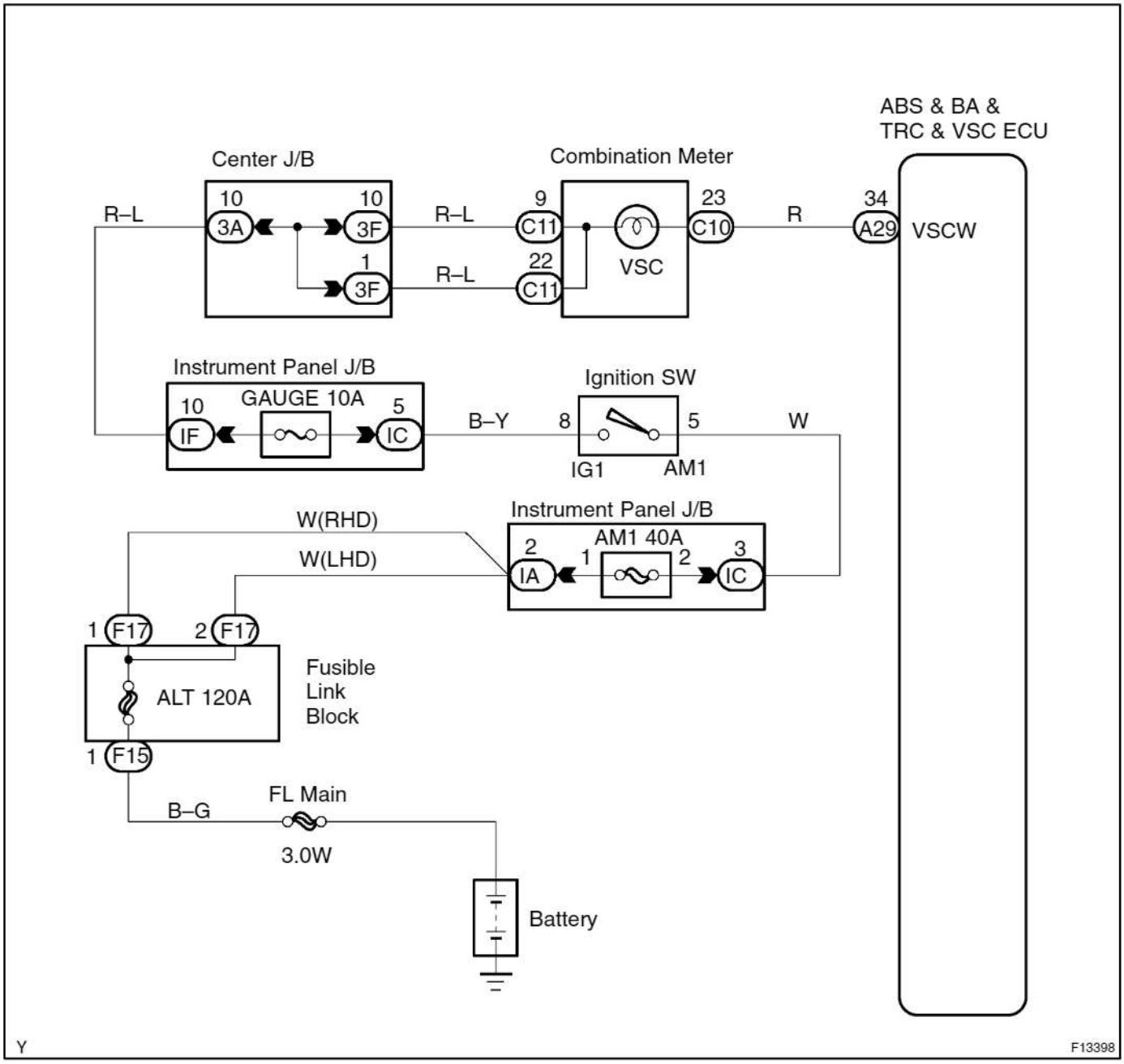
DTC	Always ON	Malfunction in ECU VSC Warning Light Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following 1. or 2. is detected: 1. There is a malfunction in the ECU internal circuit. 2. There is a malfunction in VSC warning light circuit.	• Charging system • VSC warning light circuit

HINT:
Hand–held tester may not be able to be used when ECU is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Does both VSC warning light and VSC OFF indicator light go on?

YES → Go to step 4.

NO

2	Is DTC output?

Check DTC on page DI–171.

YES → Repair circuit indicated by the output code .

NO

3	Check for open or short circuit in harness and connector between combination mater and ABS & BA & TRC & VSC ECU (WT).

OK → Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

NG

Repair or replace harness or connector.

4	Is DTC output?

Check DTC on page DI–171.

YES → Repair circuit indicated by the output code .

NO

5	**Check the steering angle sensor calibration.**

NO → **Calibrate the steering angle sensor (See page DI–171).**

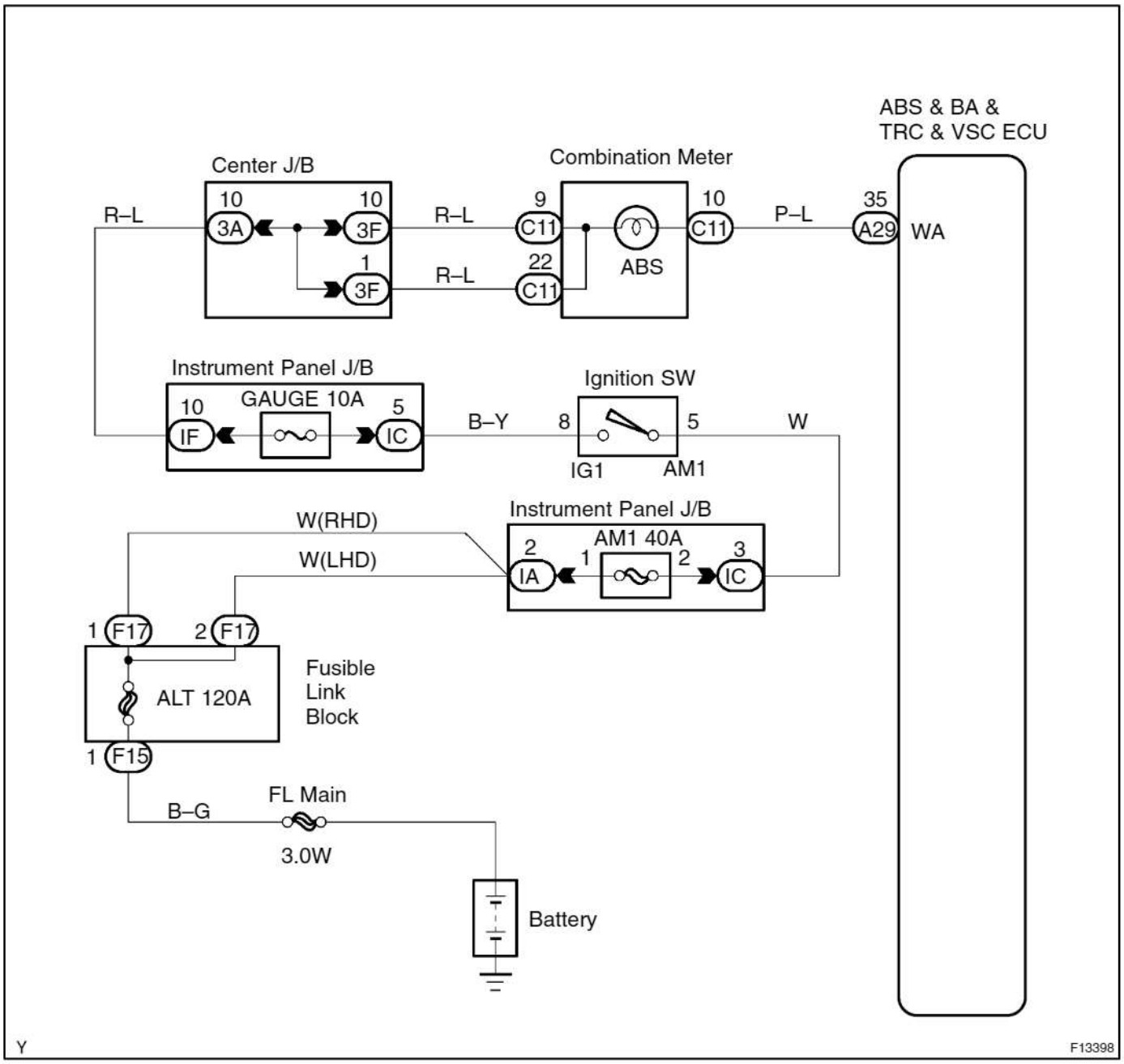
OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI801-01

ABS Warning Light Circuit (Does Not Light Up)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using a hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check operation of the ABS warning light.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:
Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter on the hand–held tester.

OK → **Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

NG

2	**Check ABS warning light.**

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → **Replace or repair bulb or combination meter.**

OK

Repair or replace and check for open or short circuit in harness and connector.

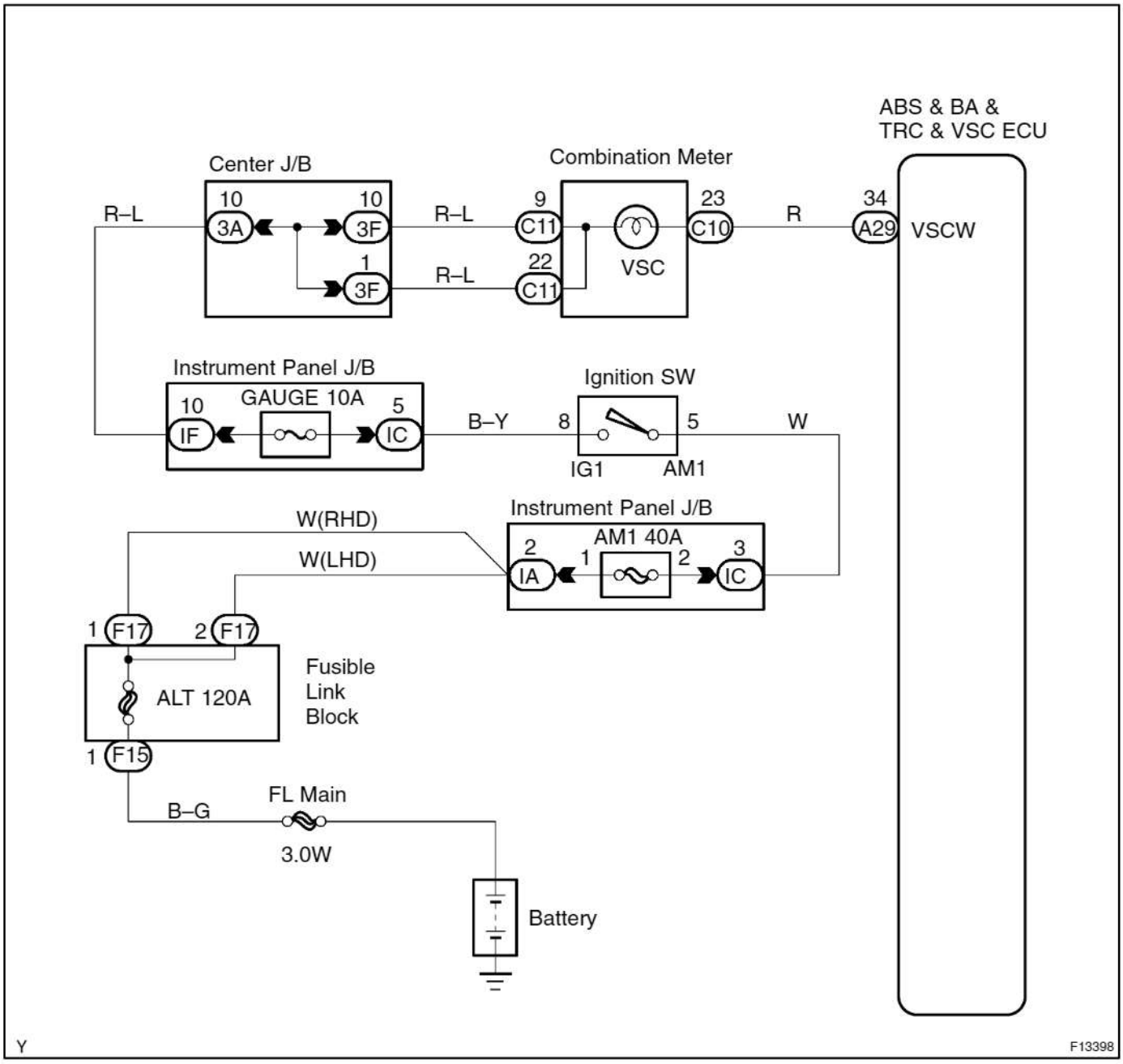
DI802-01

VSC Warning Light Circuit (Does Not Light Up)

CIRCUIT DESCRIPTION

If the ECU stores DTC to be necessary to shut down VSC operation, the VSC warning light lights on the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check operation of the VSC warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that "ON" and "OFF" of the VSC warning light can be shown on the combination meter with the hand–held tester.

OK → **Check and replace ABS & BA & TRC & VSC ECU with astuator assembly.**

NG

2	**Is DTC output?**

YES → **Repair circuit indicated by the output code.**

NO

3	**Check for open and short circuit in harness and connector between ABS & BA & TRC & VSC ECU and VSC warning light (See page IN–30).**

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

OK

4	**Check VSC warning light.**

See the combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → **Repair or replace bulb or combination meter.**

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator aseembly.

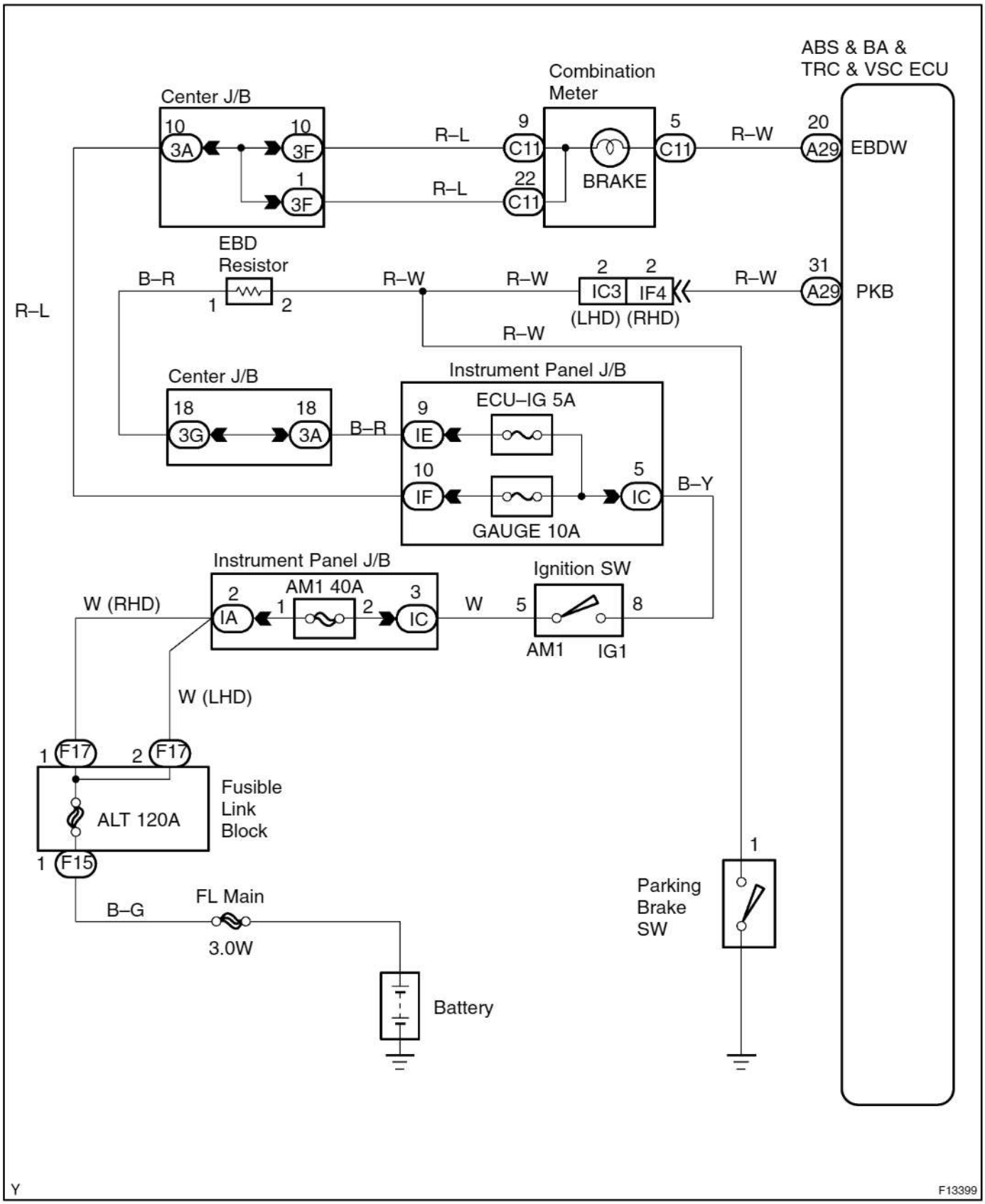
DI803-01

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up when the brake fluid is insufficient, when the parking brake is applied or when the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check parking brake switch circuit (See Pub. No. RM599E on page BE–57).

NG → Repair or replace parking brake switch circuit.

OK

2	Check brake fluid level warning switch circuit (See Pub. No. RM599E on page BE–57).

NG → Repair or replace brake fluid level warning switch circuit.

OK

3	Is DTC output for ABS ?

YES → Repair circuit indicated by the output code.

No

4	Check BRAKE warning light.

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → Repair or replace bulb or combination meter.

OK

5	**Check for open or short circuit in harness and connector between combination meter and ABS & BA & TRC & VSC ECU (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

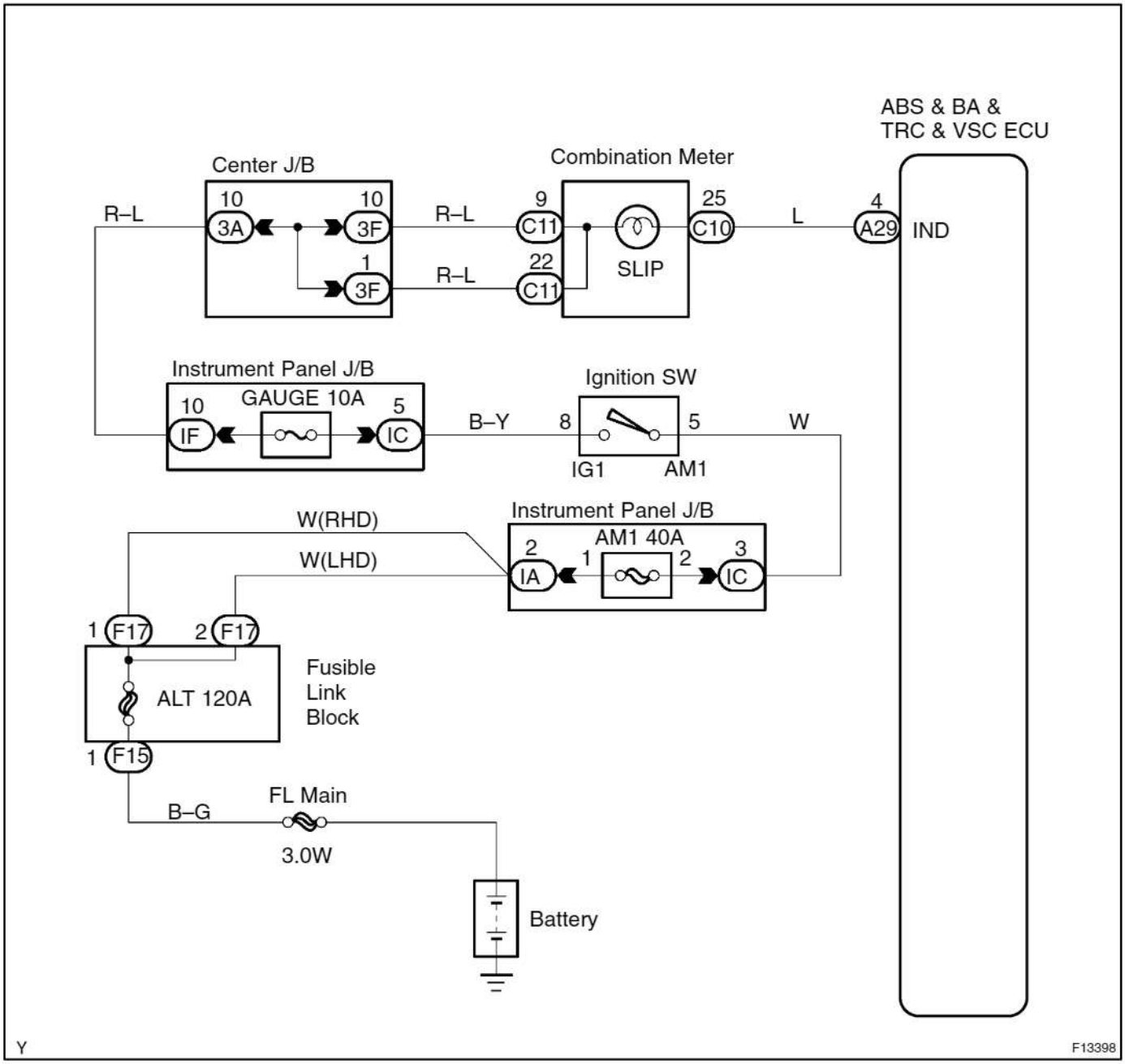
DI804-01

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator light blinks during TRC & VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1, in case of using the hand–held tester and start from step 2, in case of not using the hand–held tester.

1	**Check operation of the SLIP indicator light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that "ON" and "OFF" of the SLIP indicator light can be shown on the combination meter with the hand–held tester.

OK → **Go to step 4.**

NG

2	**Check that the SLIP indicator light is ON for 3 seconds immediately after ignition switch is turned ON.**

OK → **Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

NG

3	**Check SLIP indicator light.**

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → **Repair or replace bulb or combination meter. Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

OK

4	**Check for open and short circuit in harness and connector between ABS & BA TRC & VSC ECU and SLIP indicator light (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

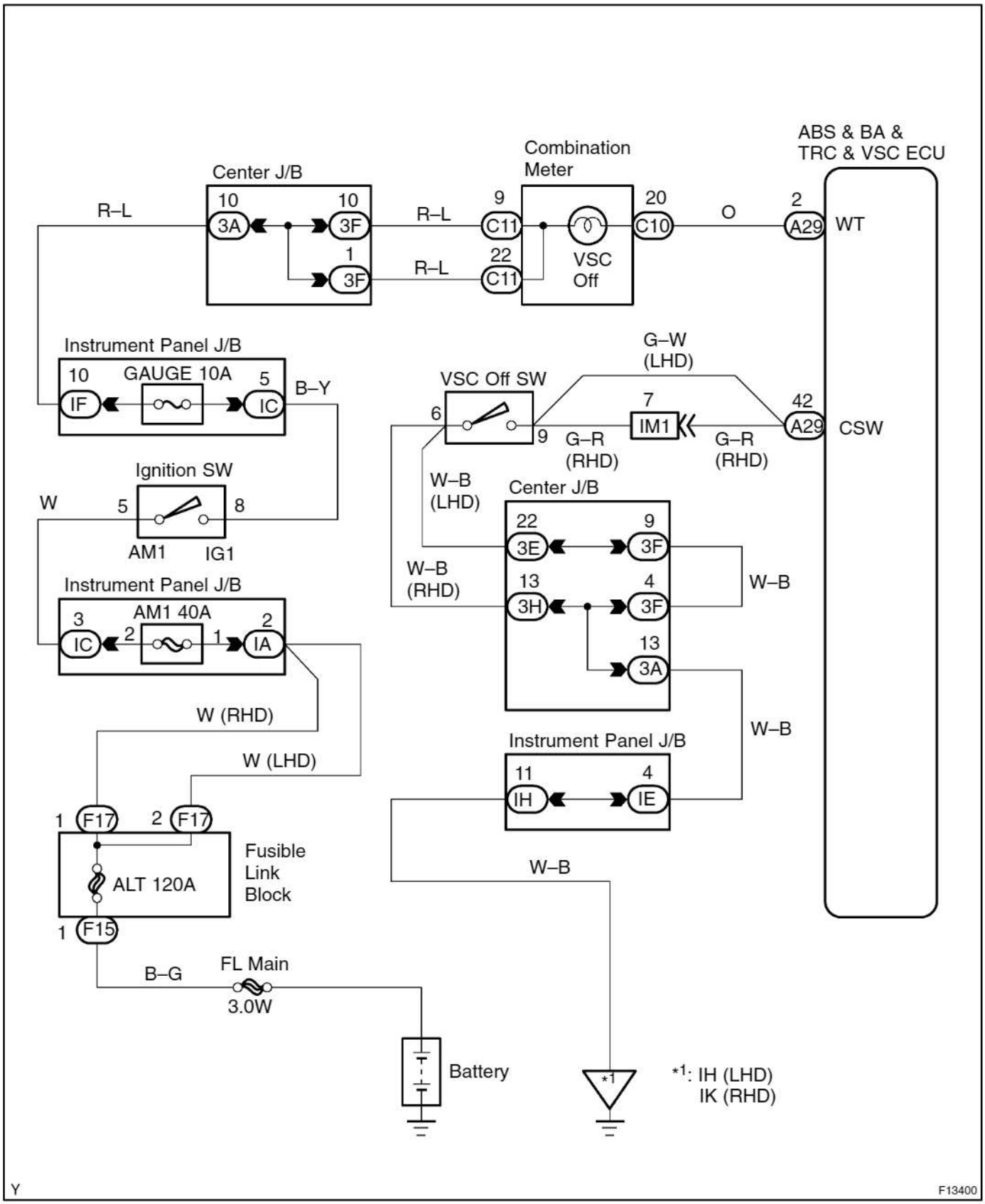
DI805-01

VSC OFF Indicator Light, VSC OFF Switch Circuit

CIRCUIT DESCRIPTION

This is the TRC & VSC control main switch. When the VSC OFF switch is pressed, TRC & VSC control is deactivated and the VSC OFF indicator light lights up. By turning off the ignition switch, TRC & VSC control is surely activated when the ignition switch turns ON next time. Also, the VSC OFF indicator light truns "ON" when the ECU prohibit TRC & VSC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using the hand–held tester.

1	**Check operation of the VSC OFF indicator light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

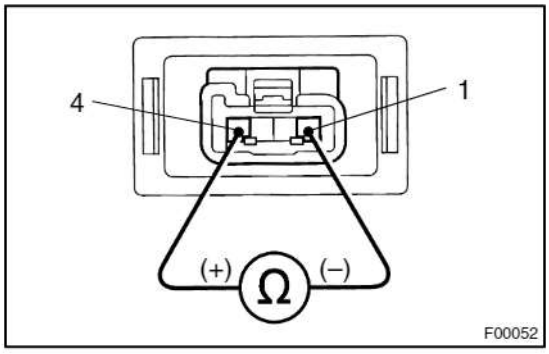
CHECK:

Check that "ON" and "OFF" of the VSC OFF indicator light can be shown on the combination meter with the hand–held tester.

NG → **Go to step 4.**

OK

2	**Check VSC OFF switch.**



PREPARATION:

(a) Remove the VSC OFF switch.
(b) Disconnect the VSC OFF switch connector.

CHECK:

Measure the resistance between terminals 1 and 4 of the VSC OFF switch when the VSC OFF switch is ON and OFF.

OK:

VSC OFF switch	Resistance
Pressed	Continuity
Released	1MΩ or higher

NG → **Replace VSC OFF switch.**

OK

3	**Check for open and short circuit in harness and connector between terminal CSW of ABS & BA & TRC & VSC ECU and VSC OFF switch and body ground (See page IN–30).**

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

OK

4	**Check VSC OFF indicator light.**

See combination meter troubleshooting (See Pub. No. RM599E on page BE–57).

NG → **Repair or replace bulb or combination meter.**

OK

5	**Check for open and short circuit in harness and connector between terminal WT of ABS & BA & TRC & VSC ECU and VSC OFF indicator light (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

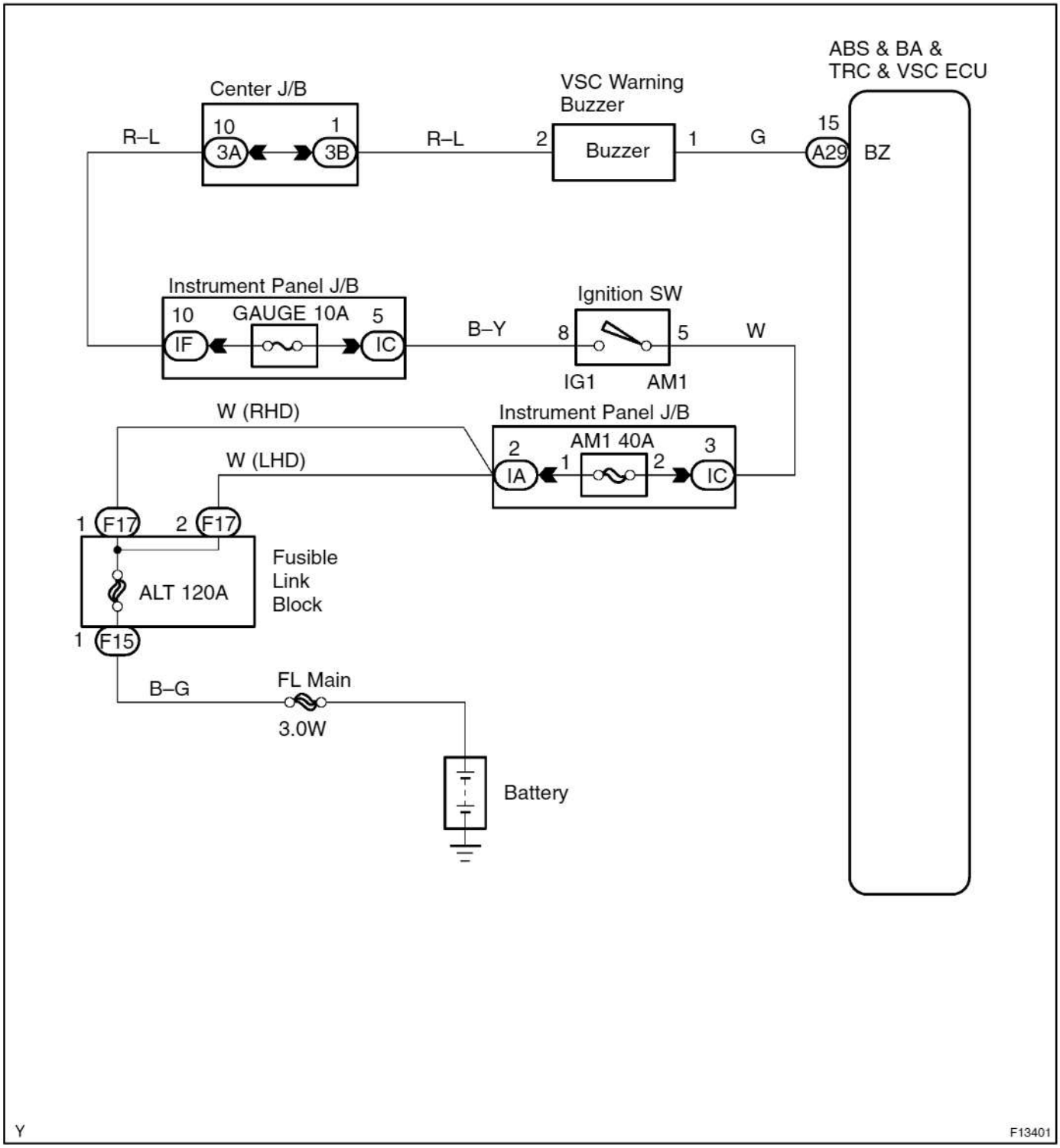
DI806-01

VSC Buzzer Circuit

CIRCUIT DESCRIPTION

The VSC buzzer sounds during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand–held tester and start from step 3 in case of not using the hand–held tester.

1	**Check operation of the VSC buzzer.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check "ON–OFF" function of the VSC buzzer with the hand–held tester.

OK → **Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.**

NG

2	**Check voltage between terminal 1 of VSC buzzer and body ground.**

PREPARATION:

Disconnect the connector from VSC buzzer.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminal (1) of VSC buzzer and body ground.

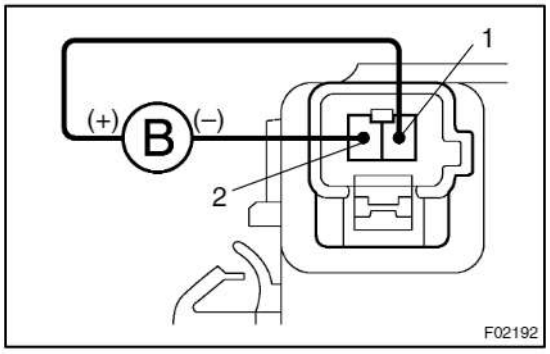
OK:

Voltage: 10 – 14 V

NG → **Repair or replace harness or connector from battery to VSC buzzer.**

OK

3	Check VSC buzzer.



PREPARATION:
Disconnect the VSC buzzer connector.
CHECK:
Apply battery voltage to the terminals 1 and 2 of VSC buzzer connector, and check that the VSC buzzer sounds.

NG → Replace VSC buzzer.

OK

4	Check for open and short circuit in harness and connector between ABS & BA & TRC & VSC ECU and VSC buzzer (See page IN–30).

NG → Repair or replace harness or connector.

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

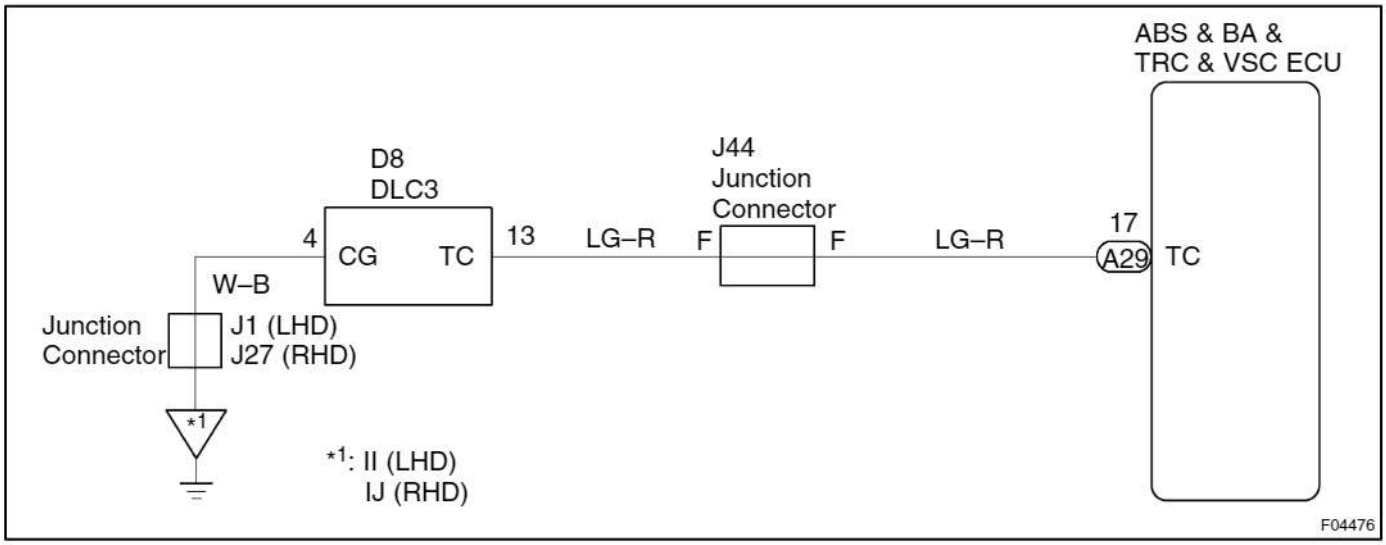
DI807-01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

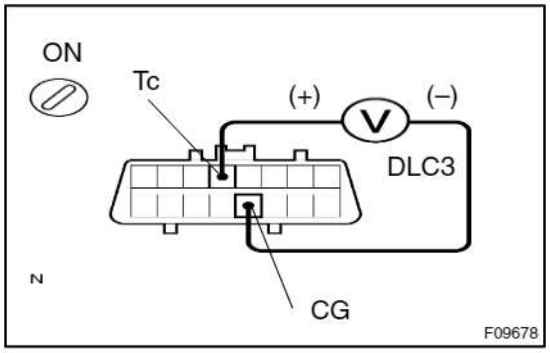
Connecting between terminals Tc and CG of the DLC3 causes the ECU to display DTC by blinking the ABS warning light, VSC warning light and BRAKE warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and CG of DLC3.

OK:

Voltage: 10 – 14 V

OK → **If each warning light does not blink even after Tc and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS & BA & TRC & VSC ECU and DLC3, DLC3 and body ground (See page IN–30).**

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

OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

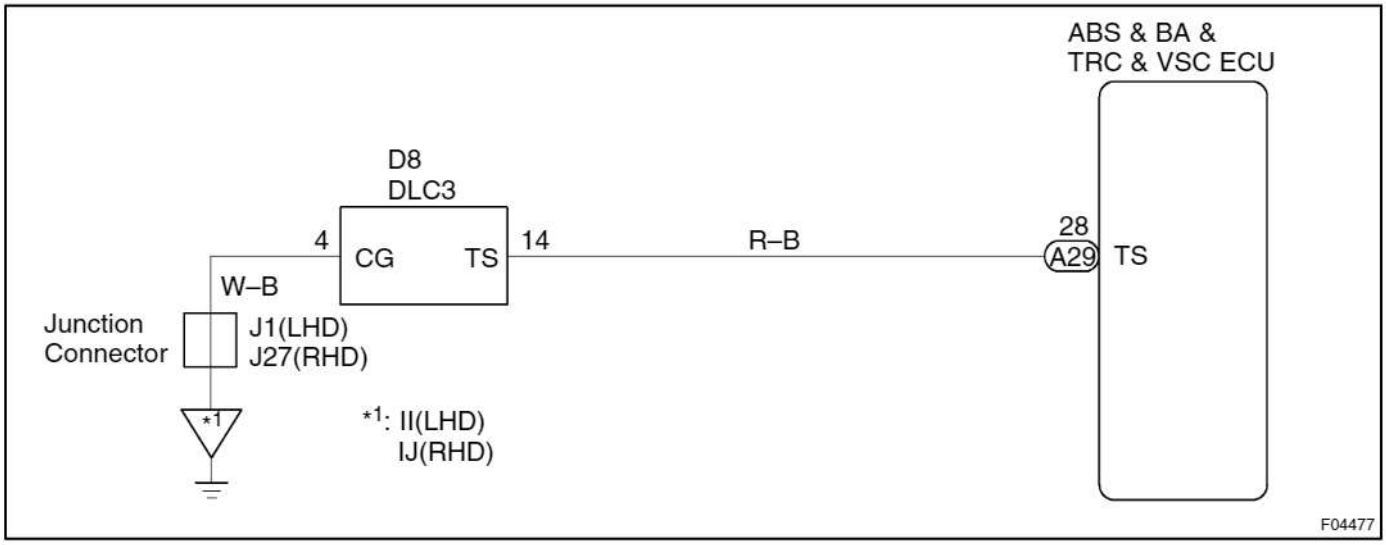
DI808-01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

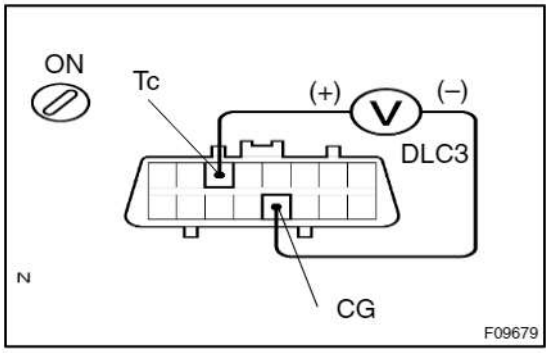
The sensor check circuit detects abnormality in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and CG of the DLC3 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals Ts and CG of DLC3.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Ts and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS & BA & TRC & VSC ECU and DLC3, DLC3 and body ground (See page IN–30).**

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

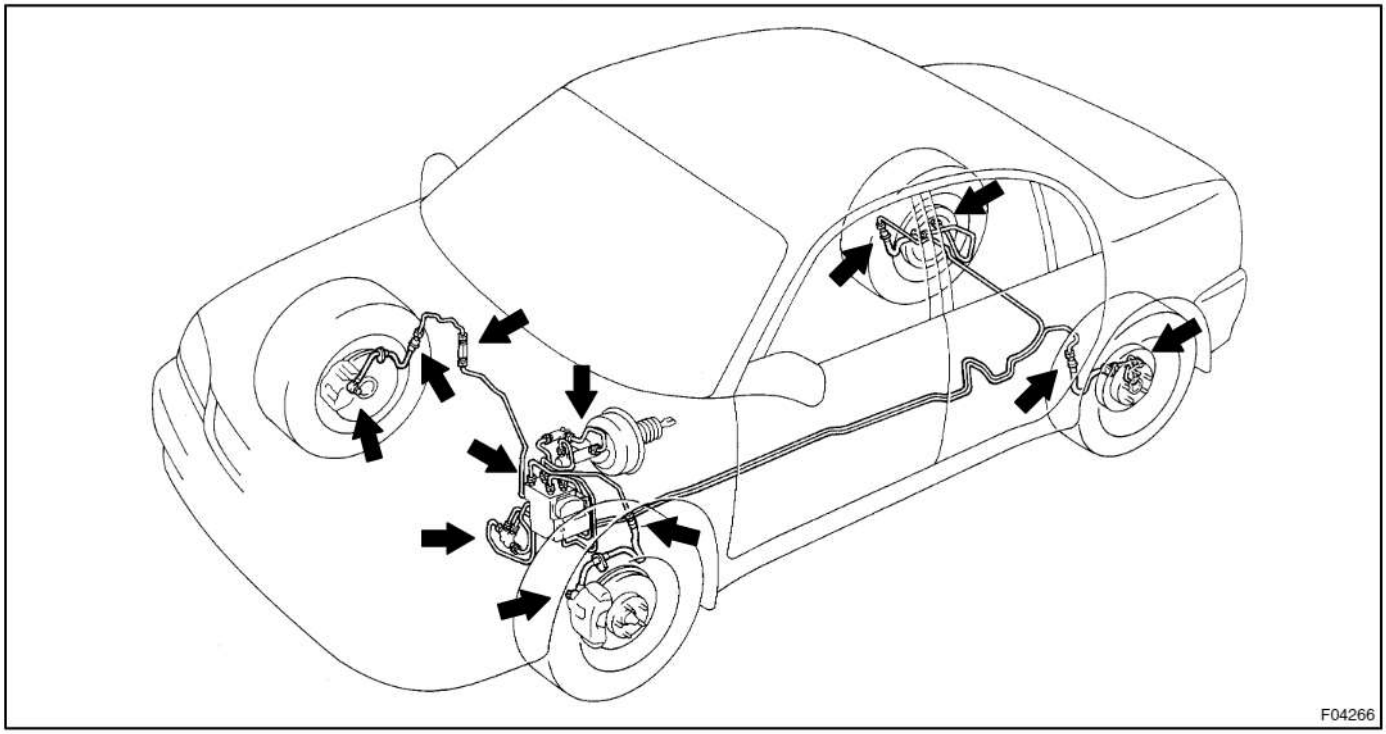
OK

Check and replace ABS & BA & TRC & VSC ECU with actuator assembly.

DI809-01

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

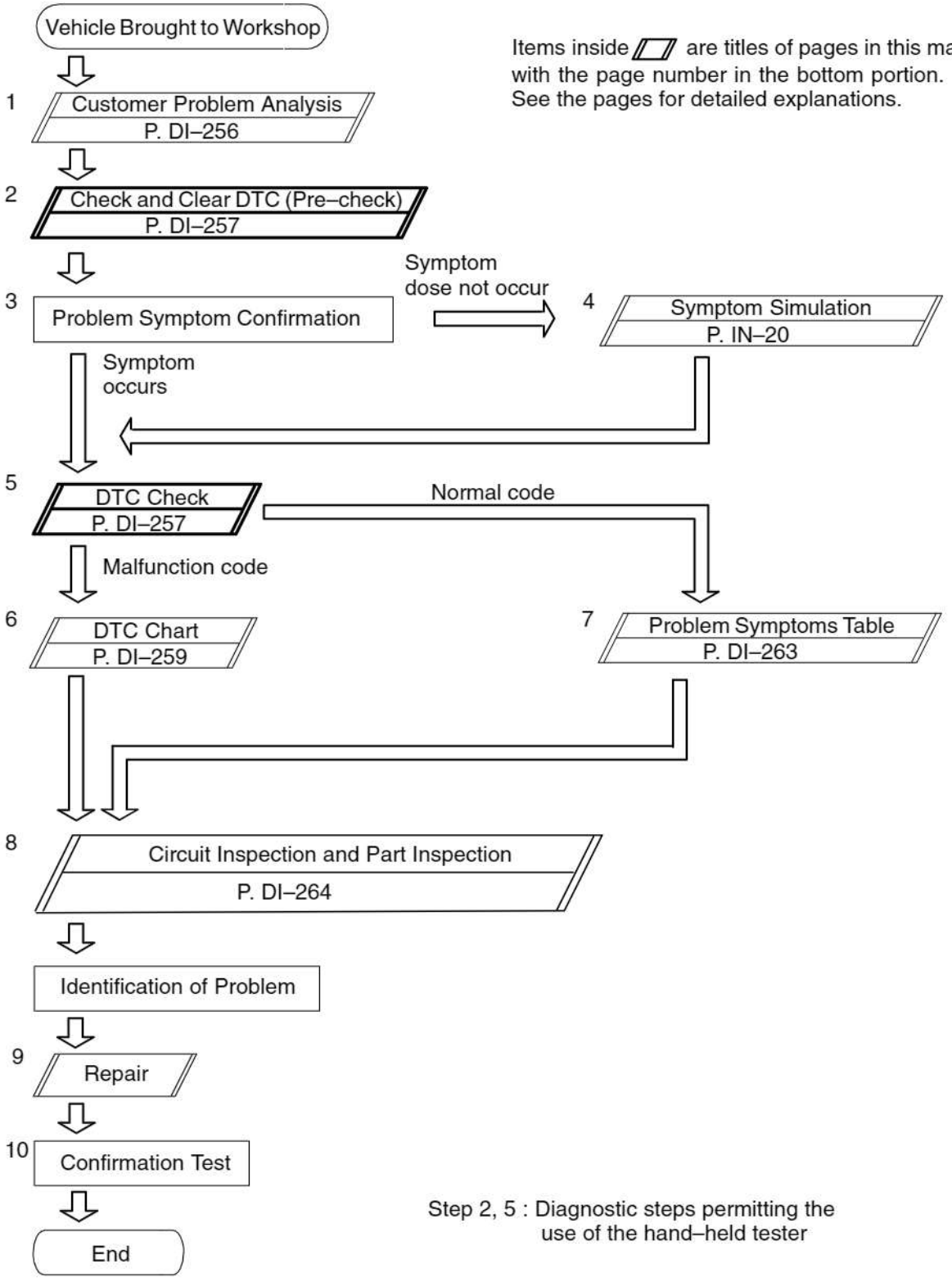


ENGINE IMMOBILISER SYSTEM

DI7FG–03

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting in accordance with the procedure on the following pages.



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

Step 2, 5 : Diagnostic steps permitting the use of the hand–held tester

DI7FH-01

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBLISER Check Sheet

Inspector's Name :

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

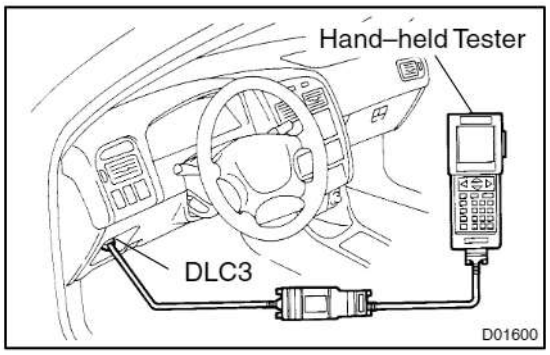
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	Malfunction Indicator Light	☐ Normal ☐ Remains ON ☐ Does not Light Up

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

DI7W6-02



PRE–CHECK

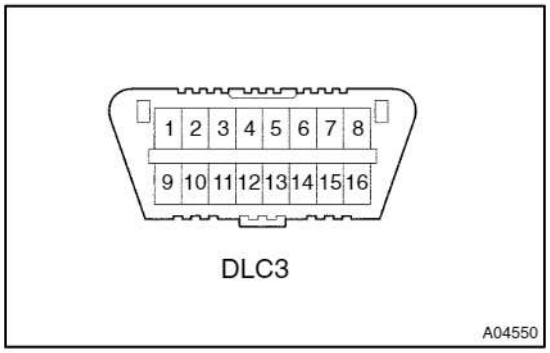
1. DIAGNOSIS SYSTEM

(a) Description

Engine ECU controls the function of immobiliser on this vehicle.

Data of the immobiliser or Diagnostic Trouble Code (DTC) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When a trouble occurs in immobiliser, Malfunction Indicator Lamp (MIL) does not light ON but DTC inspection is performed.

Therefore when there seems to be a trouble with immobiliser, use hand–held tester or SST (diagnosis check wire No. 2) to check and troubleshoot it.



(b) Inspect the DLC3.

The vehicle's engine ECU uses ISO 14230 for communication.

The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 14230 format.

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

HINT:

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

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

2. INSPECT DIAGNOSIS

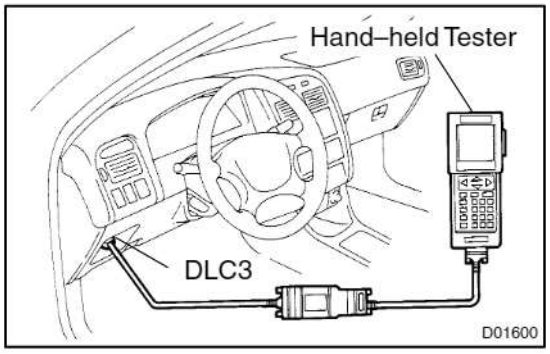
(a) Using hand–held tester:
Check the DTC.

NOTICE:

Hand–held tester only:

When the diagnosis system is switched from the normal mode to the check mode, it erases all DTCs and freezed frame data recorded in the normal mode. So before switching the modes, always check the DTCs and freezed frame data, and note them down.

(1) Prepare the hand–held tester.



(2) Connect the hand–held tester to the DLC3 under the instrument panel lower pad.
(3) Turn the ignition switch ON and push the hand–held tester switch ON.
(4) Use the hand–held tester to check the DTCs and freeze frame data; note them down. (For operating instructions, see the hand–held tester instruction book.)
(5) See page DI–259 to confirm the details of the DTCs.

(b) Clear the DTC.
The following procedures will erase the DTCs and freeze frame data.
(1) Operating the hand–held tester to erase the codes. (See the hand–held tester instruction book for operating instructions.)
(2) Disconnecting the battery terminals or EFI fuse.

DI7FJ-02

DIAGNOSTIC TROUBLE CODE CHART

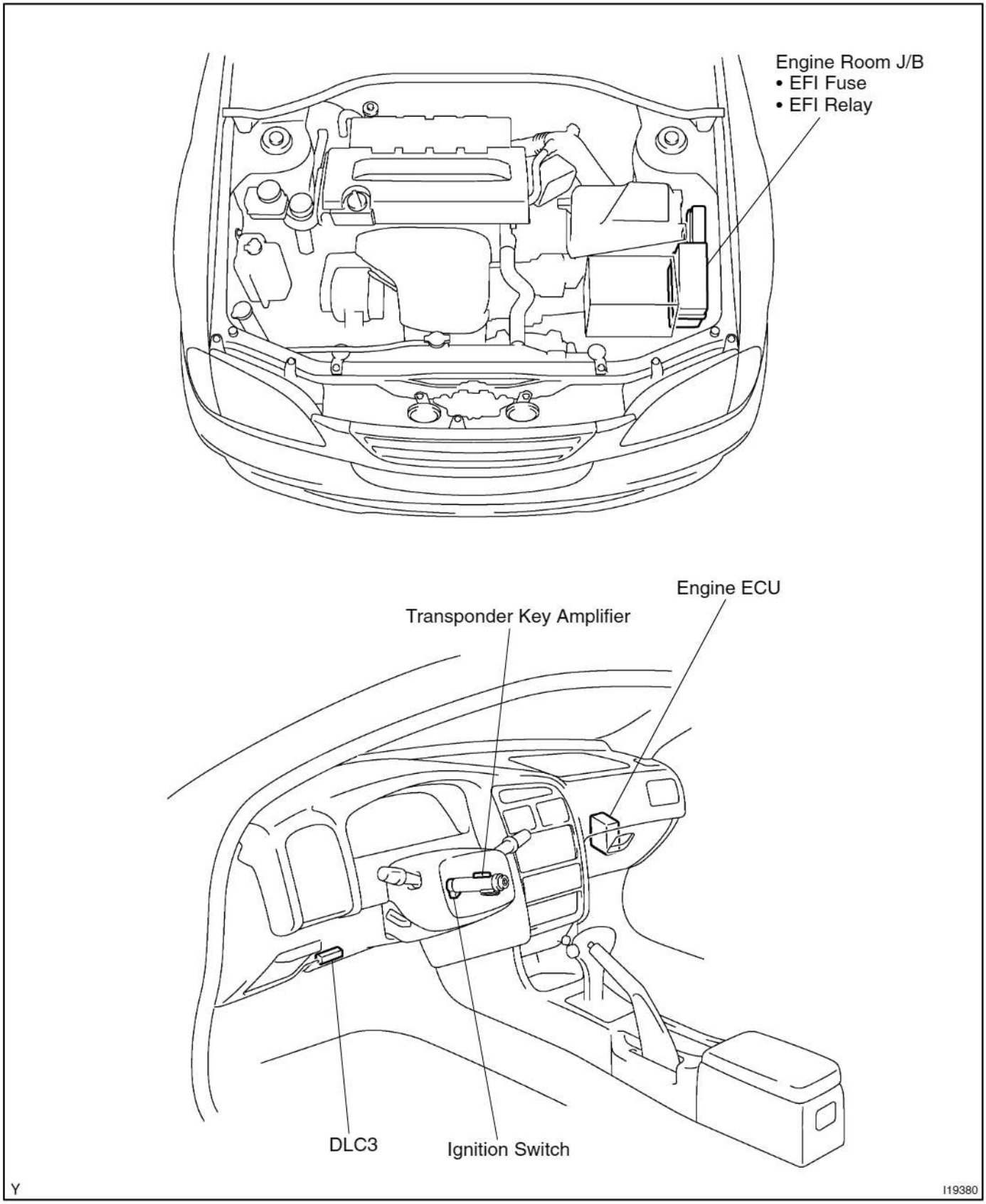
DTC No. (See page)	Detection Item	Trouble Area
B2795 (DI–264)	Unmatched Key Code	• Key • Unregistered key inserted before
B2796 (DI–265)	No Communication in Immobiliser System	• Key • Transponder key amplifier • Wire harness • Engine ECU
B2797 (DI–267)	Communication Malfunction No. 1	• Wire harness • Transponder key amplifier • Unregistered key inserted before • Engine ECU
B2798 (DI–268)	Communication Malfunction No. 2	• Key • Transponder key amplifier • Wire harness • Engine ECU

HINT:

To reduce the unnecessary exchange of engine ECU, check that a trouble occurs with the original engine ECU at the time of exchanging engine ECU and the problem will be solved with a new engine ECU.

DI7FK-03

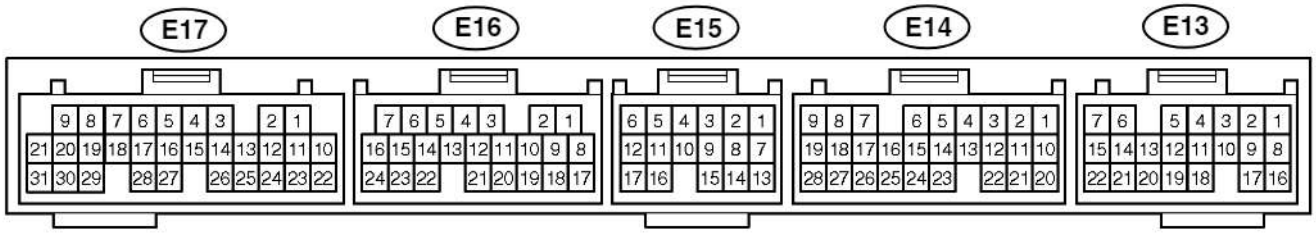
PARTS LOCATION



DI80I–01

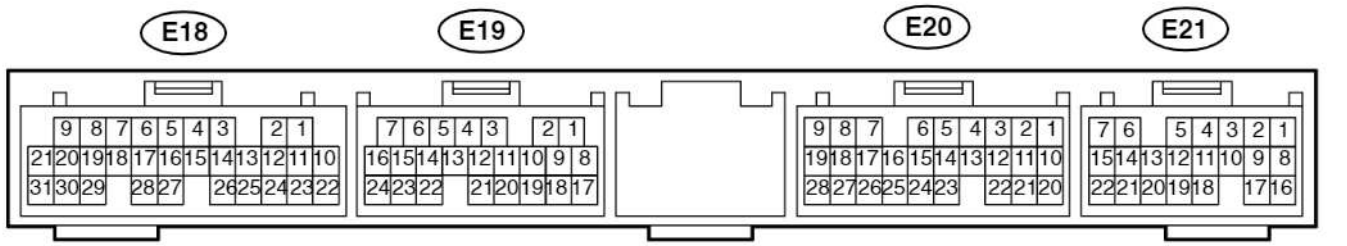
TERMINALS OF ECU

1AZ–FSE Engine ECU Terminals



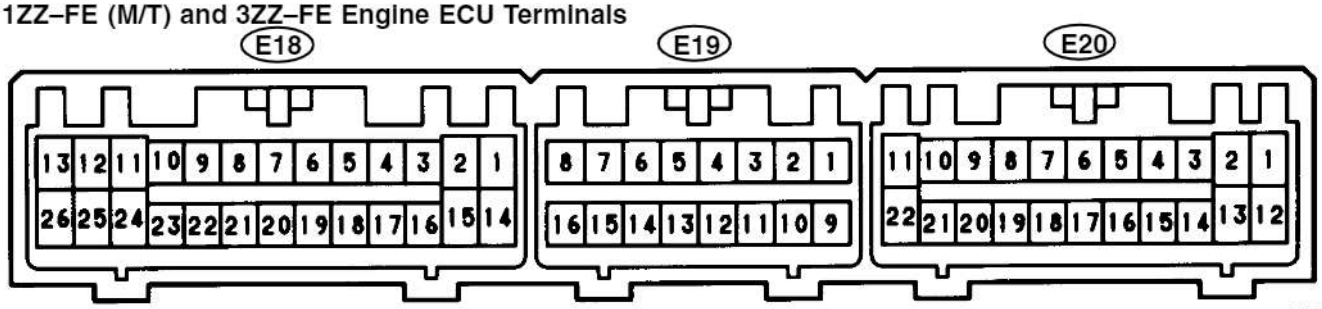
Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
CODE (E13–14) – E1 (E16–3)	B – BR	Ignition switch ON	9 – 14
RXCK ⟨E13–13) – E1 (E16–3)	B–O – BR	Ignition switch ON	9 – 14
TXCT ⟨E13–21) – E1 (E16–3)	B–W – BR	Ignition switch ON	9 – 14

1ZZ–FE (A/T) Engine and ECT ECU Terminals



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
CODE (E20–7) – E1 (E19–17)	B – BR	Ignition switch ON	9 – 14
RXCK (E20–26) – E1 (E19–17)	B–O – BR	Ignition switch ON	9 – 14
TXCT(E20–15) – E1 (E19–17)	B–W – BR	Ignition switch ON	9 – 14

1ZZ–FE (M/T) and 3ZZ–FE Engine ECU Terminals



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
CODE (E20–19) – E1 (E18–14)	B – BR	Ignition switch ON	9 – 14
RXCK (E20–20) – E1 (E18–14)	B–O – BR	Ignition switch ON	9 – 14
TXCT(E20–18) – E1 (E18–14)	B–W – BR	Ignition switch ON	9 – 14

DI7FM-02

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Immobiliser is not set (Engine starts with key codes other than the registered key code)	1. Engine ECU	IN–30
Engine does not start	1. Key 2. Wire harness 3. Transponder key amplifier 4. Engine ECU	★ IN–30 – IN–30

★: Check that the key which did not start the engine has been registered and that it is possible to start with other already registered key codes.

DI7FN-01

CIRCUIT INSPECTION

DTC	B2795	Unmatched Key Code

CIRCUIT DESCRIPTION

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key of the customer to check that DTC B2795 is output.
When the key that outputs DTC B2795, register this key. When DTC B2795 is not output, there is a possibility that the unregistered key has been inserted before. (Engine ECU is normal.)
Inquire of a customer the condition of using the system to find the cause of the trouble.
(Example: Another key has been inserted, etc.)

DTC No.	DTC Detection Condition	Trouble Area
B2795	Unmatched key code	• Key • Unregistered key inserted before

INSPECTION PROCEDURE

1	**Delete DTC and insert all presently available keys to check whether engine starts or not.**

HINT:
When inserting the key that does not start the engine, DTC B2795 is stored in memory.

RESULT:

OK	All keys starts engine.
NG	A specific key does not start engine.

OK → **No problem.**

HINT:
If the result is "OK", please confirm whether or not customers have ever inserted the unregistered key or the immobiliser key (with transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.

NG

Register key that does not start engine.

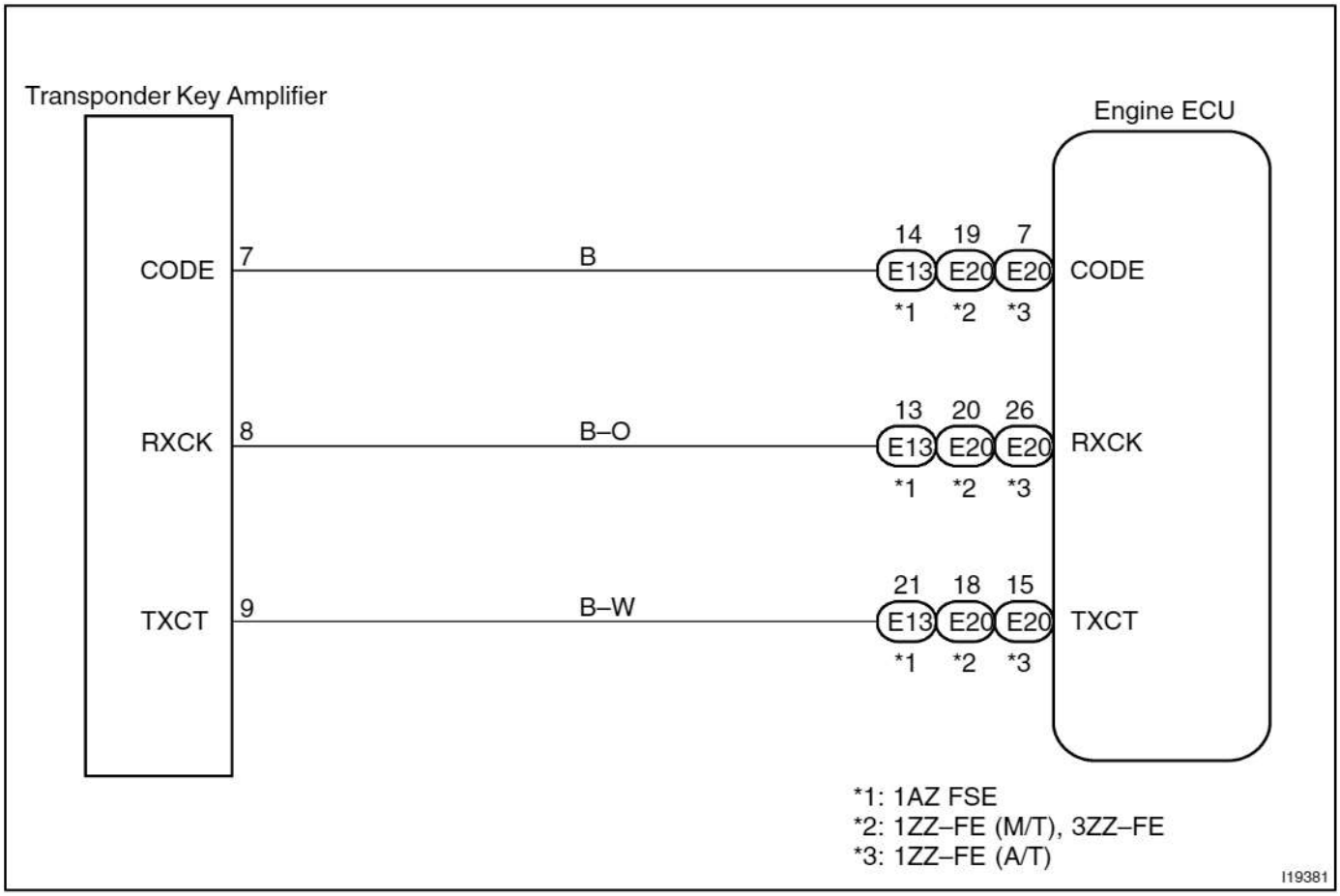
DI7FO–03

DTC	B2796	No Communication in Immobiliser system

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	• Key • Transponder key amplifier • Wire harness • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Delete DTC and insert all presently available keys to check whether engine starts or not**

RESULT:

A	All keys start engine.
B	A specific key does not start engine. In this case, DTC B2796 is stored in memory.
C	All keys do not start engine. In this case, DTC B2796 is stored in memory.

A → **No problem at this time.**

HINT:
If the result is "A", please confirm whether or not customers have ever inserted the key (without transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.

B → **Transponder chip of a specific key is defective. Replace key.**

C

2	**Check harness and connector between transponder key amplifier and engine ECU (See page IN–30).**

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

OK

3	**Does it operate normally after replacement of transponder key amplifier ?**

Yes → **Replace transponder key amplifier.**

No

Check and replace engine ECU (See page IN–30).

DI7FP–03

DTC	B2797	Communication Malfunction No. 1

CIRCUIT DESCRIPTION

This code is detected when an error occurs despite of normal communication.
(Example: Some noise is included in communication line.)

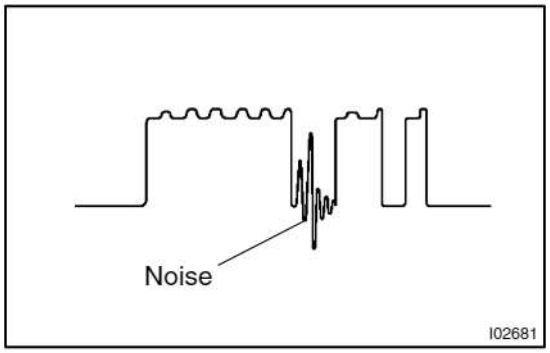
DTC No.	DTC Detection Condition	Trouble Area
B2797	Communication error	• Wire harness • Transponder key amplifier • Unregistered key inserted before • Engine ECU

WIRING DIAGRAM

Refer to DTC B2796 on page DI–265.

INSPECTION PROCEDURE

1	Check noise.



PREPARATION:
Insert already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or hand–held tester, check that noise is included in the CODE terminal of the engine ECU.
OK:
No noise is detected.

NG → **Try to find cause of noise and remove it.**

OK

2	Does it operate normally after replacement of transponder key amplifier?

Yes → **Replace transponder key amplifier.**

No

Check and replace engine ECU (See page IN–30).

DI7FQ–02

DTC	B2798	Communication Malfunction No. 2

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
B2798	Communication error	• Key • Transponder key amplifier • Wire harness • Engine ECU

WIRING DIAGRAM

Refer to DTC B2796 on page DI–265.

INSPECTION PROCEDURE

1	**Check harness and connector between transponder key amplifier and engine ECU (See page IN–30).**

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

OK

2	**Does it operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Check and replace engine ECU (See page IN–30).

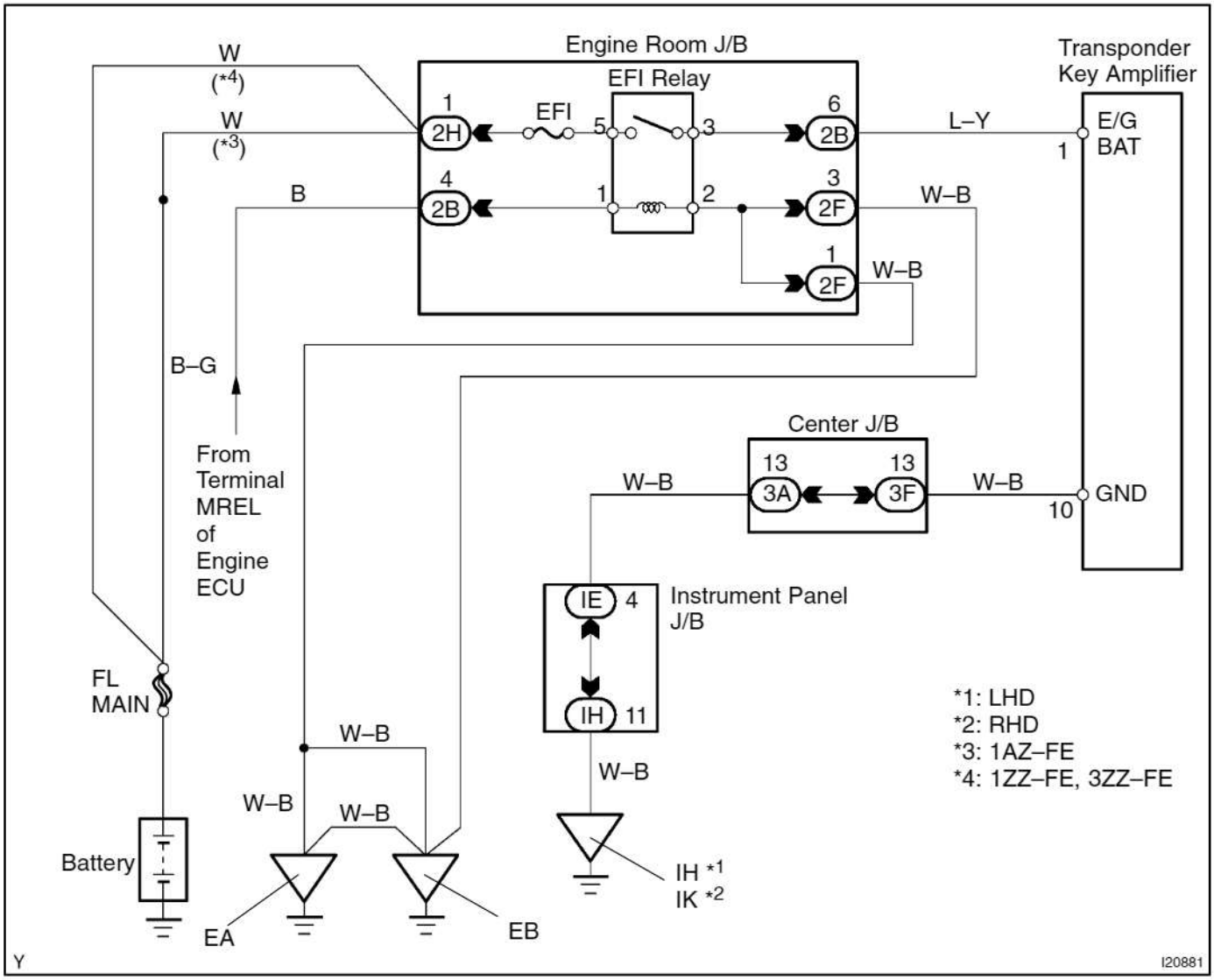
DI7FR–03

Power Source Circuit

CIRCUIT DESCRIPTION

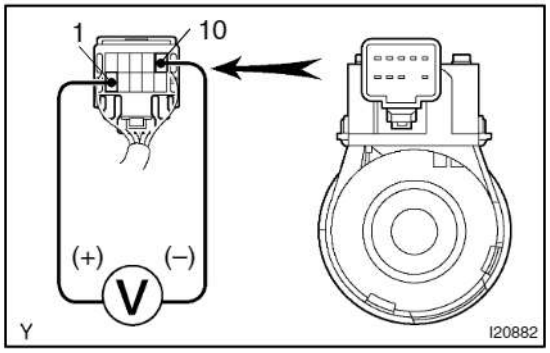
This circuit provides power to operate the transponder key amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and GND of transponder key amplifier connector.**



PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the transponder key amplifier connector.

CHECK:

Measure the voltage between terminals +B and GND of the transponder key amplifier connector.

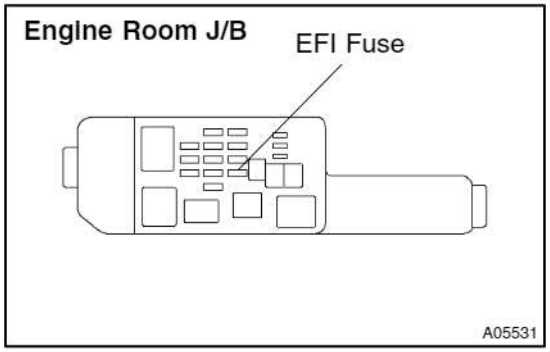
OK:

Voltage: 9 – 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–263).**

NG

2	**Check EFI fuse.**



PREPARATION:

Remove the EFI fuse from the engine room J/B.

CHECK:

Check the continuity of the EFI fuse.

OK:

Continuity

NG	**Check for short in all harness and components connected to EFI fuse.**

OK

3	Check harness and connector between transponder key amplifier and body ground (See page IN–30).

NG → Repair or replace harness or connector.

OK →

Check and repair harness and connector between transponder key amplifier and battery (See page IN–30).