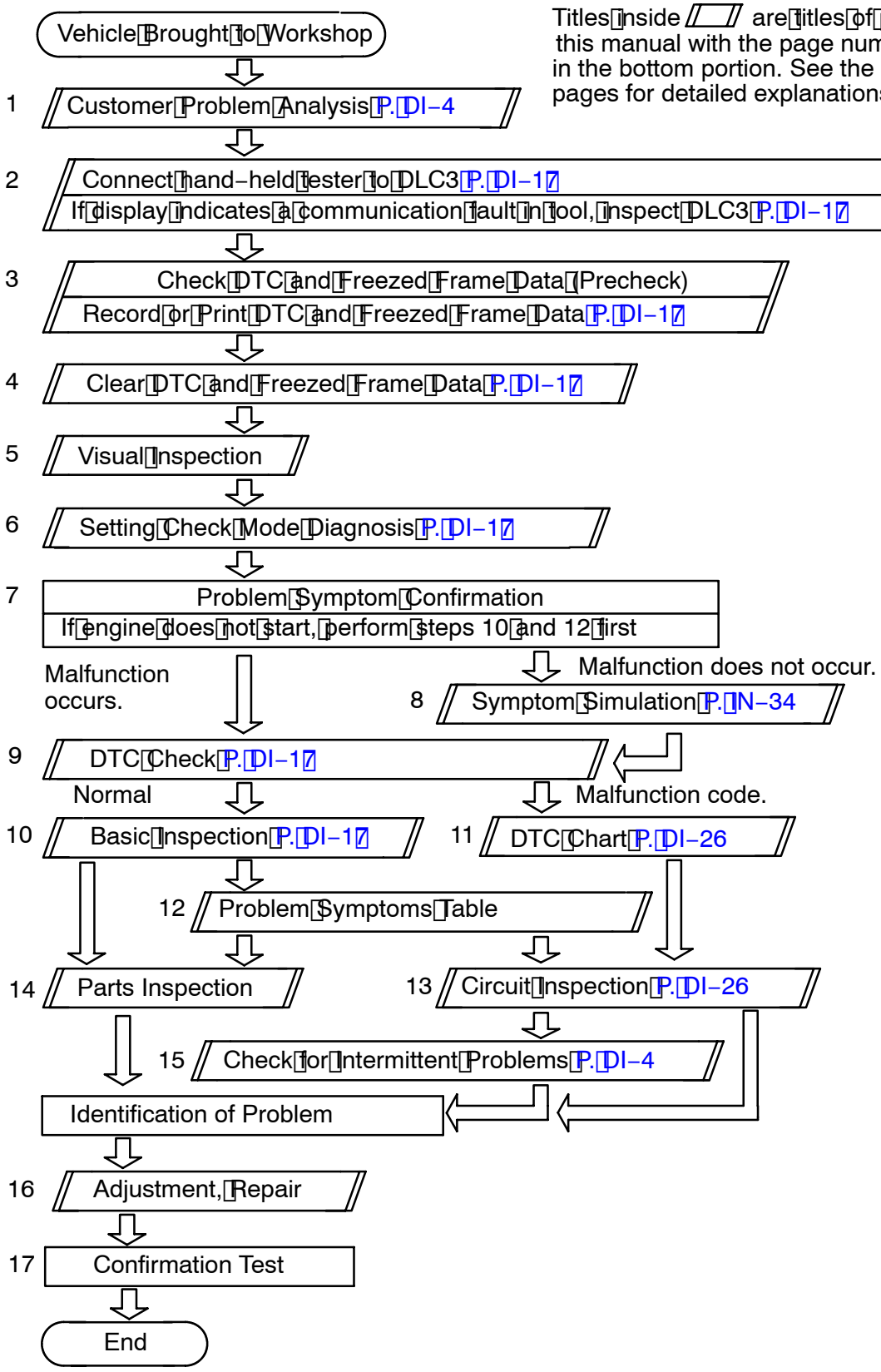
ENGINE (2JZ–GE)

DI63H–08

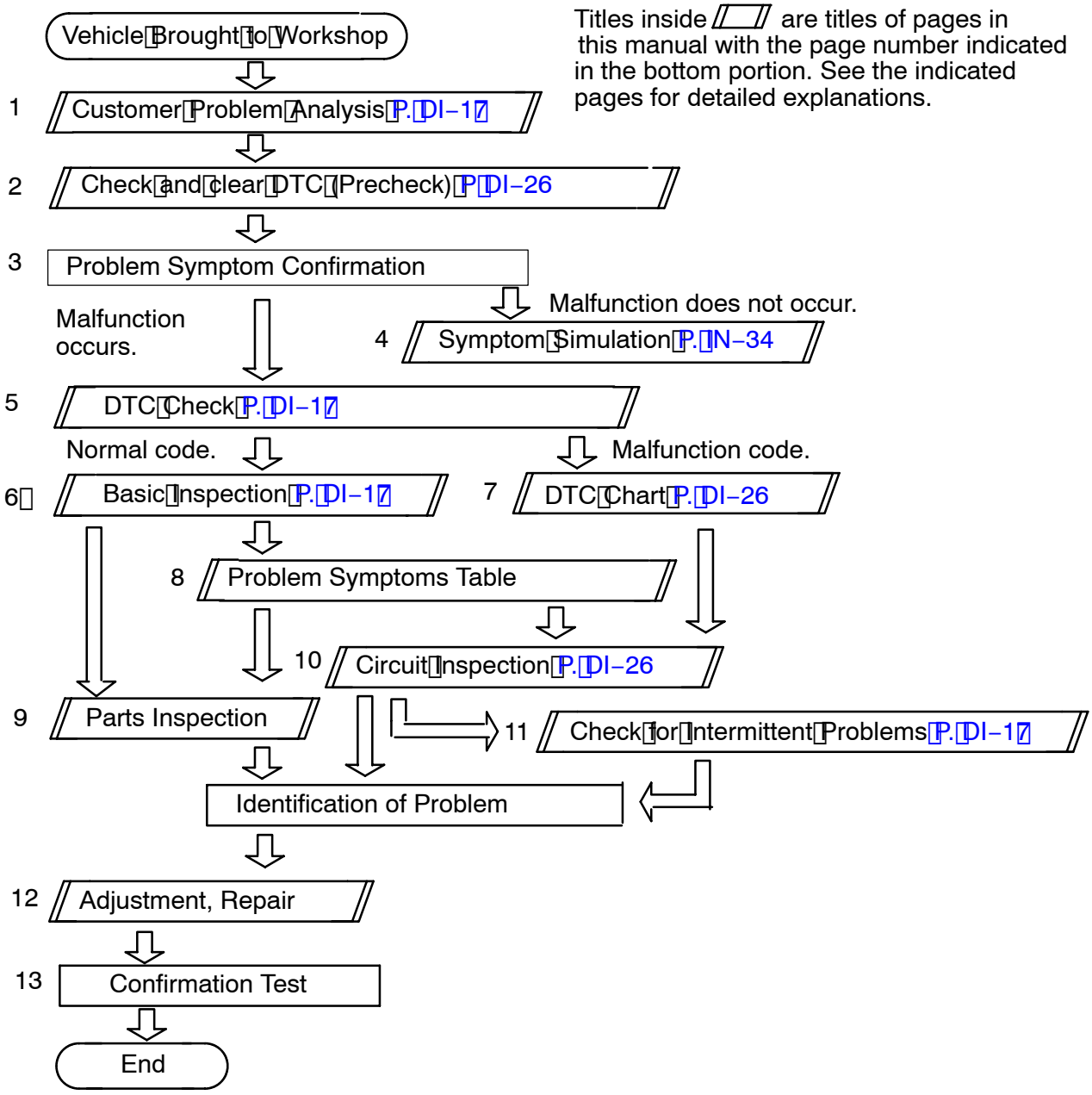
HOW TO PROCEED WITH TROUBLESHOOTING

When using hand–held tester, troubleshoot in accordance with the procedure on the following page.



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

When not using hand–held tester, troubleshoot in accordance with the procedure on the following page.



DI63I–01

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

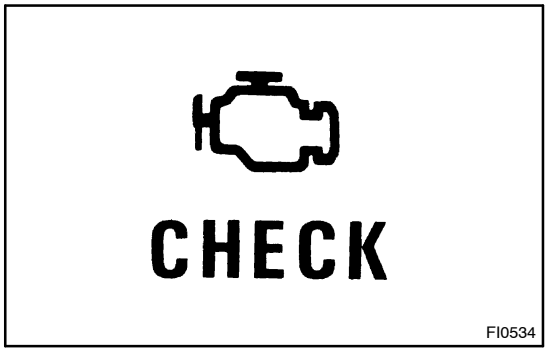
Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Date Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after–fire) ☐ Surging ☐ Knocking ☐ Other _____
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other _____
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other _____
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other _____
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____ °F/____ °C)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other _____
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other _____
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other _____

DTC Inspection	Normal Mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check (Test) Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

DI85I–02

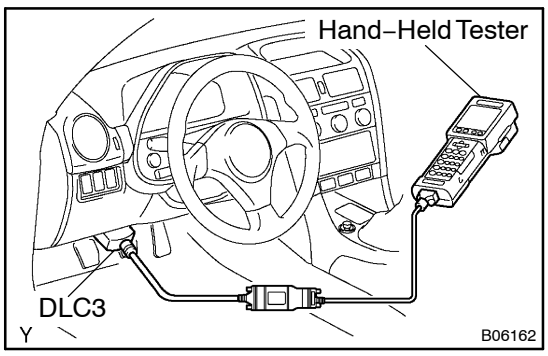


PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description for EURO–OBD (European spec.)

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD scan tool complying with ISO 15031–4 or hand–held tester, and read off various data output from the vehicle's engine ECU.
  Euro–OBD regulations require that the vehicle's on–board computer lights up the check engine warning ignition the instrument panel when the computer detects a malfunction in the emission control system/components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the check engine warning light (CHK ENG) lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO15031–6 are recorded in the engine ECU memory (See page DI–17). If the malfunction does not repaired in 3 consecutive trips, the (CHK ENG) goes off automatically but the DTCs remain recorded in the engine ECU memory.



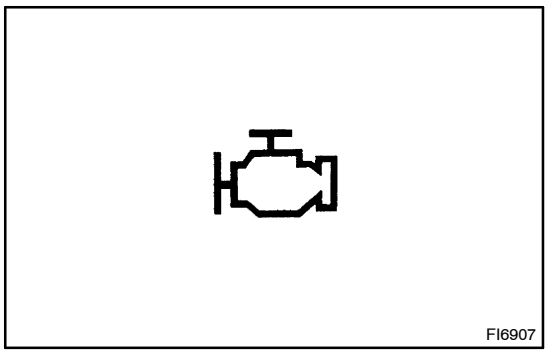
- To check the DTCs, connect the OBD scan tool or hand–held tester to the Data Link Connector 3 (DLC3) on the vehicle. The OBD scan tool or hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data (For operating instructions, see the OBD scan tool's 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–17).
- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the engine ECU to check mode when troubleshooting,

the technician can cause the check engine warning light to light up for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 2).

- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the engine ECU memory. (1st trip) If the same malfunction is detected again during the second drive test, this second detection causes the (CHK ENG) to light up. (2nd trip) (However, the ignition switch must be turned OFF between the 1st trip and the 2nd trip.).
- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300 – P0306) or fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) or other malfunction (first malfunction only), is detected.
  Because freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected, when troubleshooting, it is useful to determine 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.

Priorities for troubleshooting:
If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.
If no instructions are given, troubleshoot DTCs according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175) and misfire (DTCs P0300 – P0306).
(2) Fuel trim malfunction (DTCs P0171, P0172, P0174 and P0175).
(3) Misfire (DTCs P0300 – P0306).

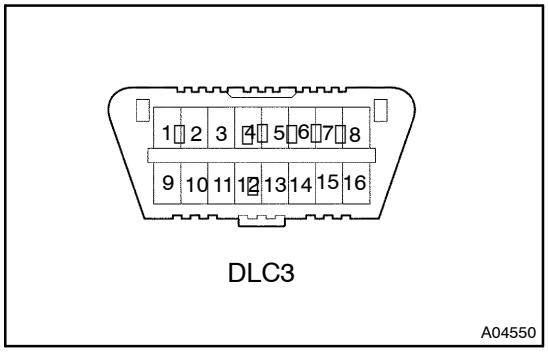

FI6907

(b) Description for M–OBD (Except European spec.)

- When troubleshooting Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the vehicle to the hand–held tester, and read off various data output from the vehicle's engine ECU.
- The vehicle's on–board computer indicates the check engine light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components.

In addition to an indication of the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) recorded in the engine ECU memory (See page DI–17). When the malfunction does not reoccur, the CHK ENG is indicated until the ignition switch is turned off, and then the CHK ENG is not indicated when the ignition switch is turned on but the DTCs remain recorded in the engine ECU memory.

- To check the DTCs, connect the hand–held tester to Data Link Connector 3 (DLC3) on the vehicle or read the DTC which is indicated on the multi information display when TC and CG terminals on the DLC3 are connected. The hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see the instruction book.)
- The diagnosis system operates in normal mode during normal vehicle use. It also has a check (test) mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the engine ECU to check (test) mode using hand–held tester when troubleshooting, the technician can cause the CHK ENG on the light up for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 2).
- * 2 trip detection logic:
  When a logic malfunction is fist detected, the malfunction is temporally stored in the engine ECU memory. If the same malfunction is detected again during the second drive test, this second detection cases the CHK ENG to light up.
  The 2 trip repeats the same mode for 2 times. (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip)
- Freeze frame data:
  Freeze frame data records the engine condition when malfunction is detected.
  Because freeze frame data records the engine conditions (fuel system, calculator load, water temperature, fuel trim, engine speed, vehicle speed, etc.) 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.



(c) Check the DLC3.
The vehicle's engine ECU uses the ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) communication protocol. The terminal arrangement of DLC3 complies with ISO 15031–3 and matches the ISO 9141–2/ISO 14230 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus ⊕ Line/Pulse generation	During transmission
4	Chassis Ground ↔ Body Ground/1 Ω or less	Always
16	Battery Positive ↔ Body Ground/9 – 14 V	Always

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

2. INSPECT DIAGNOSIS (Normal Mode)

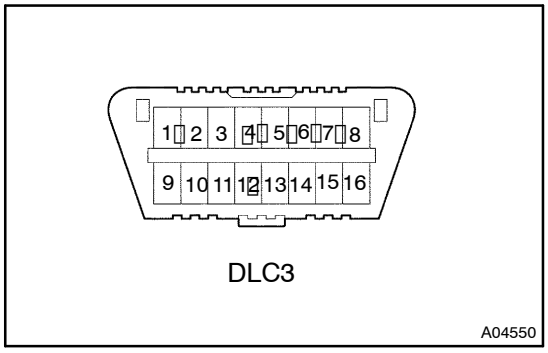
(a) Check the DTC using hand–held tester.

NOTICE:

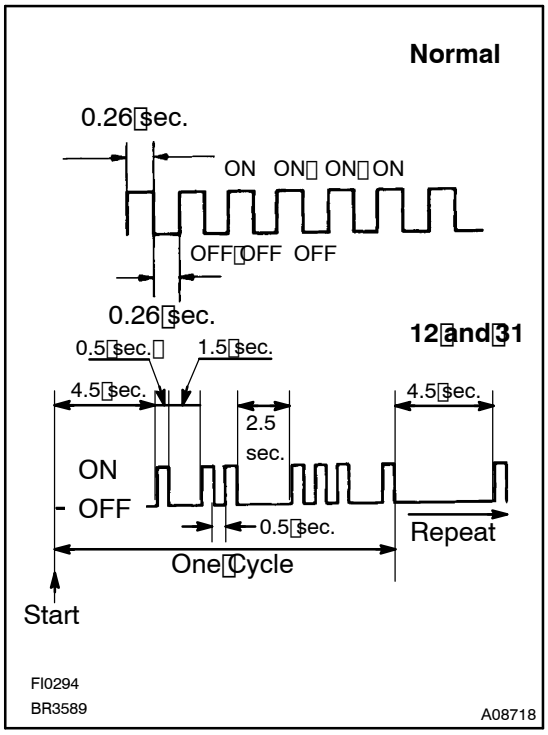
Hand–held tester only:

When the diagnosis system is switched from normal mode to check mode, it erases all DTCs and freezed frame data recorded in normal mode. So before switching 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 DLC3.
(3) Turn the ignition switch ON and push the hand–held tester main switch ON.
(4) Use the hand–held tester to check the DTCs and freezed frame data, note them down. (For operating instructions, see the hand–held tester instruction book.)
(5) See page DI–17 to confirm the details of the DTCs.



(b) Except European spec.:
Check the DTC when not using hand–held tester.
(1) Turn the ignition switch ON.
(2) Using SST, connect between terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843–18040



(3) Read the DTC from the check engine warning light (CHK ENG).
As an example, the blinking patterns for codes, normal, 12 and 31 are as shown in the illustration.
(4) Check the details of the malfunction using the DTC chart on page DI–17.
(5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn off the display.

HINT:
In the event of 2 or more malfunction cords, the indication will begin from the smaller numbered cord and continue in order to the larger.

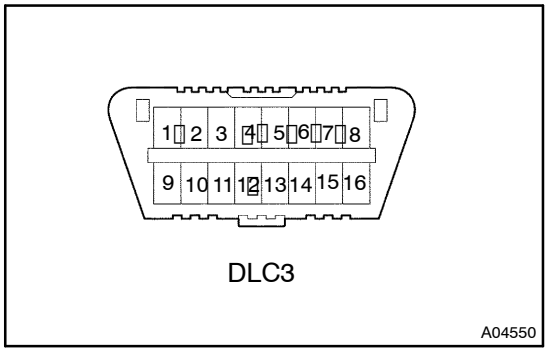
(6) Push the function key of the steering switch until EFI will be displayed on the instrument panel.
(7) Read the DTC on the instrument panel.

HINT:
- If a DTC is not indicated, check the TC terminal circuit.
- If a code No.89 is indicated, read the number of blinks of the ECT SNOW indication to get the DTC for the electric throttle control system (ETCS).

NOTICE:
- **When simulating symptoms with out a hand–held tester to check the DTCs, use normal mode. For code on the DTC chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the CHECK ENG is indicated on the instrument panel and the DTCs are recorded in the engine ECU.**
- **Check the 1st trip DTC using Mode 7 for ISO 15031 (Continuous Test Results of Euro–OBD function in hand–held tester).**

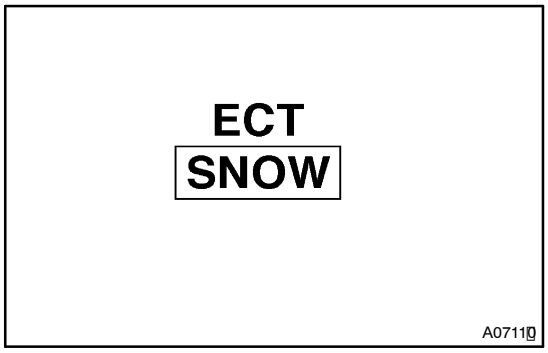
(c) Check the DTC for ETCS
(1) Turn the ignition switch ON.

HINT:
If the ECT SNOW indicator does not light up, troubleshoot the combination meter (See page BE–31).



(2) Using SST, connect between terminals 13 (TC) and 4 (CG) of the DLC3.

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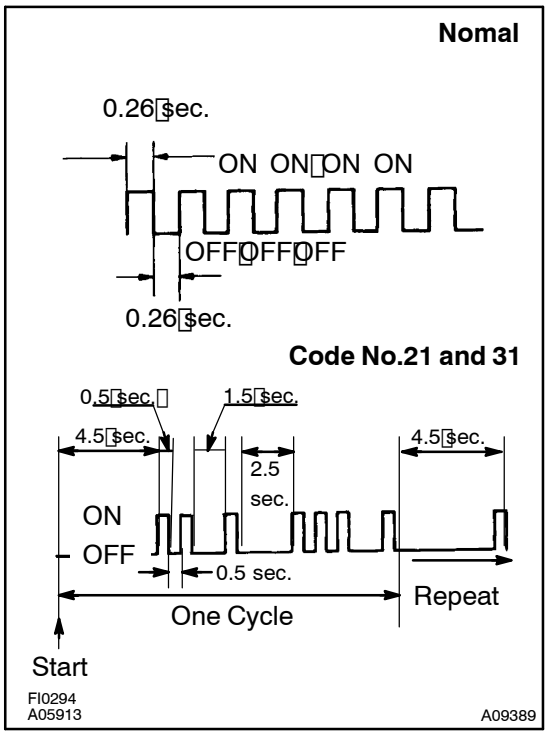
(3) Read the DTC from the ECT snow indicator the combination meter.

HINT:

If a DTC is not output, check the TC terminal circuit.

(4) Check details of the malfunction using the DTC chart on page DI–17.

(5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn off the display.



HINT:

In the event of 2 or more malfunction codes, indication will begin from the smaller numbered code and continue in order to the lager.

(d) Clear the DTC.

The DTCs and freezed frame data will be erased by either actions.

(1) Operating the hand–held tester to erase the codes (See the hand–held tester's instruction book for operating instructions.).

(2) Disconnecting the battery terminals of EFI and ECTS fuses.

NOTICE:

If the hand–held tester switches the engine ECU from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

3. INSPECT DIAGNOSIS (Check (Test) Mode)

HINT:

Hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check (test) mode.

(a) Check the DTC.

(1) Initial conditions

- Battery voltage 11 V or more
- Throttle valve fully closed.
- Transmission in P or N position
- A/C switched OFF

(2) Turn the ignition switch OFF.
(3) Prepare the hand–held tester.
(4) Connect the hand–held tester to the DLC3.
(5) Turn the ignition switch ON and push the hand–held tester main switch ON.
(6) Switch the hand–held tester from the normal mode to the check (test) mode.

NOTICE:
If the hand–held tester switches the engine ECU from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

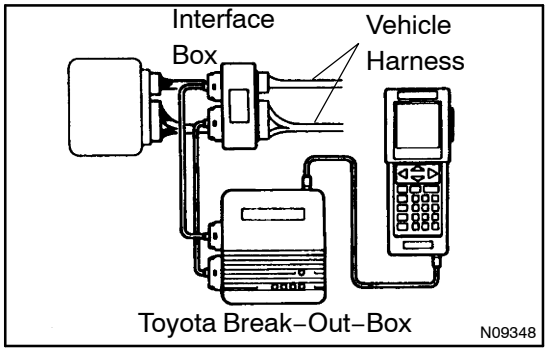
(7) Start the engine.
(8) Simulate the conditions of the malfunction described by the customer.

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 freezed frame data, etc.

HINT:
Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check (test) mode to normal mode. so all DTCs, etc. are erased.

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



(b) Engine ECU Terminal Values Measurement Using Break–Out–Box and Hand–Held Tester
(1) Hook up the break–out–box and hand–held tester to the vehicle.
(2) Read the engine ECU input/output values by following the prompts on the tester screen.

HINT:
- Hand–held tester has a ”Snapshot” function.
  This records the measured values and is effective in the diagnosis of intermittent problems.
- Please refer to the hand–held tester/break–out–box operator’s manual for further details.

4. FAIL–SAFE CHART

If any of the following codes is recorded, the engine ECU enters fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0100/31	From the amount of throttle valve opening and the engine rpm, estimate the amount of inhaled air.	Returned to normal condition
P0110/24	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115/22	Water temperature is fixed at 80°C (176°F)	Returned to normal condition

P0120/41	Saved driving mode	Ignition switch OFF
P0135/21 P0141/21 P0155/28 P0161/28	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325/52 P0330/53	Max. timing retardation	Ignition switch OFF
P1300/14 P1305/15 P1310/14 P1315/14 P1320/14 P1325/14 P1330/14 P1340/14	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

HINT:

Hand–held tester only:

By putting the vehicle's engine ECU in the check (test) mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

(a) Clear the DTCs (See step 2).

(b) Set the check (Test) mode (See step 3).

(c) Perform a simulation test (See page IN–23).

(d) Check the connector and terminal (See page IN–34).

(e) Handle the connector (See page IN–34).

6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.

1	**Is battery voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to problems table (See page DI–24)**

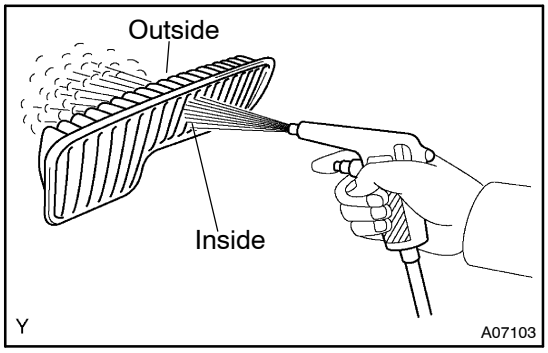
YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**

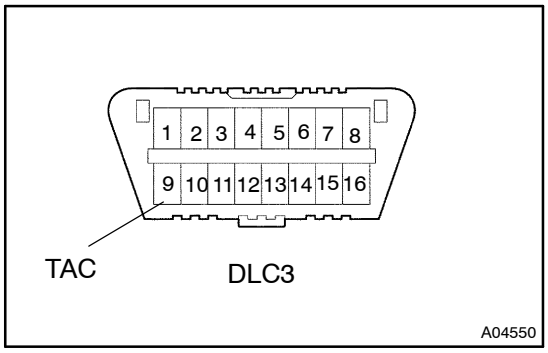


PREPARATION:
Remove the air filter.
CHECK:
Visually check that the air filter is not dirty or excessive oily.
HINT:
If necessary, clean the air filter with compressed air. First blow from inside thoroughly, then blow from outside of the air filter.

NG → **Repair or replace**

OK

5	**Check idle speed.**



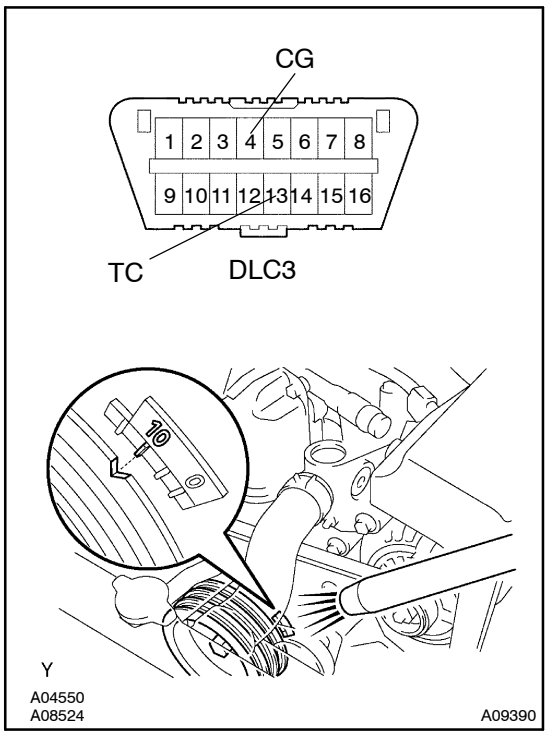
PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N position.
(e) Connect the hand–held tester to the DLC3 on the vehicle.
(f) If you have no hand–held tester, connect tachometer test prove to terminal 9 (TAC) of the DLC3.
SST 09843–18030

NOTICE:
As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before use.
CHECK:
Check the idle speed.
OK:
Idle speed: 650 – 750 rpm

NG → **Proceed to problem symptoms table (See page DI–24).**

OK

6	Check ignition timing.



PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843–18040
(e) Using a timing light, connect the tester to the ignition coil connector wire (See page EM–12).

CHECK:

Check the ignition timing.

OK:

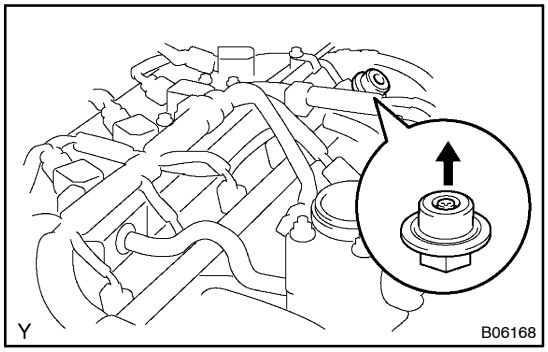
Ignition timing: 10° BTDC at idle

NG → **Proceed to page IG–1 and continue to trouble-shoot.**

OK

Proceed to problem symptoms table (See page DI–24).

7	Check fuel pressure.



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push hand–held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the hand–held tester operator's manual for further details.
(f) If you have no hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page FI–6).

CHECK:

Check that pulsation damper screw rises up when fuel pump operates.

HINT:

At this time, you will hear a fuel flowing noise.

NG	**Proceed to page FI–6 and continue to trouble-shoot.**

OK

8	**Check for spark.**

PREPARATION:

(a) Remove the ignition coil from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while engine is being cranked.

NOTICE:

To prevent excess fuel being from injected from the injectors during this test, don't crank the engine for more than 5 – 10 seconds at a time.

NG	**Proceed to page IG–1 and continue to trouble-shoot.**

OK

Proceed to problem symptoms table (See page DI–24).

7. ENGINE OPERATING CONDITION

NOTICE:

The values given below for "Normal Condition" are representative values, so a vehicle may still be normal even if its value varies differ from those listed here. So do not decide whether a part is faulty or not solely according to the "Normal Condition" here.

Hand–held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
FUEL SYS #2	Fuel System Bank 2 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED

CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 19.7 – 50.4 % Racing without load (2,500rpm): 16.8 – 47.4 %
COOLANT TEMP	Water Temp. Sensor Value	After warming up: 80 – 95˚C (176 – 203˚F)
SHORT FT #1	Short–term Fuel Trim Bank 1	0 ± 20 %
LONG FT #1	Long–term Fuel Trim Bank 1	0 ± 20 %
SHORT FT #2	Short–term Fuel Trim Bank 2	0 ± 20 %
LONG FT #2	Long–term Fuel Trim Bank 2	0 ± 20 %
ENGINE SPD	Engine Speed	Idling: 650 – 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No.1	Idling: BTDC 5 – 15˚
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to ambient temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 3.2 gm/ sec. Racing without load (2,500 rpm): 11.2 gm/sec.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0 %, 5 V → 100 %	Throttle fully closed: 8 – 20 % Throttle fully open: 64 – 96 %
O2S B1 S1	Voltage Output of Oxygen Sensor Bank 1 Sensor 1	Idling: 0.1 – 0.9 V
O2S B1 S2	Voltage Output of Oxygen Sensor Bank 1 Sensor 2	Driving (50 km/h, 31 mph): 0.1 – 0.9 V
O2S B2 S1	Voltage Output of Oxygen Sensor Bank 2 Sensor 1	Idling: 0.1 – 0.9 V
O2S B2 S2	Voltage Output of Oxygen Sensor Bank 2 Sensor 2	Driving: (50 km/h, 31 mph): 0.1 – 1.0 V
O2FT B1 S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2FT B2 S1	Oxygen Sensor Fuel Trim Bank 2, Sensor 1 (Same as SHORT FT #2)	0 ± 20 %
MIL ON RUN DIST	Distance since activation of check engine warning light	When there is no DTC: 0 km/h (0 mph)
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.9 ms
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
STARTER SIG	Starter Signal	Cranking: ON
A/C SW	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
ELE LOAD SIG	Electrical Load Signal	Defogger switch ON: ON
SW	Closed Throttle Position	Throttle fully closed: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
PS OIL PRESS SW	Power Steering Oil Pressure Switch Signal	Turn steering wheel: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1 – CYL#6	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 – 300
INTAKE CTRL VSV1	Intake Air Control Valve VSV Signal	VSV operating: ON

FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP VSV	EVAP VSV Signal	VSV operating: ON
THROTTLE POS #2	Throttle position sensor No.2 output voltage	Throttle fully closed: 2.0 – 2.9 V Throttle fully open: 4.6 – 5.0 V
ACCEL POS #1	Accelerator pedal position sensor No.1 output voltage	Accelerator pedal released: 0.25 – 0.9 V Accelerator pedal depressed: 3.2 – 4.8 V
ACCEL POS #2	Accelerator pedal position sensor No.2 output voltage	Accelerator pedal released: 1.8 – 2.7 V Accelerator pedal depressed: 4.7 – 5.0 V
THROTTLE TARGET	Target position of throttle valve	Idling: 0.4 – 1.1 V
THROTL OPN DUTY	Throttle motor opening duty ratio	Throttle fully closed: 0 % When accelerator pedal is depressed, duty ratio is increased
THROTL CLS DUTY	Throttle motor closed duty ratio	Throttle fully closed: 0 % When accelerator pedal is quick released, duty ratio is increased
THROTTLE MOT	Whether or not throttle motor control is permitted	Idling: ON
CLUTCH	Whether or not magnetic clutch control is permitted	Idling: ON
+BM	Whether or not electric throttle control system power is inputted	Idling: ON
ACCEL IDL POS	Whether or not accelerator pedal position sensor is detecting idle	Idling: ON
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle	Idling: ON
FAIL #1	Whether or not fail safe function is executed	ETCS is failed: ON
FAIL #2	Whether or not fail safe function is executed	ETCS is failed: ON
THROTTL INITAL	Throttle fully closed learning value	0.4 – 0.8 V
ACCEL LEARN VAL	Accelerator fully closed learning value	0.4 – 0.8 V
THROTTLE MOT	Throttle motor control current	Idling: 0 – 3.0 A
CLUTCH	Magnetic clutch control current	0.8 – 1.0 A
A/C MAG CLUTCH	A/C switch signal	A/C ON: ON
VVT CTRL	VVT control signal	VVT operation: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.5 – 1.4
TOTAL FT B2	Total Fuel Trim Bank 2: Average value for fuel trim system of bank 2	Idling: 0.5 – 1.4
O2 LR B1 S1	Oxygen Sensor Lean Rich Bank 1 Sensor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 – 1,000 msec.
O2 LR B2 S1	Oxygen Sensor Lean Rich Bank 2 Sensor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 – 1,000 msec.
O2 RL B1 S1	Oxygen Sensor Rich Lean Bank 1 Sensor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 – 1,000 msec.
O2 RL B2 S1	Oxygen Sensor Rich Lean Bank 1 Sensor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 – 1,000 msec.

*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

DI63K–06

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in the check mode, check the circuit for the code listed in the table below. For details of each code, turn to the page referred to under the ”See page” for the respective ”DTC No.” in the DTC chart.

ENGINE TROUBLE CODES

DTC No. (See page)	Detection Item	Trouble Area	*1 CHK ENG	Memory
P0100/31 (DI–26)	Air Flow Meter Circuit Malfunction	• Open or short in Air Flow Meter circuit • Air Flow Meter • Engine ECU	○	○
P0110/24 (DI–30)	Intake Air Temp. Circuit Malfunction	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor • Engine ECU	○	○
P0115/22 (DI–35)	Water Temp. Circuit Malfunction	• Open or short in water temp. sensor circuit • Water temp. sensor • Engine ECU	○	○
P0116/22*5 (DI–41)	Water Temp. Circuit Range/Performance Problem	• Water temp. sensor • Cooling system	○	○
P0120/41 (DI–42)	Throttle Position Sensor Circuit Malfunction	• Open or short in throttle position sensor circuit • Throttle position sensor • Engine ECU	○	○
P0121/41 (DI–48)	Throttle Position Sensor Circuit Range/Performance Problem	• Throttle position sensor	○	○
P0125/91*5 (DI–49)	Insufficient Coolant Temp. for Closed Loop Fuel Control	• Open or short in oxygen sensor (bank 1, 2 sensor 1) circuit • Oxygen Sensor (bank 1, 2 sensor 1) • Air induction system • Fuel pressure • Injector • Gas leakage on exhaust system • Engine ECU	○	○
P0130/21 (DI–57)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Injector • Engine ECU	○*5	○
P0133/21*3 (DI–63)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Injector • Engine ECU	○*3	○
P0135/21 (DI–63)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	• Open or short in heater circuit of oxygen sensor • Oxygen sensor heater • Engine ECU	○*3	○
P0136/27 (DI–69)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	• Open or short in oxygen sensor circuit • Oxygen sensor	○*5	○
P0141/21 (DI–67)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	• Same as DTC No. P0135/21	○*3	○

P0150/28 (DI–57)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	• Same as DTC No. P0130/21	○*3	○
P0153/28*3 (DI–63)	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	• Same a DTC No. P0133/21	○*3	○
P0155/28 (DI–67)	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	• Same as DTC No. P0135/21	○*3	○
P0156/29 (DI–69)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	• Same as DTC No. P0136/27	○*3	○
P0161/28 (DI–67)	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)	• Same as DTC No. P0135/21	○*3	○
P0171/25 (DI–71)	System too Lean (A/F Lean Malfunction, Bank 1)	• Air induction system • Injector blockage • Vacuum Sensor • Water temp. sensor • Fuel pressure • Gas leakage on exhaust system • Open or short in oxygen sensor (bank1, 2 sensor1) circuit • Oxygen sensor (bank1, 2 sensor1) • Engine ECU	○*3	○
P172/26*3 (DI–71)	System too Rich (A/F Rich Malfunction, Bank 1)	• Injector leak, blockage • Vacuum sensor • Water temp. sensor • Ignition system • Fuel pressure • Gas leakage on exhaust system • Open or short in oxygen sensor (bank1, 2 sensor1) circuit • Oxygen sensor (bank1, 2 sensor1) • Engine ECU	○	○
P0174/25 (DI–71)	System too Lean (A/F Lean Malfunction, Bank 2)	• Same as DTC No. P0171/25	○*3	○
P0175/26*3 (DI–71)	System too Rich (A/F Rich Malfunction, Bank 2)	• Same as DTC No. P0172/26	○	○
P0300/93*3 (DI–76)	Random/Multiple Cylinder Misfire Detected	• Open or short engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Vacuum sensor • Water temp. sensor • Compression pressure • Valve clearance • Valve timing • Engine ECU	○	○
P0301/93*3 (DI–76)	Cylinder 1 Misfire Detected			
P0302/93*3 (DI–76)	Cylinder 2 Misfire Detected			
P0303/93*3 (DI–76)	Cylinder 3 Misfire Detected			
P0304/93*3 (DI–76)	Cylinder 4 Misfire Detected			
P0305/93*3 (DI–76)	Cylinder 5 Misfire Detected			
P0306/93*3 (DI–76)	Cylinder 6 Misfire Detected			
P0325/52 (DI–81)	Knock Sensor 1 Circuit Malfunction (Bank 1)	• Open or short in knock sensor 1 circuit • Knock sensor 1 (looseness) • Engine ECU	○	○
P0330/55 (DI–81)	Knock Sensor 2 Circuit Malfunction (Bank 2)	• Open or short in knock sensor 2 circuit • Knock sensor 2 (looseness) • Engine ECU	○	○

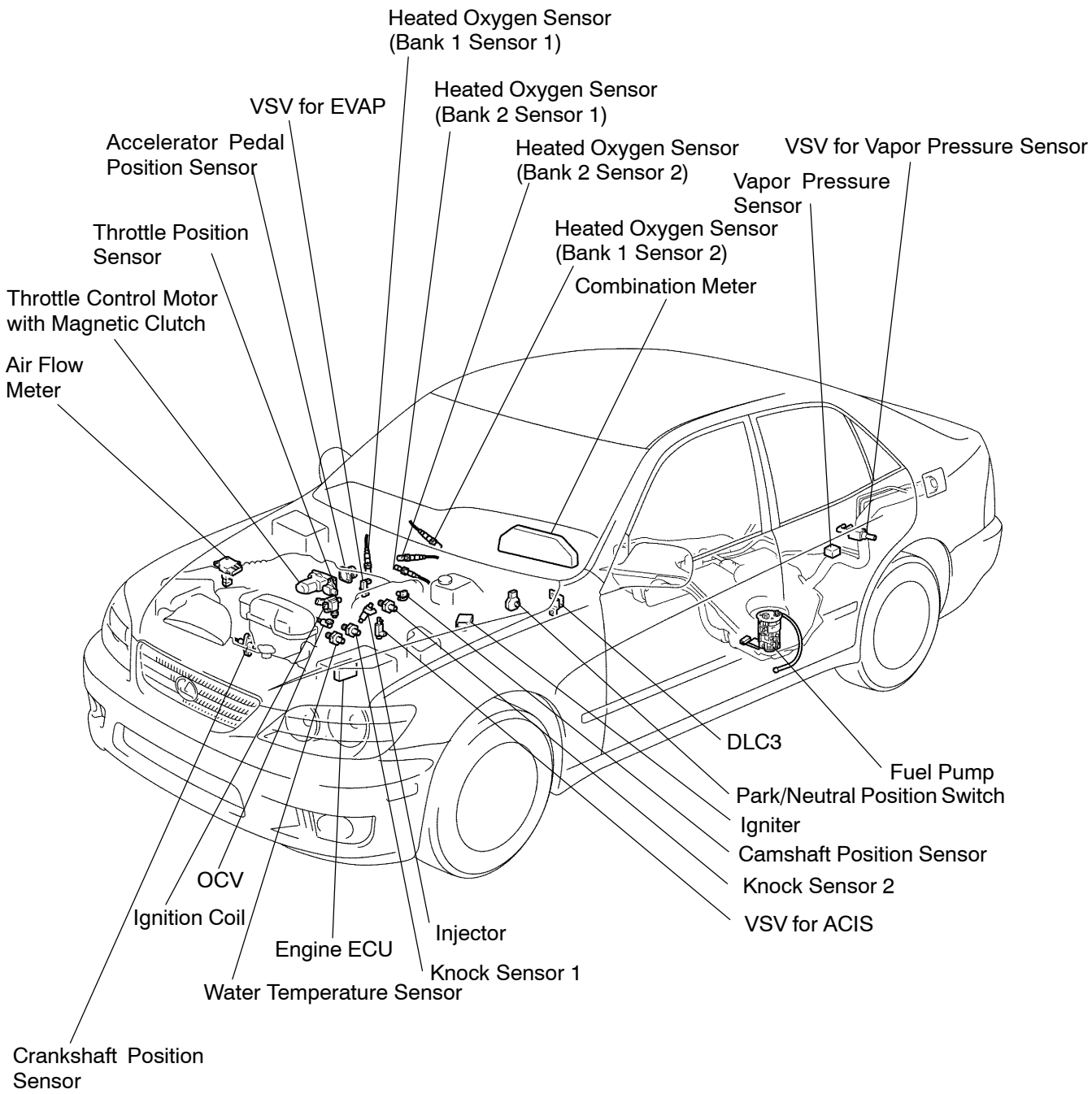
P0335/12, 13 (DI–84)	Crankshaft Position Sensor Circuit Malfunction (NE Signal)	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Crankshaft timing pulley • Engine ECU	○	○
P0340/12 (DI–86)	Camshaft Position Sensor Circuit Malfunction (G Signal)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Intake camshaft • Engine ECU	○	○
P0420/94*3 (DI–88)	Catalyst System Efficiency Below Threshold (Bank 1)	• Gas leakage on exhaust system • Oxygen sensor • Three–way catalytic converter	○	○
P0430/94*3 (DI–88)	Catalyst System Efficiency Below Threshold (Bank 2)	• Same as DTC P0420/94	○	○
P0443/94*3 (DI–91)	Evaporative Emission Control System Purge Control Vent Control Malfunction	• Open or short in VSV circuit for EVAP • VSV for EVAP • Engine ECU	○	○
P0500/42 (DI–94)	Vehicle Speed Sensor Malfunction	• Open or short in vehicle speed sensor circuit • Transmission output speed sensor • Engine ECU	○	○
P0505/33*3 (DI–100)	Idle Control System Malfunction	• Air induction system • Electric throttle control system	○	○
P0550/75 (DI–101)	Power Steering Pressure Sensor Circuit Malfunction	• PS pressure sensor • Engine ECU	○	○
P1120/19 (DI–103)	Accelerator Pedal Position Sensor Circuit Malfunction	• Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • Engine ECU	○	○
P1121/19 (DI–109)	Accelerator Pedal Position Sensor Range/Performance Problem	• Accelerator pedal position sensor	○	○
P1125/89*2 (DI–110)	Throttle Control Motor Circuit Malfunction	• Open or short in throttle control motor circuit • Throttle control motor • Engine ECU	○	○
P1126/89*2 (DI–113)	Magnetic Clutch Circuit Malfunction	• Open or short in magnetic clutch circuit • Magnetic clutch • Engine ECU	○	○
P1127/89*2 (DI–116)	ETCS Actuator Power Source Circuit Malfunction	• Open in ETCS power source circuit • Engine ECU	○	○
P1128/89*2 (DI–118)	Throttle Control Motor Lock Malfunction	• Throttle control motor • Throttle body	○	○
P1129/89*2 (DI–120)	Electric Throttle Control System Malfunction	• Electric throttle control system • Engine ECU	○	○
P1200/78*4 (DI–121)	Fuel Pump Relay/Engine ECU Circuit Malfunction	• Open or short in fuel pump relay circuit • Fuel pump relay • Engine ECU	○	○
P1300/14 (DI–125)	Igniter Circuit Malfunction	• Ignition system • Open or short in IGF or IGT1 – 3 circuit from igniter to engine ECU • Igniter • Engine ECU	○	○
P1335/13 (DI–131)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Crankshaft timing pulley • Engine ECU	–	○

P1346/18 (DI–132)	VVT Sensor/Camshaft Position Sensor Circuit Range/Performance Problem (Bank 1)	• Mechanical system (Jumping teeth of timing belt, belt stretched) • ECM	○	○
P1349/59 (DI–133)	VVT System Malfunction (Bank 1)	• Valve timing • OCV • VVT controller assembly • Engine ECU	○*5	○
P1520 (DI–140)	Stop Light Switch Signal Circuit	• Open or short in stop light switch signal circuit • Stop light switch • Engine ECU	○	○
P1633/89*2 (DI–143)	Engine ECU Malfunction (ETCS Circuit)	• Engine ECU	○	○
P1645/82 (DI–144)	Body ECU Malfunction	• Body ECU • A/C ECU • Communication bus	–	–
P1651/96*5 (DI–145)	VSV for ACIS Circuit Malfunction	• Open or short in VSV circuit for ACIS • VSV for ACIS • Engine ECU	○	○
P1656/39 (DI–149)	OCV Circuit Malfunction (Bank 1)	• Open or short in OCV circuit • OCV • Engine ECU	○	○
P1780/97 (DI–231)	Park/Neutral Position Switch Malfunction	• Short in neutral start switch circuit • Neutral start switch • Engine ECU	○	○

*1: ○ ... CHK ENG is indicated. – ... CHK ENG is not indicated.
*2: Except Europe if the DTC No.89 is indicated on the check engine warning light, read the DTC for ETCS from ECT SNOW indicator to get the detail of the DTC No.89. If using the hand–held tester, the detail DTC for ETCS is displayed on the hand–held tester.
*3: Europe.
*4: Except Europe.
*5: Except Australia.

DI2DI–09

PARTS LOCATION

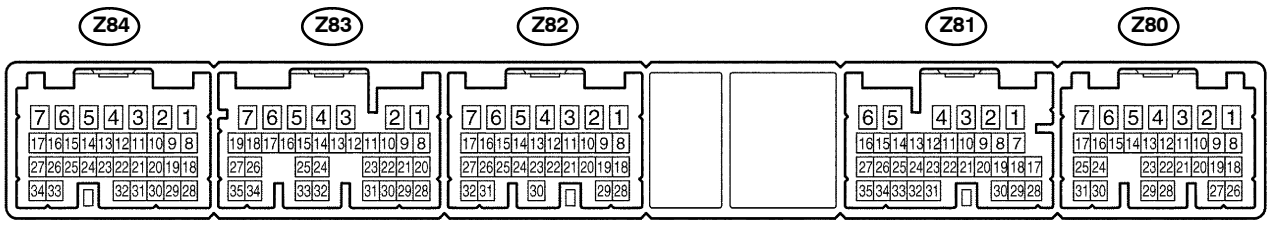


P A14020

A17198

TERMINALS OF ECU

DI2S1–05



D11582

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (Z80–4) – E1 (Z83–7)	B–Y ↔ BR	Always	9 – 14
+BM (Z80–7) – E1 (Z83–7)	V–Y ↔ BR		
IGSW (Z80–17) – E1 (Z83–7)	B –O ↔ BR	IG switch ON	9 – 14
+B (Z80–6) – E1 (Z83–7)	B–R ↔ BR		
+B2 (Z80–5) – E1 (Z83–7)	B–R ↔ BR		
VC (Z81–35) – E2 (Z81–34)	L–Y ↔ BR	IG switch ON	4.5 – 5.5
VTA (Z84 25) – E2 (Z81 34)	Y–G ↔ BR	IG switch ON Accelerator pedal released	0.4 – 1.0
		IG switch ON Accelerator pedal depressed	3.2 – 4.8
VTA2 (Z84 24) – E2 (Z81 34)	Y–R ↔ BR	IG switch ON Accelerator pedal released	2.0 – 2.9
		IG switch ON Accelerator pedal depressed	4.6 – 5.1
VPA (Z81 33) – E2 (Z81 34)	L ↔ BR	IG switch ON Accelerator pedal released	0.3 – 0.9
		IG switch ON Accelerator pedal depressed	3.2 – 4.8
VPA2 (Z81 32) – E2 (Z81 34)	L–R ↔ BR	IG switch ON Accelerator pedal released	1.8 – 2.7
		IG switch ON Accelerator pedal depressed	4.7 – 5.1
VG (Z82–27) – EVG (Z82–26)	R–L ↔ GR	Idling, P or N position, A/C switch OFF	1.1 – 1.5
THA (Z82–32) – E2 (Z81–34)	W–R ↔ BR	Idling, Intake air temp. 20°C (68°F)	0.5 ~ 3.4
THW (Z82–24) – E2 (Z81–34)	B–R ↔ BR	Idling, Engine coolant temp. 80°C (176°F)	0.2 ~ 1.0
STA (Z80–12) – E1 (Z83–7)	B ↔ BR	Shift lever position P or N position, ignition switch START	9 ~ 14
#10 (Z84–15) – E01 (Z82–2) #20 (Z82–17) – E01 (Z82–2) #30 (Z84–14) – E01 (Z82–2) #40 (Z82–16) – E01 (Z82–2) #50 (Z84–13) – E01 (Z82–2) #60 (Z82–15) – E01 (Z82–2)	Y ↔ W–B B–W ↔ W–B L ↔ W–B R ↔ W–B W ↔ W–B R–L ↔ W–B	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page FI–22)
IGT (Z82–13) – E1 (Z83–7) IGT2 (Z84–27) – E1 (Z83–7) IGT3 (Z84–26) – E1 (Z83–7)	Y ↔ BR G–B ↔ BR R–W ↔ BR	Idling	Pulse generation (See page DI–125)
IGF (Z82–7) – E1 (Z83–7)	R–Y ↔ BR	IG switch ON	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–125)

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
G2 (Z84–29) – NE– (Z84–32)	Y ↔ L	Idling	Pulse generation (See page DI–81)
NE (Z84–31) – NE– (Z84–32)	W ↔ L		
M–REL (Z80–13) – E1 (Z83–7)	B–Y ↔ BR	IG switch ON	9 ~ 14
STP (Z81–4) – E1 (Z83–7)	G–W ↔ BR	Brake pedal is depressed	7.5 ~ 14
		Brake pedal is released	Below 1.5
PRG (Z84–11) – E01 (Z82–2)	B–R ↔ W–B	IG switch ON	9 ~ 14
OX1A (Z83–28) – E2 (Z81–34) OX1B (Z81–28) – E2 (Z81–34) OX2A (Z82–28) – E2 (Z81–34) OX2B (Z81–17) – E2 (Z81–34)	B ↔ BR W ↔ BR W ↔ BR R ↔ BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI–49)
HT1A (Z83–9) – E01 (Z82–2) HT1B (Z81–7) – E01 (Z82–2) HT2A (Z82–30) – E01 (Z82–2) HT2B (Z81–8) – E01 (Z82–2)	R ↔ W–B G ↔ W–B Y ↔ W–B GR–B ↔ W–B	Idling	Below 3.0
		IG switch ON	9 ~ 14
KNK1 (Z83–1) – E1 (Z83–7)	B ↔ BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI–81)
KNK2 (Z83–2) – E1 (Z83–7)	GR ↔ BR		
TC (Z81–3) – E1 (Z83–7)	P–B ↔ BR	IG switch ON	9 ~ 14
W (Z81–2) – E01 (Z82–2)	GR–R ↔ W–B	Idling	9 ~ 14
		IG switch ON	Below 3.0
ACMG (Z80–16) – E01 (Z82–2)	L–O ↔ W–B	A/C switch ON (At Idling)	Below 3.0
		A/C switch OFF	9 ~ 14
OCV+ (Z84–6) – OCV– (Z84–5)	W–R ↔ Y–B	IG switch ON	Pulse generation (See page DI–133)
ACIS (Z82–21) – E01 (Z82–2)	B–L ↔ W–B	IG switch ON	9 ~ 14
		Engine speed between 2.500 and 4,000 rpm	Below 3.0
CL+ (Z84–10) – CL– (Z84–9)	G–R ↔Y–R	Idling	Pulse generation (See page DI–110)
M+ (Z84–3) – ME01 (Z82–3) M– (Z84–2) – ME01 (Z82–3)	W ↔ BR R ↔ BR	Idling	Pulse generation (See page DI–110)
SIL (Z80–26) – E1 (Z83–7)	W ↔ BR	IG switch ON	9 ~ 14
SP2+ (Z83–23) – SP2– (Z83–22)	L–Y ↔ R–L	Vehicle is driving	Pulse generation (See page DI–94)

DI2T1–06

PROBLEM SYMPTOMS TABLE

When the malfunction is not confirmed in the diagnostic trouble code check and the problem still can not be confirmed in the basic inspection, proceed to this matrix chart and troubleshoot according to the numbered order given below.

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST–16
	2. Neutral start switch circuit	DI–231
	3. Body ECU	DI–549
No initial combustion (Does not start)	1. Engine ECU power source circuit	DI–156
	2. Ignition coil with igniter	DI–125
	3. Fuel pump control circuit	DI–121
	4. Injector circuit	DI–76
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–121
	2. Ignition coil with igniter	DI–125
	3. Injector circuit	DI–76
Engine cranks normally (Difficult to start)	1. Starter signal circuit	DI–152
	2. Fuel pump control circuit	DI–121
	3. Ignition coil with igniter	DI–125
	4. Spark plug	IG–1
	5. Compression	EM–3
	6. Injector circuit	DI–76
Cold engine (Difficult to start)	1. Starter signal circuit	DI–152
	2. Fuel pump control circuit	DI–121
	3. Injector circuit	DI–76
	4. Ignition coil with igniter	DI–125
	5. Spark plug	IG–1
Hot engine (Difficult to start)	1. Starter signal circuit	DI–152
	2. Fuel pump control circuit	DI–121
	3. Injector circuit	DI–76
	4. Ignition coil	–
	5. Spark plug	IG–1
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit)	DI–612
	2. Engine ECU power source circuit	DI–156
	3. Neutral start switch circuit	DI–231
	4. Back up power source circuit	DI–165
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit)	DI–612
	2. Neutral start switch circuit	DI–231
	3. Fuel pump control circuit	DI–121
	4. Injector circuit	DI–76
	5. Air flow meter circuit	DI–26
	6. Back up power source circuit	DI–165
Rough idling (Poor idling)	1. Air flow meter circuit	DI–549
	2. Injector circuit	DI–76
	4. Ignition coil with igniter	DI–125
	5. Compression	EM–3
	6. Fuel pump control circuit	DI–121
	7. Back up power source circuit	DI–165
Hunting (Poor idling)	1. Air flow meter circuit	DI–549
	2. Engine ECU power source circuit	DI–156
	3. Fuel pump control circuit	DI–121

Hesitation/Poor acceleration (Poor driveability)	1. Air flow meter circuit 2. Injector circuit 3. Fuel pump control circuit 4 Ignition coil with igniter 5. A/T faulty	DI–549 DI–76 DI–121 DI–125 DI–167
Muffler explosion, after fire (Poor driveability)	1. Ignition coil 2. Spark plug 3. Injection circuit	DI–76 IG–1 DI–76
Surging (Poor driveability)	1. Fuel pump connector circuit 2. Spark plug 3. Injection circuit	DI–121 IG–1 DI–76
Engine stall (Soon after starting)	1. Fuel pump connector circuit 2. Air flow meter circuit	DI–121 DI–26
Engine stall (After accelerator pedal depressed)	1. Air flow meter circuit	DI–26
Engine stall (After accelerator pedal released)	1. Air flow meter circuit 2. Engine ECU	DI–26 IN–34
Engine stall (During A/C operation)	1. A/C signal circuit (Compressor circuit) 2. Engine ECU	DI–612 IN–34
Engine stall (When shifting N to D)	1. Neutral start switch circuit	DI–231

DI7GR–08

CIRCUIT INSPECTION

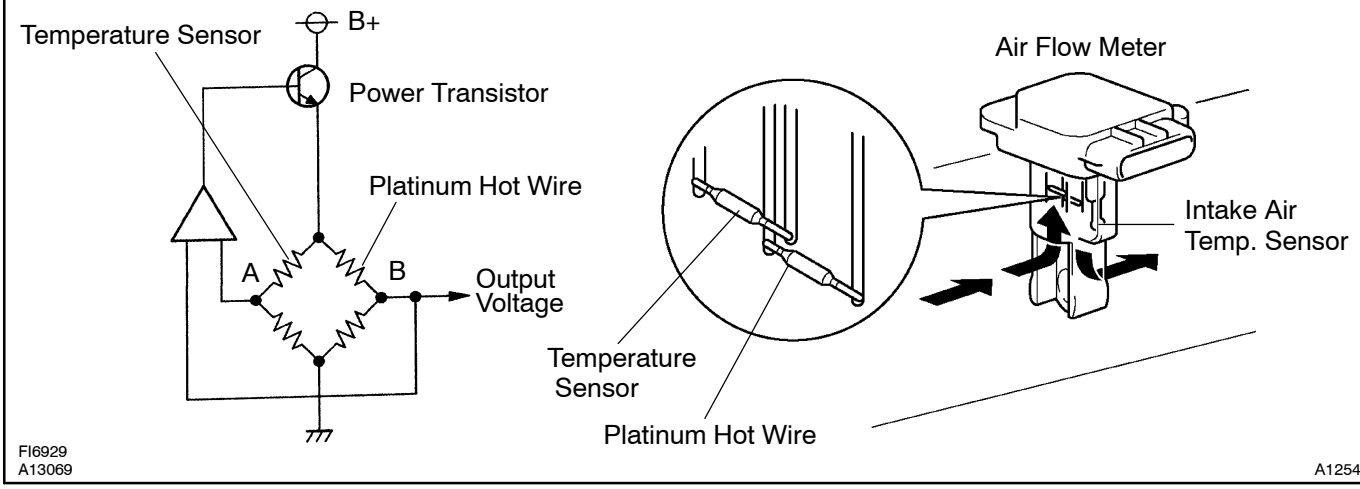
DTC	P0100/31	Air Flow Meter Circuit Malfunction

CIRCUIT DESCRIPTION

The air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, temperature sensor and a control circuit installed in a plastic housing. The hot wire air flow meter works on the principle that the hot wire and temperature sensor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the air flow meter.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



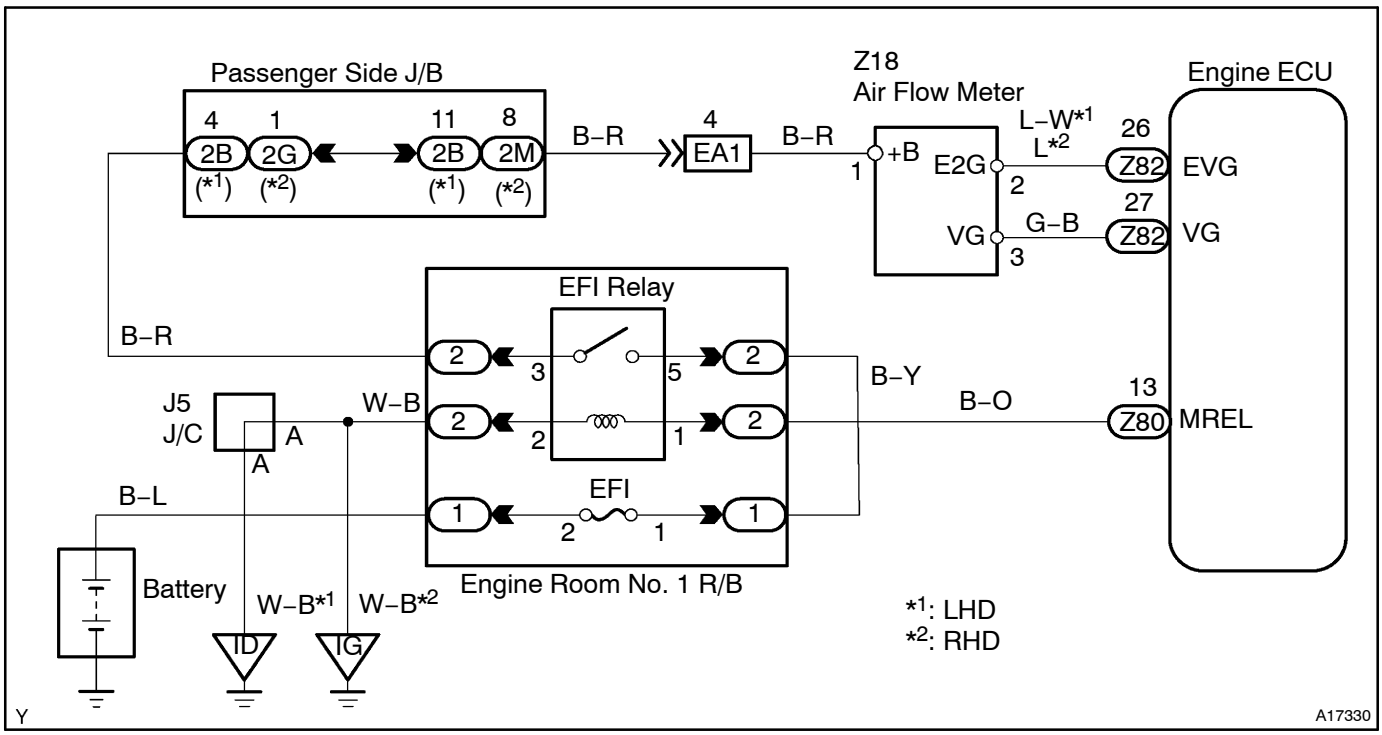
DTC No.	DTC Detection Condition	Trouble Area
P0100/31	Open or short in air flow meter circuit with more than 3 sec. and engine speed is less than 4,000 rpm	• Open or short in air flow meter circuit • Air flow meter • Engine ECU

HINT:

After confirming DTC P0100/31, use the hand–held tester to confirm the air flow ratio from the CURRENT DATA.

Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	• Air flow meter power source circuit open • VG circuit open or short
271.0 or more	• EVG circuit open

WIRING DIAGRAM



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 was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect hand–held tester, and read value of air flow rate.**

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) Start the engine.

CHECK:

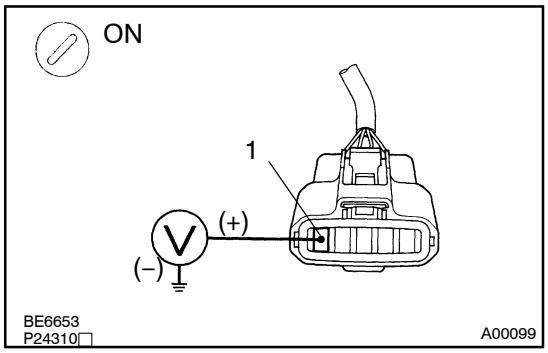
Read the air flow rate on the hand–held tester.

RESULT:

	Type I	Type II
Air Flow Rate (gm/sec.)	0.0	271.0 or more

Type I	**Go to step 2.**
Type II	**Go to step 5.**

2	**Check voltage of air flow meter power source.**



PREPARATION:

(a) Disconnect the air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 1 of the air flow meter connector and body ground.

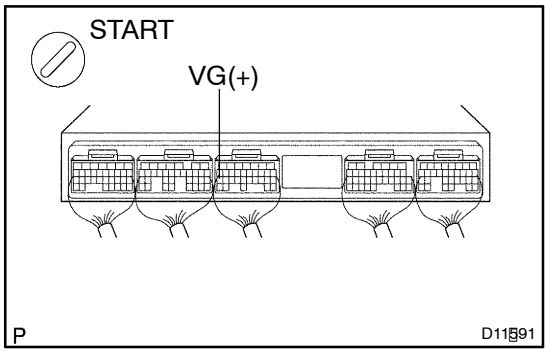
OK:

Voltage: 9 – 14 V

NG	**Check for open in harness and connector between EFI main relay (Marking: EFI MAIN) and air flow meter (See page IN–34).**

OK

3	**Check voltage between terminals VG of engine ECU connector and body ground.**



PREPARATION:

(a) Remove the engine ECU hood and cover.

(b) Start the engine.

CHECK:

Measure the voltage between terminal VG of the engine ECU connector and body ground while the engine is idling.

OK:

Voltage:

0.2 – 4.9 V (P or N position and A/C switch OFF)

OK	**Check and replace engine ECU (See page IN–34).**

NG

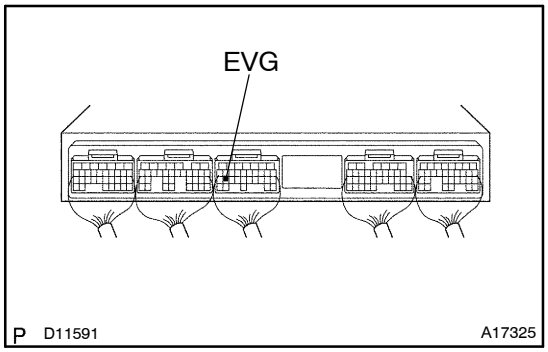
4	**Check for open and short in harness and connector between air flow meter and engine ECU (See page IN–34).**

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

OK

Replace air flow meter.

5	**Check continuity between terminal EVG of engine ECU connector and body ground.**



PREPARATION:
Remove the engine ECU hood and cover.
CHECK:
Check the continuity between terminal EVG of the engine ECU connector and body ground.
OK:
Continuity (1 Ω or less)

NG → **Check and replace engine ECU (See page IN–34).**

OK

6	**Check for open in harness and connector between air flow meter and engine ECU (See page IN–34).**

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

OK

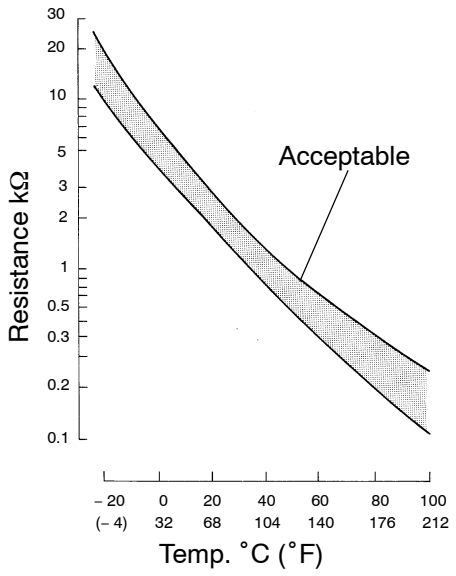
Replace air flow meter.

DI63Q–06

DTC	P0110/24	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

(Fig. 1)



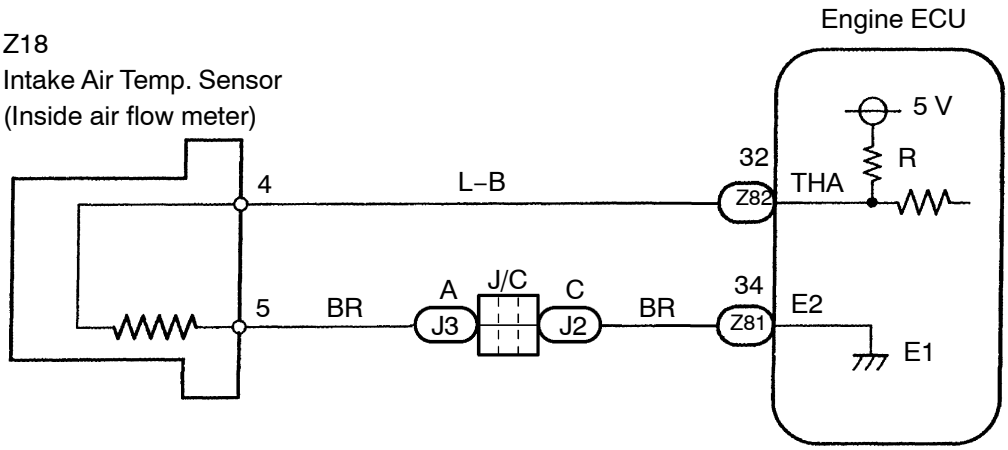
The intake air temperature sensor is built into the air cleaner and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See Fig. 1).
The intake air temperature sensor is connected to the engine ECU (See below). The 5 V power source voltage in the engine ECU is applied to the intake air temp. sensor from terminal THA via resistor R.
That is, resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the engine ECU increases the fuel injection volume to improve driveability during cold engine operation.

DTC No.	DTC Detecting Condition	Trouble Area
P0110/24	Open or short in intake air temp. sensor circuit	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor • Engine ECU

HINT:
After confirming DTC P0110/24, use the hand–held tester to confirm the intake air temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
–40°C (–40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0100/31, P0101/31, P0110/24, P0115/22, P0120/41, P0121/41, P1120/19 and P1121/19 are output simultaneously, E2 (sensor ground) may be open.
- 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.

When using hand–held tester:

1	**Connect hand–held tester, and read value of intake air temperature.**

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.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Same as actual intake air temperature.

HINT:

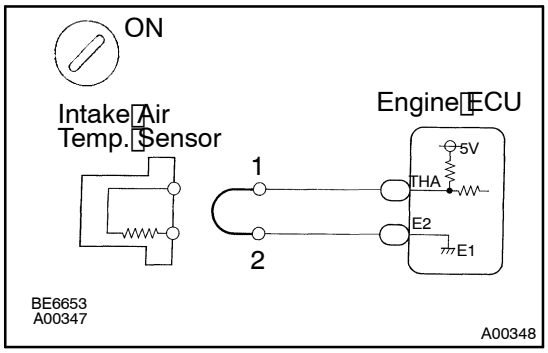
- If there is open circuit, hand–held tester indicates –40°C (–40°F).
- If there is short circuit, hand–held tester indicates 140°C (284°F) or more.

NG → **–40°C (–40°F) ... Go to step 2**
140°C (284°F) or more ... Go to step 4.

OK

Check for intermittent problems
(See page DI–17).

2	Check for open in harness or engine ECU.



PREPARATION:

(a) Disconnect the intake air temperature sensor connector.

(b) Connect the sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the hand–held tester.

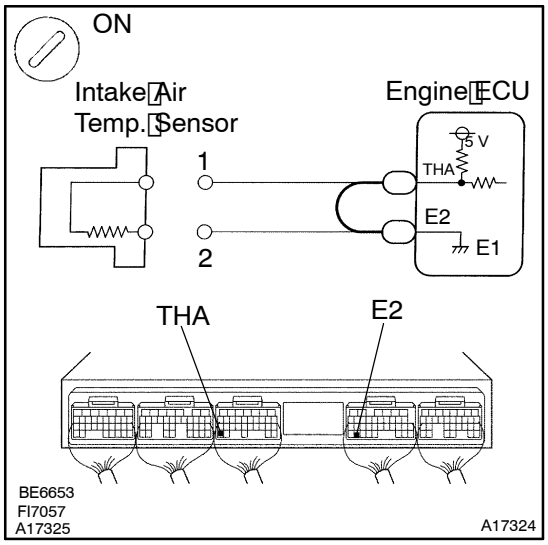
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace intake air temperature sensor.

NG

3	Check for open in harness or engine ECU connector.



PREPARATION:

(a) Remove the engine ECU hood and cover.

(b) Connect between terminals THA and E2 of the engine ECU connector.

HINT:

The intake air temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the engine ECU connector (See page IN–34).

CHECK:

Read the temperature value on the hand–held tester.

OK:

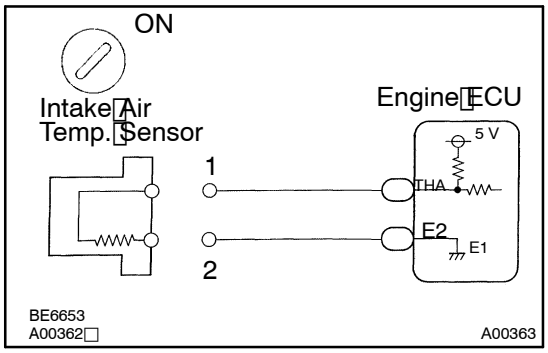
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THA, repair or replace harness.

NG

Confirm good connection at engine ECU. If OK, check and replace engine ECU (See page IN–34).

4	Check for short in harness and engine ECU.



PREPARATION:

(a) Disconnect the intake air temperature sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read the temperature value on the hand–held tester.

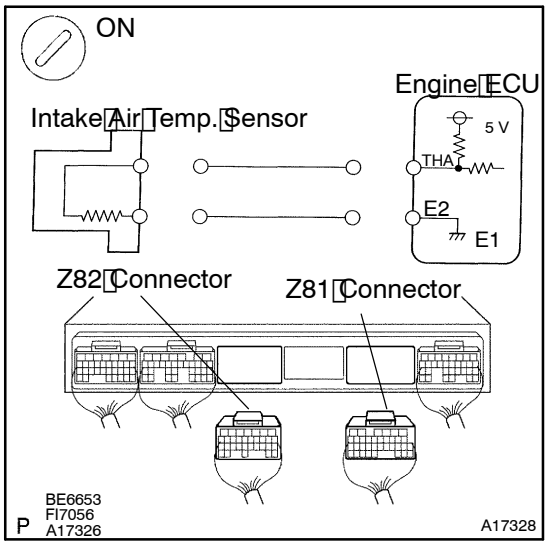
OK:

Temperature value: –40°C (–40°F)

OK	Replace intake air temperature sensor.

NG

5	Check for short in harness or engine ECU.



PREPARATION:

(a) Remove the engine ECU hood.

(b) Disconnect the Z82 and Z81 connector from the engine ECU.

HINT:

The intake air temperature sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Temperature value: –40°C (–40°F)

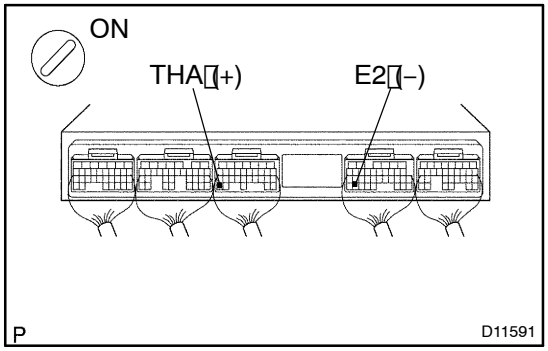
OK	Repair or replace harness or connector.

NG

Check and replace engine ECU (See page IN–34).

When not using hand–held tester:

1	Check voltage between terminals THA and E2 of engine ECU connector.



PREPARATION:

(a) Remove the engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals THA and E2 of the engine ECU connector.

OK:

Intake Air Temperature	Voltage
20°C (68°F)	0.5 – 3.4 V
60°C (140°F)	0.2 – 1.0 V

OK: Check for intermittent problems (See page DI–17).

NG

2	Check intake air temperature sensor (See page FI–31).

NG: Replace intake air temperature sensor.

OK

3	Check for open and short in harness and connector between engine ECU and intake air temperature sensor (See page IN–34).

NG: Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

DI2S4–10

DTC	P0115/22	Water Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

A thermistor built into the water temp. sensor changes the resistance value according to the water temperature.

The structure of the sensor and connection to the engine ECU is the same as in the DTC P0110/24 (Intake Air Temp. Circuit Malfunction) shown on page DI–30.

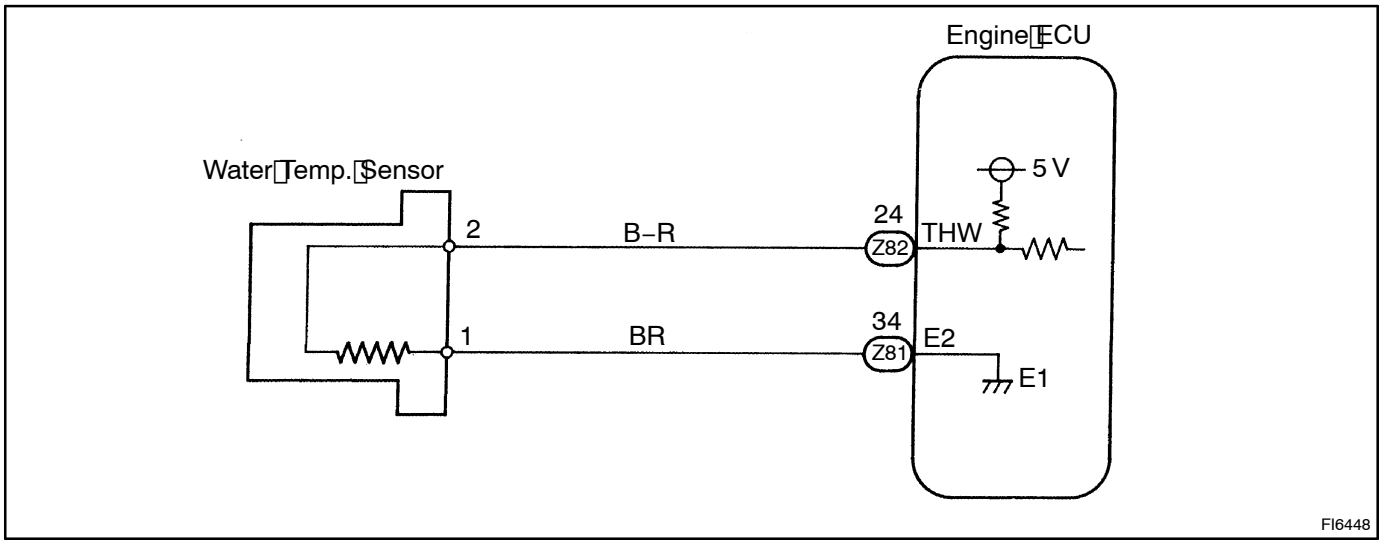
DTC No.	DTC Detecting Condition	Trouble Area
P0115/22	Open or short in water temp. sensor circuit	• Open or short in water temp. sensor circuit • Water temp. sensor • Engine ECU

HINT:

After confirming DTC P0115/22 use the hand–held tester to confirm the water temperature from CURRENT DATA.

Temperature Displayed	Malfunction
–40°C (–40°F)	Open circuit
140C° (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0110/24 (Intake Air Temp. Circuit Malfunction), P0115/22 (Water Temp. Circuit Malfunction), P0120/41 (Throttle Position Sensor Circuit Malfunction), P1120/19 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- 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.

When using hand–held tester

1	**Connect hand–held tester, and read value of water temperature.**

PREPARATION:

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

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

CHECK:

Read temperature value on the hand–held tester.

OK:

Same as actual water temperature

HINT:

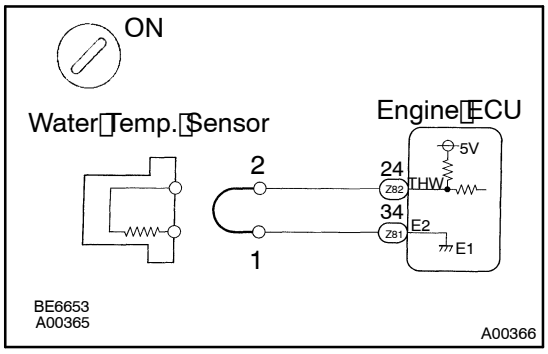
- If there is open circuit, Hand–held tester indicates –40°C (–40°F).
- If there is short circuit, Hand–held tester indicates 140°C (284°F) or more.

NG → **–40°C (–40°F)...Go to step 2.**
140°C (284°F) or more...Go to step 4.

OK

Check for intermittent problems (See page DI–24).

2	Check for open in harness or engine ECU.



PREPARATION:

(a) Disconnect the water temp. sensor connector.

(b) Connect sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand–held tester.

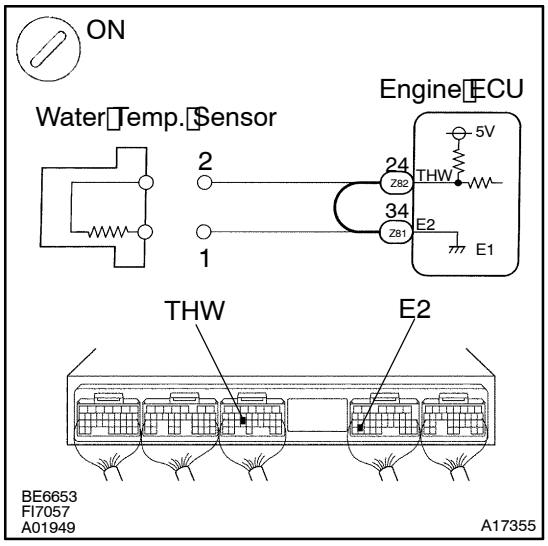
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace water temp. sensor.

NG

3	Check for open in harness or engine ECU.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Connect between terminals THW and E2 of the engine ECU connector.

HINT:

Water temp. sensor connector is disconnected.

Before checking, do a visual and contact pressure check for the engine ECU connector (See page IN–34).

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand–held tester.

OK:

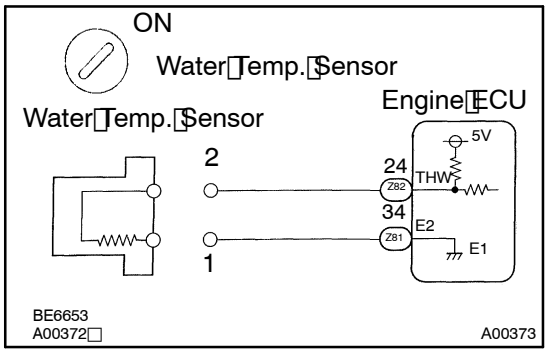
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THW, repair or replace harness.

NG

**Confirm good connection at engine ECU.
If OK, check and replace engine ECU.
(See page IN–34)**

4	Check for short in harness and engine ECU.



PREPARATION:

(a) Disconnect the water temp. sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand–held tester.

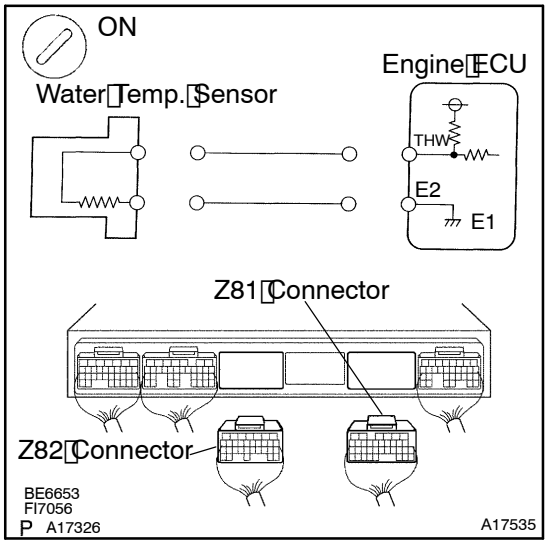
OK:

Temperature value: –40°C (–40°F)

OK	Replace water temp. sensor.

NG

5	Check for short in harness or engine ECU.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Disconnect the Z81 and Z82 connector of the engine ECU.

HINT:

Water temp. sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the hand–held tester.

OK:

Temperature value: –40°C (–40°F)

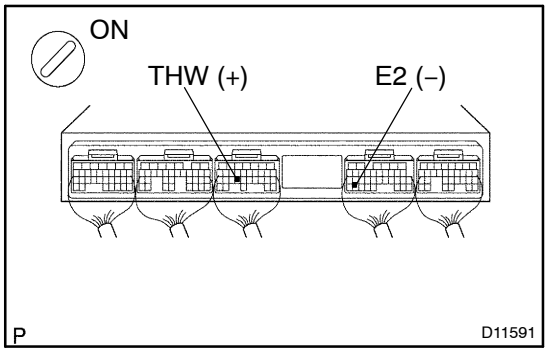
OK	Repair or replace harness or connector.

NG

Check and replace engine ECU (See page IN–34).

When not using hand–held tester

1	Check voltage between terminals THW and E2 of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn ignition switch ON.

CHECK:
Measure voltage between terminals THW and E2 of engine ECU connector.

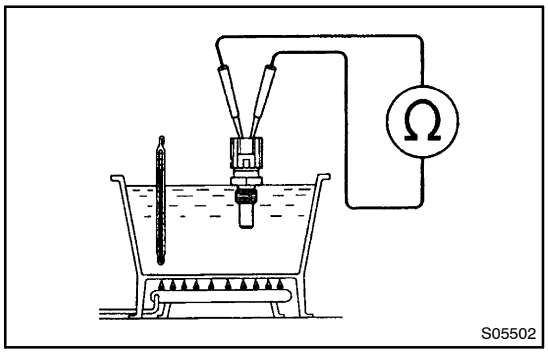
OK:

Water temp. °C (°F)	Voltage
20 (68)	0.5 – 3.4 V
60 (140)	0.2 – 1.0 V

OK → **Check for intermittent problems (See page DI–24).**

NG

2	Check water temp. sensor.



PREPARATION:
Disconnect the water temp. sensor connector.

CHECK:
Measure resistance between terminals.

OK:
Resistance is within acceptable zone on chart.

Water Temp.	Resistance
20°C (68°F)	2 – 3 kΩ
80°C (176°F)	0.2 – 0.4 kΩ

NG → **Replace water temp. sensor.**

OK

3	Check for open and short in harness and connector between engine ECU and water temp. sensor (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace engine ECU.

DI07J–16

DTC	P0116/22	Water Temp. Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115/22 on page DI–35.

DTC No.	DTC Detecting Condition	Trouble Area
P0116/22	When the fluctuations in the engine coolant temperature are within 3°C (37°F) before and after the following conditions are met: 1. IDL OFF time ≧ 250 sec. 2. Vehicle speed change of 28 km/h (17 mph) or more occurs 10 times or more. 3. −40°C (−40°F) ≦ Engine coolant temperature when the ignition switch is turned ON < 60°C (140°F) 4. Intake air temperature after starting the engine ≧ −6.7°C (20°F)	• Water temp. sensor • Cooling system

INSPECTION PROCEDURE

HINT:

- If DTC P0115/22 and P0116/22 are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.
- 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.

1	Are there any other codes (besides DTC P0116/22) being output?

YES → Go to relevant DTC chart.

NO

2	Check thermostat (See page CO–10).

NG → Replace thermostat.

OK

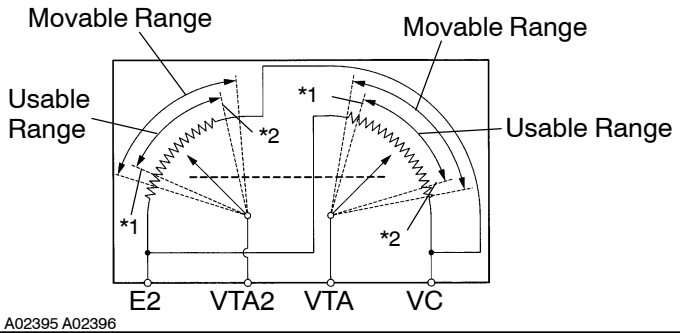
Replace water temp. sensor.

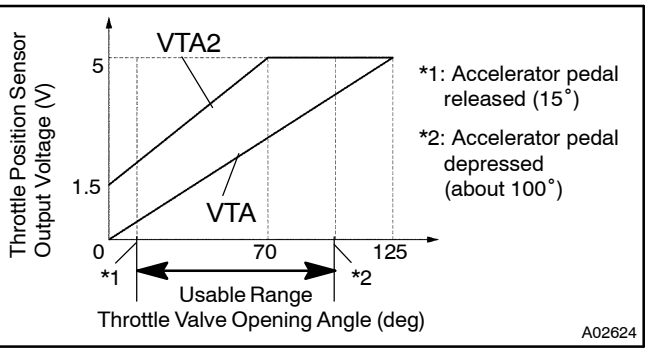
DI2S5–05

DTC	P0120/41	Throttle Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Throttle position sensor is mounted on the throttle body and it have the 2 sensors to detect the throttle opening angle and the malfunction of the throttle position sensor's own.
The voltage applied to the terminals VTA and VTA2 of the engine ECU changes between 0 V and 5 V in proportion to the opening angle of the throttle valve.
The engine ECU judges the current opening angle of the throttle valve from these signals input from terminals VTA and VTA2, and the engine ECU controls the throttle motor to make the throttle valve angle properly in response to driving condition.
If this DTC is stored, the engine ECU shuts down the power for the throttle motor and the electromagnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.



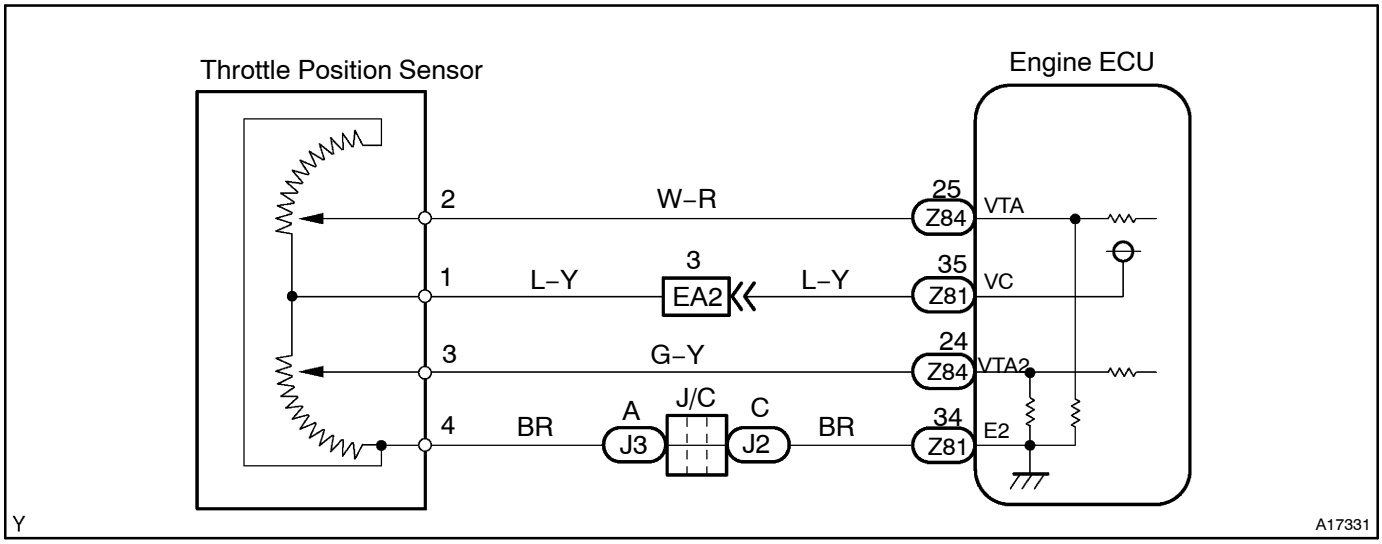


DTC No.	DTC Detecting Condition	Trouble Area
P0120/41	Condition (a), (b), (c) or (d) continues for 2.0 seconds: (a) VTA ≦ 0.2 V (b) VTA2 ≦ 0.5 V (c) VTA ≧ 4.8 V (d) When VTA ≧ 0.2 V and ≦ 2.0 V, and VTA2 ≧ 4.97 V (b) VTA–VTA2 ≦ 0.02 V	• Open or short in throttle position sensor circuit • Throttle position sensor • Engine ECU
	Condition (a) or (b) continues for 0.4 seconds: (a) VTA ≦ 0.2 V and VTA2 ≦ 0.5 V	

HINT:
After confirming DTC P0120/41 use the hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Accelerator pedal position expressed as percentage and voltage				Trouble area
Accelerator pedal released		Accelerator pedal depressed		
THROTTLE POS	THROTTLE POS #2	THROTTLE POS	THROTTLE POS #2	
0 %	0 V	0 %	0 V	VC line open
0 %	2.0 ~ 2.9 V	0 %	4.6 ~ 5.1 V	VTA line open or grand short
8 ~ 20 %	0 V	64 ~ 96 %	0 V	VTA2 line open or grand short
100 %	5 V	100 %	5 V	E2 line open

WIRING DIAGRAM



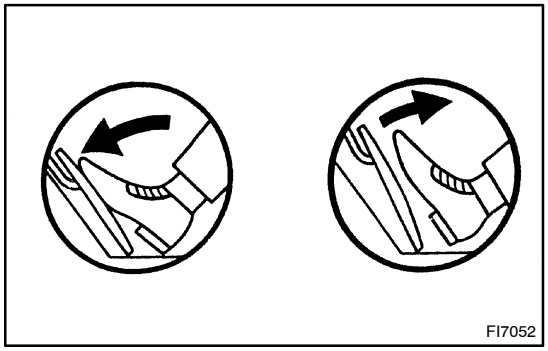
INSPECTION PROCEDURE

HINT:

- If DTC P0110/24 (Intake Air Temp. Circuit Malfunction), P0115/22 (Water Temp. Circuit Malfunction), P0120/41 (Throttle Position Sensor Circuit Malfunction), P1120/19 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- 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.

When using hand–held tester

1	Connect hand–held tester, read throttle valve opening percentage.



PREPARATION:

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

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

CHECK:

Read the throttle valve opening percentage for VTA circuit and read the voltage for VTA2 circuit.

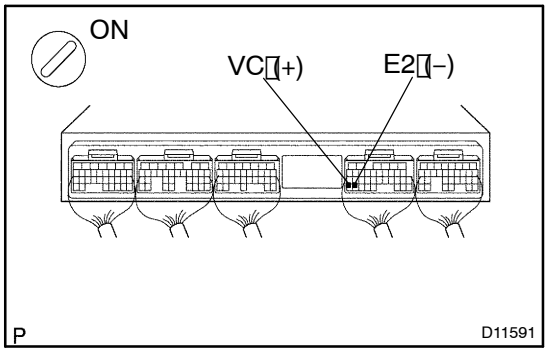
OK:

Accelerator pedal	Throttle valve opening position expressed as percentage (VTA)	Voltage (VTA2)
Released	8 – 20 %	2.0 – 2.9 V
Depressed	64 – 96 %	4.6 – 5.1 V

OK	Check and replace engine ECU (See page IN–34).

NG

2	Check voltage between terminals VC and E2 of engine ECU connector.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the engine ECU
connector.

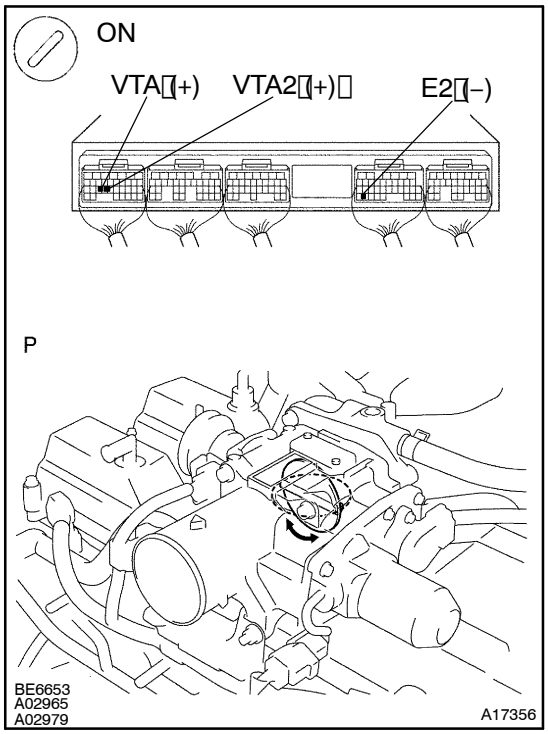
OK:

Voltage: 4.5 ~ 5.5 V

NG	Check and replace engine ECU (See page IN–34).

OK

3	Check voltage between terminals VTA, VTA2 and E2 of engine ECU connector.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VTA, VTA2 and E2 of the engine ECU connector.

OK:

Accelerator pedal	Voltage	
	VTA	VTA2
Released	0.4 – 1.0 V	2.0 – 2.9 V
Depressed	3.2 – 4.8 V	4.6 – 5.1 V

OK: Check and replace engine ECU (See page IN–34).

NG

4	Check throttle position sensor (See page FI–32).

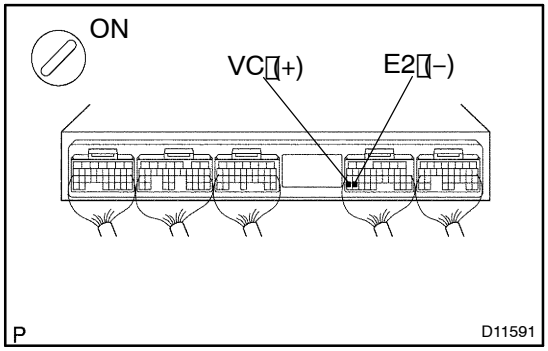
NG: Replace throttle position sensor (See page FI–37).

OK

Check for open and short in harness and connector between engine ECU and throttle position sensor (VC, VTA, VTA2, E2 line) (See page IN–34).

When not using hand–held tester

1	Check voltage between terminals VC and E2 of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

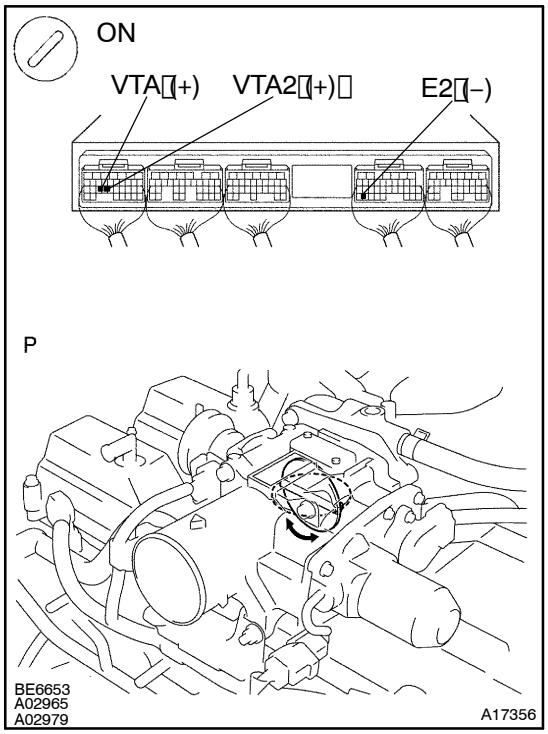
CHECK:
Measure voltage between terminals VC and E2 of the engine ECU connector.

OK:
Voltage: 4.5 – 5.5 V

NG	Check and replace engine ECU (See page IN–34).

OK

2	Check voltage between terminals VTA, VTA2 and E2 of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals VTA, VTA2 and E2 of the engine ECU connector.

OK:

Accelerator pedal	Voltage	
	VTA	VTA2
Released	0.4 ~ 1.0 V	2.0 ~ 2.9 V
Depressed	3.2 ~ 4.8 V	4.6 ~ 5.1 V

OK	Check and replace engine ECU (See page IN–34).

NG

3	Check throttle position sensor (See page FI–32).

NG → Replace throttle position sensor (See page FI–37).

OK →

Check for open and short in harness and connector between engine ECU and throttle position sensor (VC, VTA, VTA2, E2 line) (See page IN–34).

DI2T2–03

DTC	P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 (Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction) on page DI–42.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continue for 2.0 seconds: (a) Difference between VTA and VTA2 is out of threshold	• Throttle position sensor • Engine ECU

INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester or OBD scan tool. 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.

Replace throttle position sensor (See page FI–37).

DI85J–03

DTC	P0125/91	Insufficient Coolant Temp. for Closed Loop Fuel Control

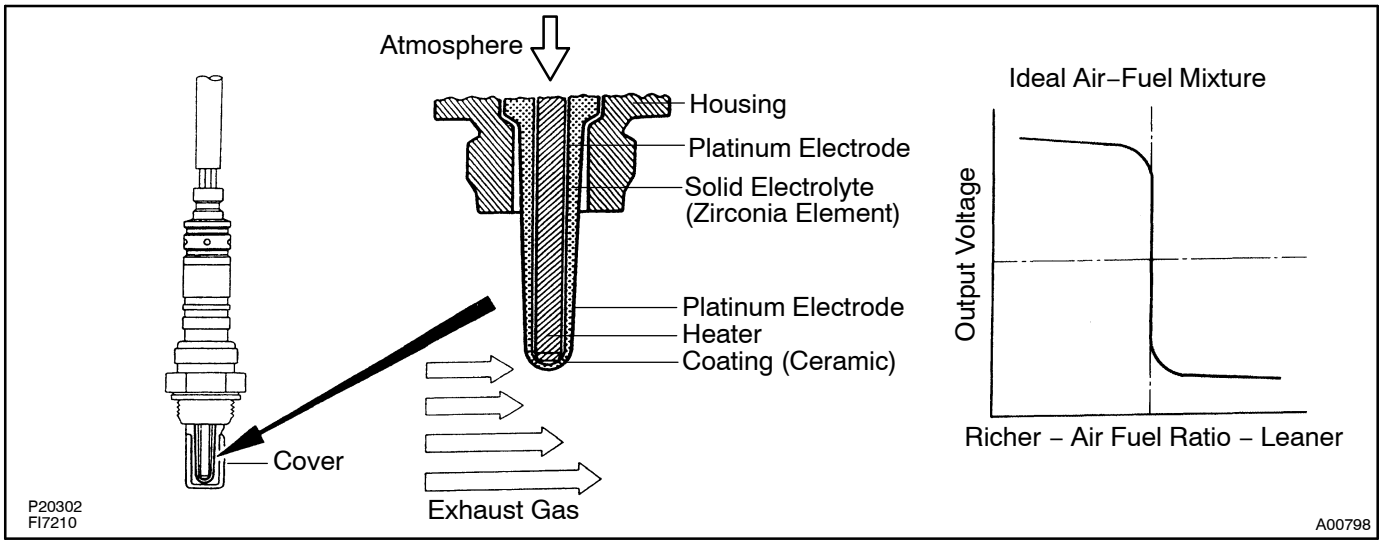
CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The oxygen sensor (bank 1, 2 sensor 1) has the characteristic which its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide the engine ECU with feedback to control of the air–fuel ratio.

When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the engine ECU of the LEAN condition (small electromotive force: < 0.45 V).

When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the engine ECU of the RICH condition (large electromotive force: > 0.45 V). The engine ECU judges by the electromotive force from the oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the engine ECU is unable to perform accurate air–fuel ratio control. The oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the engine ECU. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.

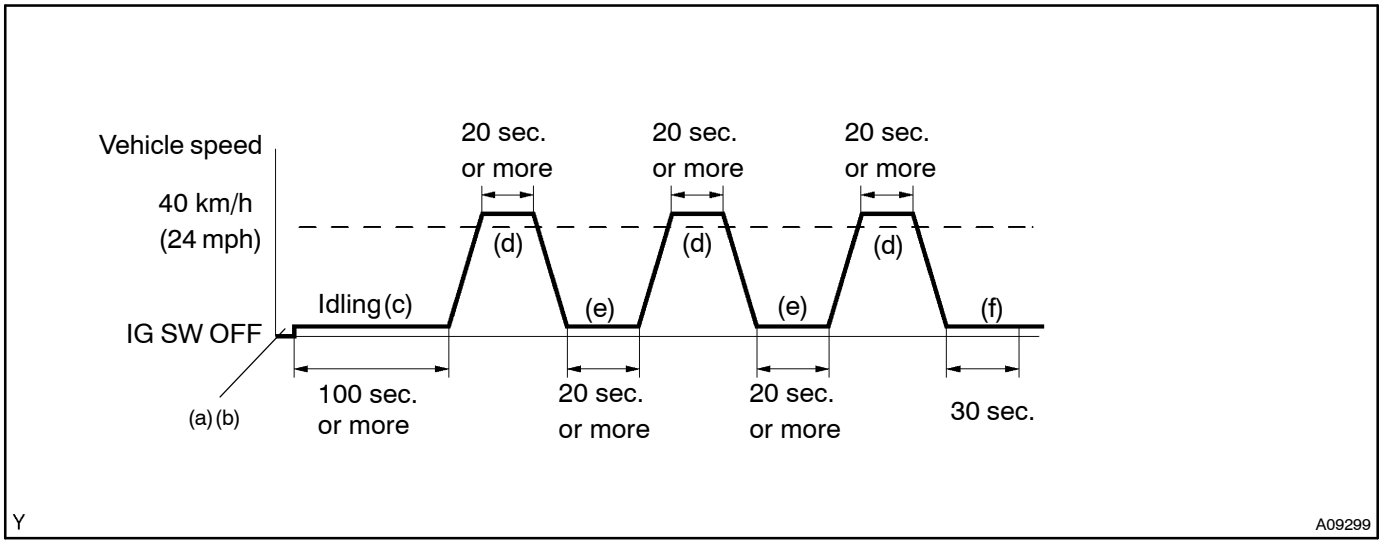


DTC No.	DTC Detecting Condition	Trouble Area
P0125/91	After engine is warmed up, heated oxygen sensors (bank 1, 2 sensor 1) output does not indicate RICH (≧0.45 V) even once when conditions (a), (b), (c) and (d) continue for at least 90 sec.: (a) Engine speed: 1,400 rpm or more (b) Vehicle speed: 40 – 100 km/h (25 – 62 mph) (c) Throttle valve does not fully closed (d) 180 sec. or more after starting engine	• Open or short in oxygen sensor (bank 1, 2 sensor 1) circuit • Oxygen sensor (bank 1, 2 sensor 1) • Air induction system • Fuel pressure • Injector • Gas leakage on exhaust system • Engine ECU

HINT:

After confirming DTC P0125, use the hand–held tester to confirm voltage output of the oxygen sensor (bank 1, 2 sensor 1) from the CURRENT DATA. If voltage output of the oxygen sensor is less than 0.1 V, oxygen sensor circuit may be open or short.

CONFIRMATION DRIVING PATTERN



(a) Connect the hand–held tester to the DLC3.
(b) Switch the hand–held tester from normal mode to check mode (See page DI–4).
(c) Start the engine and let the engine idle for 100 seconds or more.
(d) Drive the vehicle at 40 km/h (24 mph) or more for 20 seconds or more.
(e) Let the engine idle for 20 seconds or more.
(f) Let the engine idle for 30 seconds.

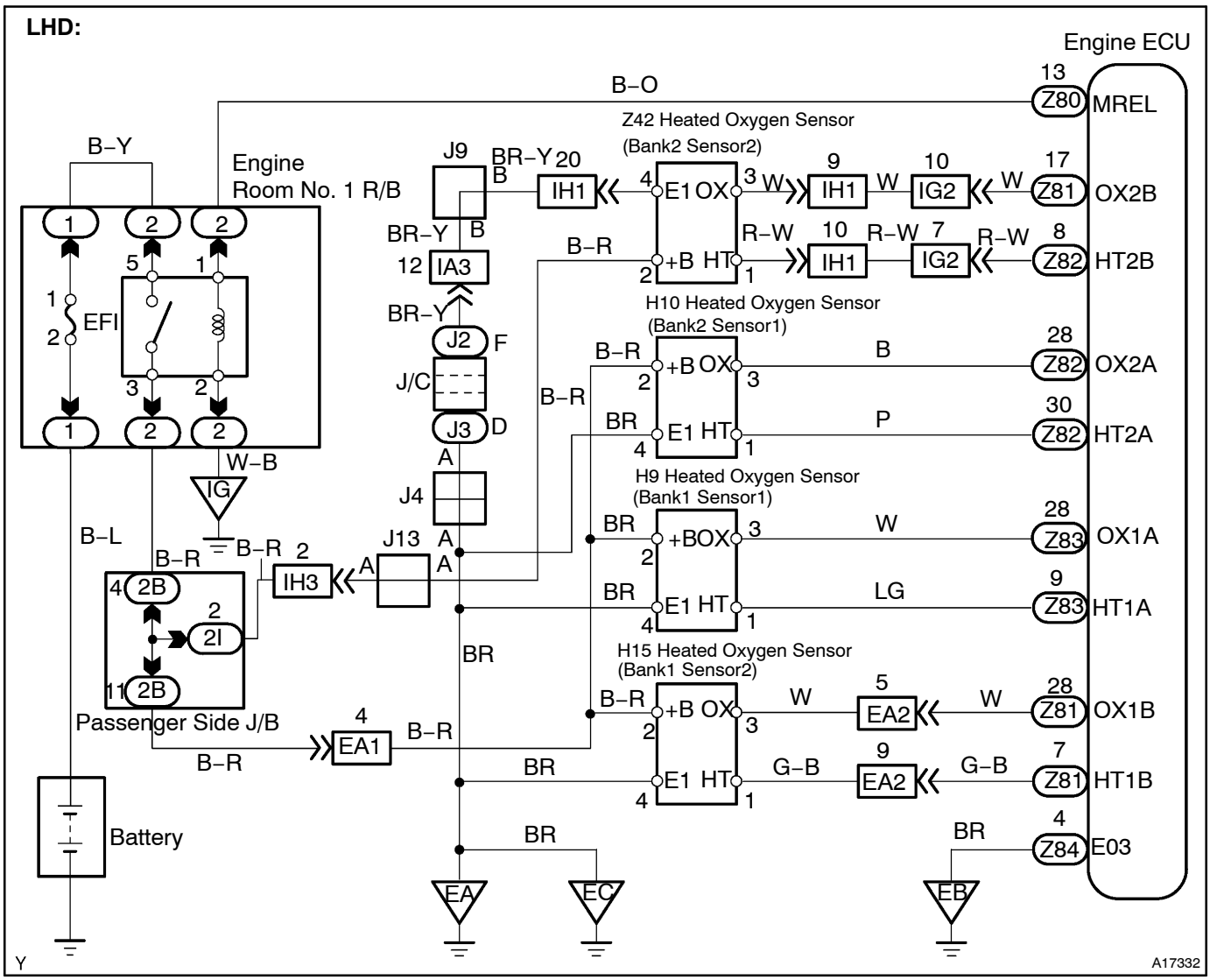
HINT:

If a malfunction exists, the MIL will light up during step (f).

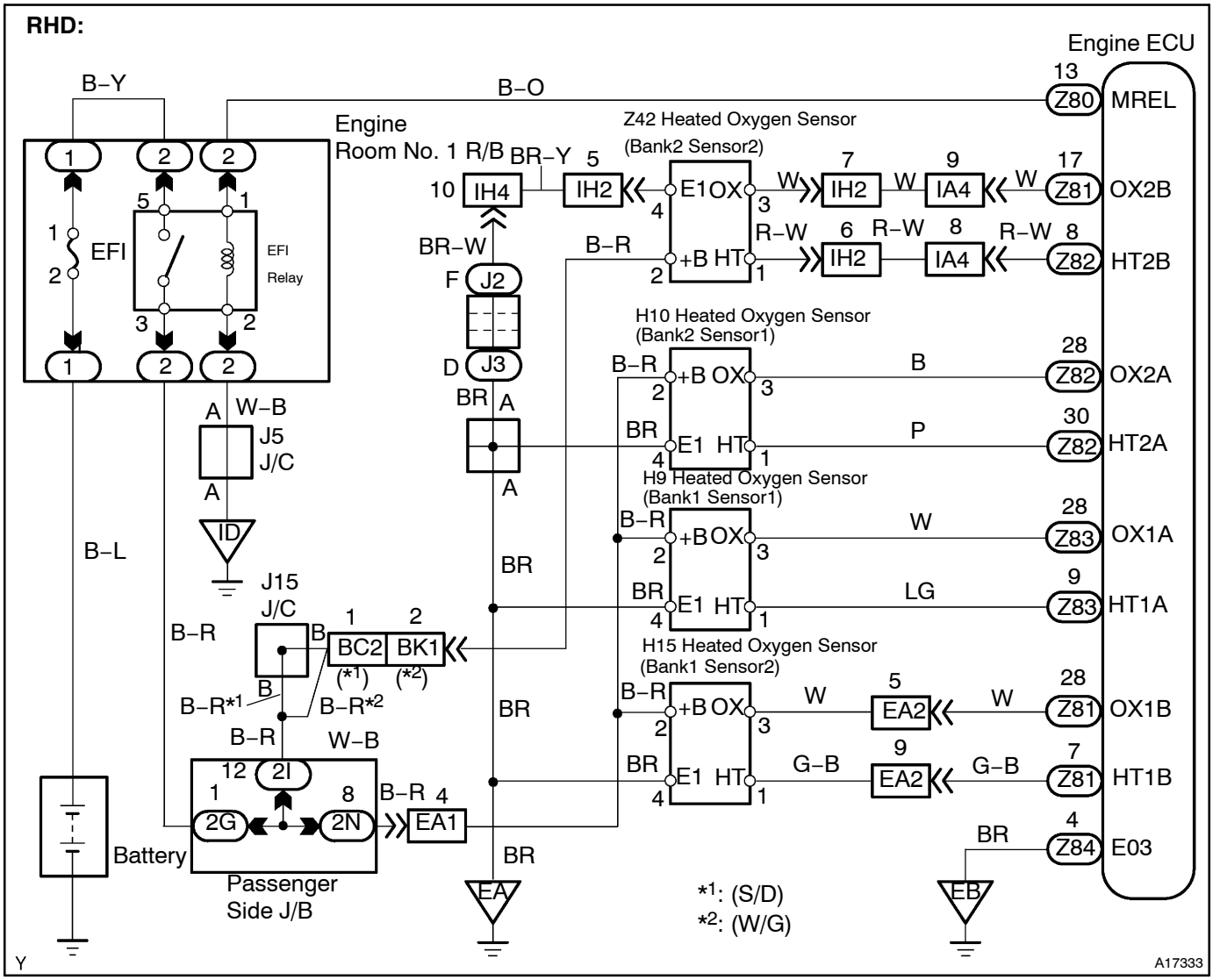
NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand–held tester, turn the ignition switch OFF after performing steps (c) to (f), then perform steps (c) to (f) again.

WIRING DIAGRAM



RHD:


Engine ECU
13
Z80
MREL
B–Y
B–O
Engine
Room No. 1 R/B
Z42 Heated Oxygen Sensor
(Bank2 Sensor2)
BR–Y
5
10
IH4
IH2
E1
OX
3
4
W
7
IH2
W
9
IA4
W
17
Z81
OX2B
R–W
6
R–W
8
R–W
8
Z82
HT2B
B–R
+B
HT
2
1
BR–W
F
J2
D
J3
H10 Heated Oxygen Sensor
(Bank2 Sensor1)
B–R
+B
OX
2
3
B
28
Z82
OX2A
BR
E1
HT
4
1
P
30
Z82
HT2A
H9 Heated Oxygen Sensor
(Bank1 Sensor1)
B–R
+B
OX
2
3
W
28
Z83
OX1A
BR
E1
HT
4
1
LG
9
Z83
HT1A
H15 Heated Oxygen Sensor
(Bank1 Sensor2)
B–R
+B
OX
2
3
W
5
EA2
W
28
Z81
OX1B
BR
E1
HT
4
1
G–B
9
EA2
G–B
7
Z81
HT1B
BR
4
Z84
E03
EB
EFI
EFI
Relay
A
W–B
J5
J/C
A
ID
B–L
J15
J/C
B–R
B
1
2
BC2
BK1
(*1)
(*2)
B
B–R*1
B–R*2
B–R
W–B
12
2I
1
8
2G
2N
B–R
4
EA1
BR
A
BR
A
EA
Battery
Passenger
Side J/B
*1: (S/D)
*2: (W/G)
Y
A17333

INSPECTION PROCEDURE

When not using hand–held tester:

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.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0125 will be recorded. The CHECK ENGINE (MIL) then comes on.

1	**Are there any other codes (besides DTC P0125) being output?**

YES → **Go to relevant DTC chart (See page DI–17).**

NO

2	**Connect the hand–held tester, and read value for voltage output of oxygen sensors (bank 1, 2 sensor 1).**

PREPARATION:

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

(b) Warm up the engine to normal operating temperature (above 75°C (169°F)).

CHECK:

Read voltage output of the oxygen sensors when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 times using the accelerator pedal.

OK:

Oxygen sensor output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 9**

NG

3	Check for open and short in harness and connector between engine ECU and oxygen sensors (bank 1, 2 sensor 1) (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check whether misfire is occurred or not by monitoring DTC and data list.

NG → Perform troubleshooting for misfire (See page DI–76).

OK

5	Check air induction system (See page FI–1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page FI–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipeline and filter (See page FI–1).

OK

7	Check injector injection (See page FI–22).

NG → Replace injector.

OK

8	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Replace oxygen sensor (bank 1, 2 sensor 1).

9	Perform confirmation driving pattern.

GO

10	Is there DTC P0125 being output again?

YES → Check and replace engine ECU (See page IN–34).

NO

11	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems (See page DI–4).

YES

DTC P0125 is caused by running out of fuel.

When not using hand–held tester:

1	Are there any other codes (besides code 91) being output?

YES → Go to relevant DTC chart (See page DI–17).

NO

Replace oxygen sensor (bank 1, 2 sensor 1).

DI9HK–01

DTC	P0130/21	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)

DTC	P0150/58	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

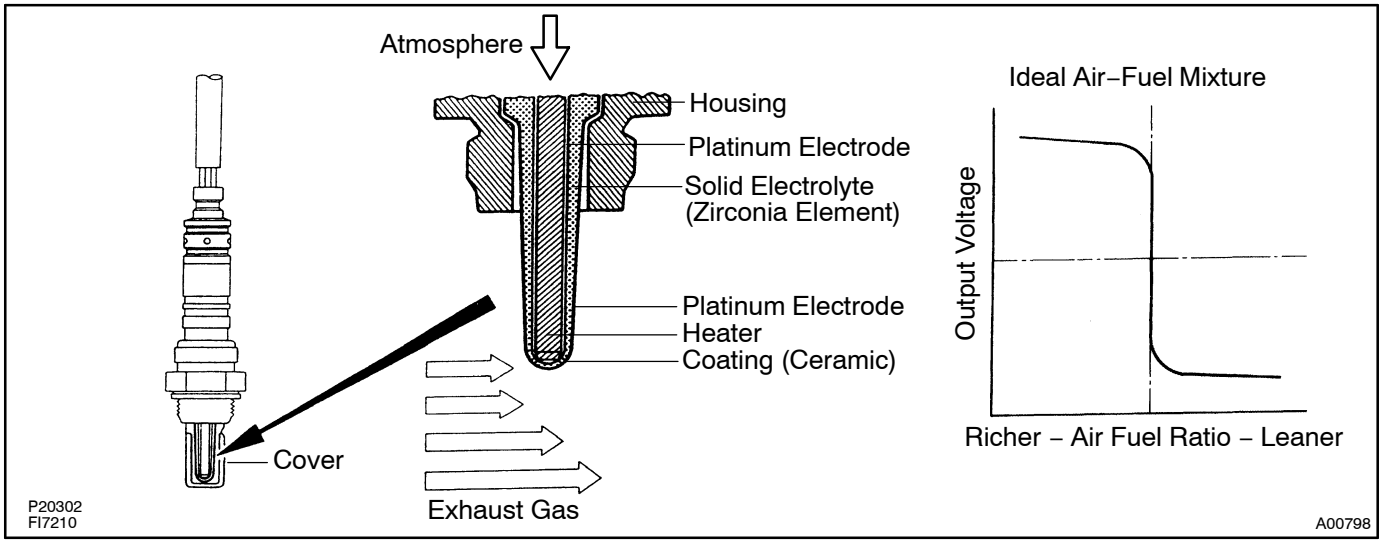
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air–fuel ratio.

When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the engine ECU of the LEAN condition (small electromotive force: 0 V).

When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the engine ECU of the RICH condition (large electromotive force: 1 V). The engine ECU judges by the electromotive force from the oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the engine ECU is unable to perform accurate air–fuel ratio control.

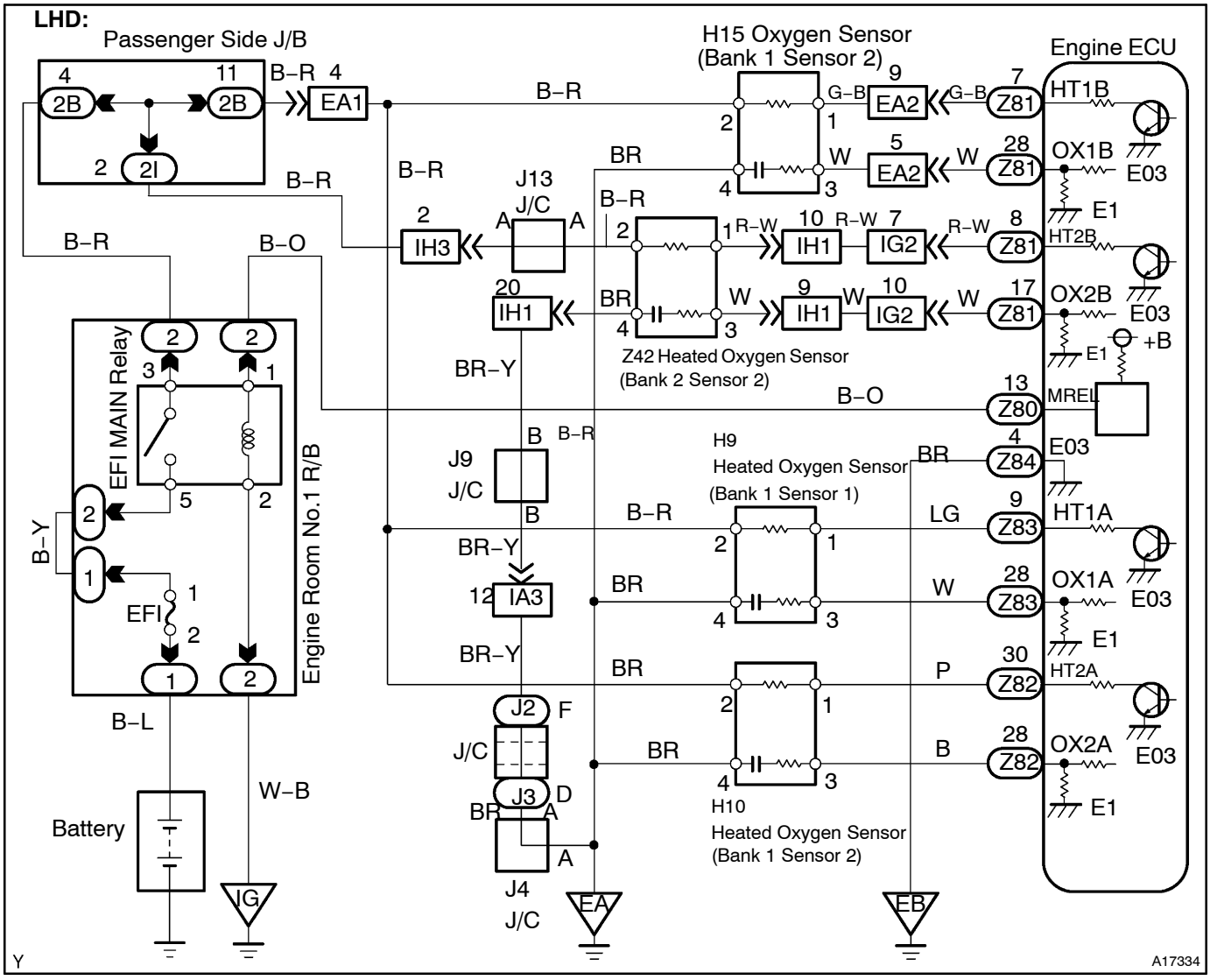
The oxygen sensors include a heater which heats the Zirconia element. The heater is controlled by the engine ECU. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.

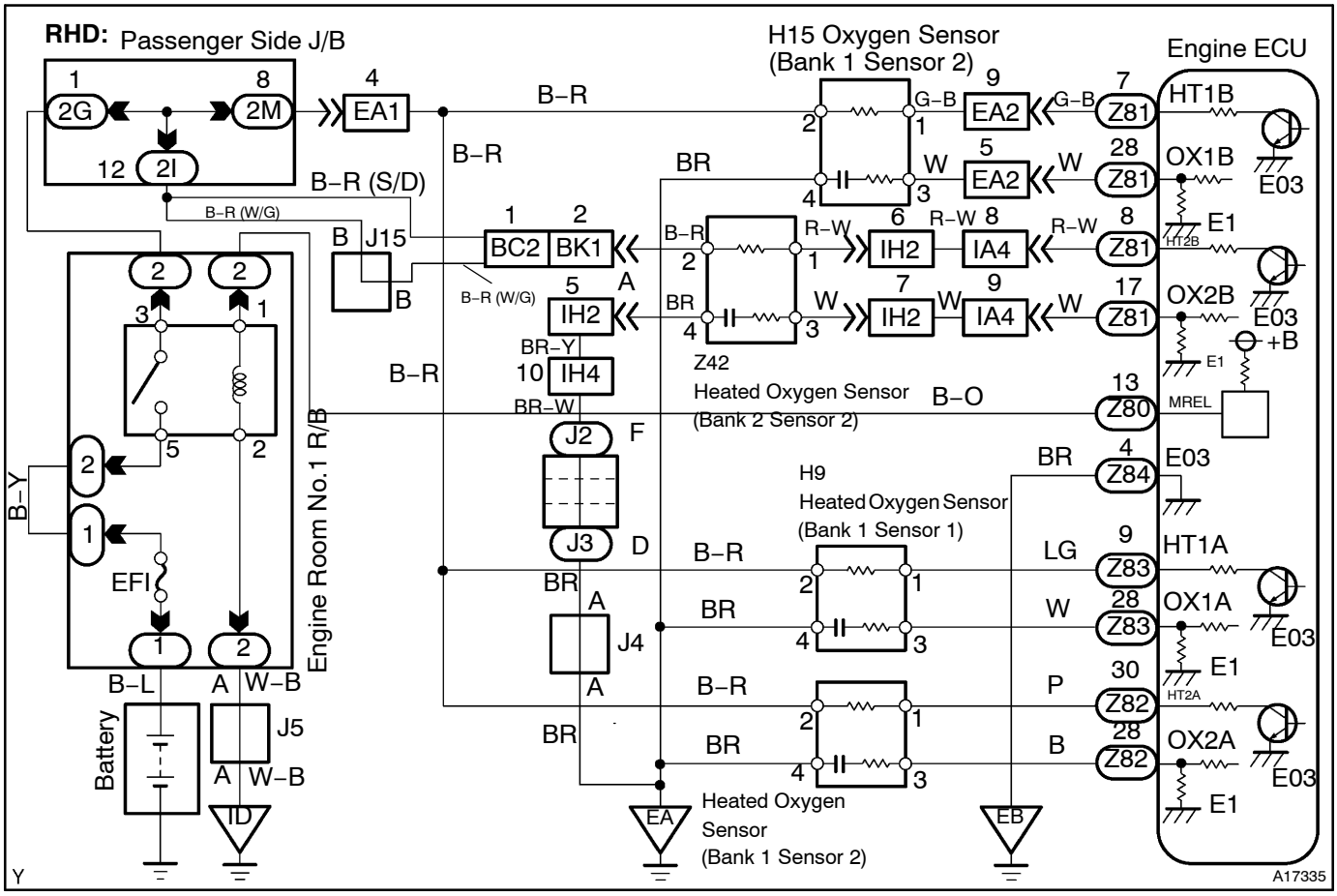


DTC No.	DTC Detecting Condition	Trouble Area
P0130/21 P0150/28	Voltage output of heated oxygen sensor remains at 0.4 V or more, or 0.55 V or less, at three times during idling after engine is warmed up (2 trip detection logic)	• Oxygen sensor • Fuel trim malfunction

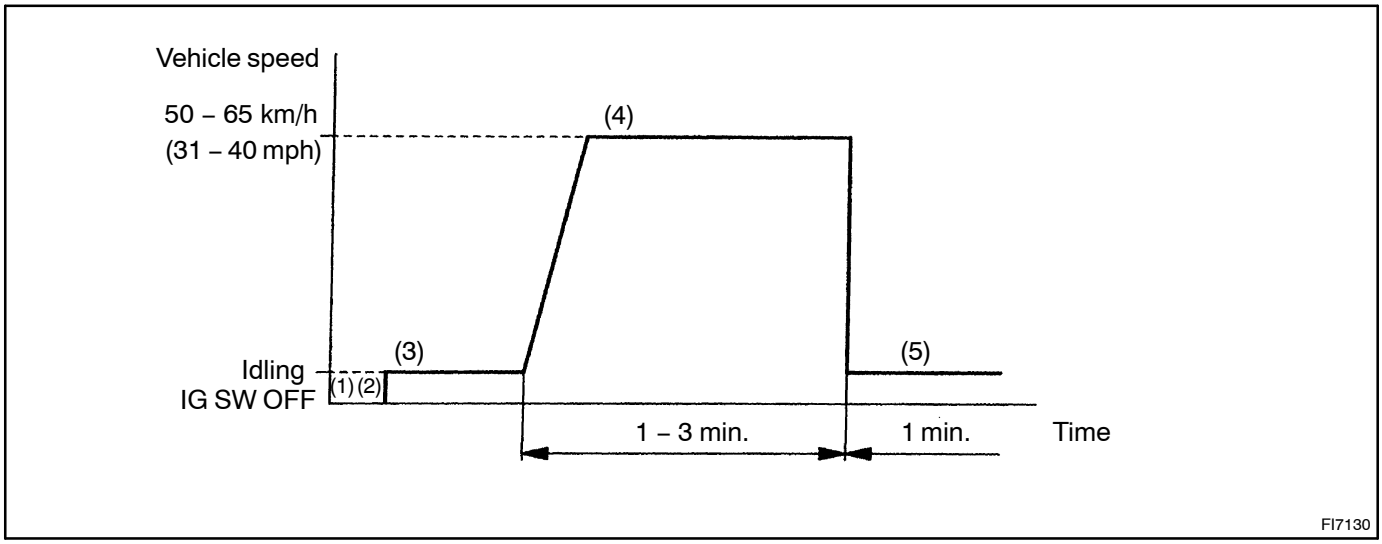
HINT:
Bank 1 refers to bank that includes cylinder No.1.
Bank 2 refers to bank that does not include cylinder No.1.
Sensor 1 refers to the sensor closer to the engine body.
The oxygen sensor's output voltage and the short–term fuel trim value can be read using the hand–held tester.

WIRING DIAGRAM





CONFIRMATION DRIVING PATTERN



(1) Connect the hand–held tester to the DLC3.
(2) Switch the hand–held tester from normal mode to check (test) mode (See page DI–4).
(3) Start the engine and warm it up with all accessory switches OFF.
(4) Drive the vehicle at 50 – 65 km/h (31 – 40 mph) for 1 – 3 min. to warm up the heated oxygen sensor.
(5) Let the engine idle for 1 min.
(6) Perfom steps (3) to (5) three times.

HINT:

If a malfunction exists, the CHECK ENG will be indicated on the multi information display during step (6).

NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand–held tester, turn the ignition switch OFF after performing steps (3) to (6), then perform steps (3) to (6) again.

INSPECTION PROCEDURE

When using hand–held tester

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 for open and short in harness and connector between engine ECU and oxygen sensor (See page IN–34).**

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

OK

2	**Check for oxygen sensor data.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Warm up the engine to normal operating temp.
CHECK:
Read the oxygen sensor output voltage and short–term fuel trim.
RESULT:

Pattern	Heated oxygen sensor output voltage	Short–term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about +20 %
2	Rich condition (Changes at 0.4 V or more)	Changes at about –20 %
3	Except 1 and 2	

1, 2 → **Check fuel trim system (See page DI–71).**

3

3	**Check output voltage of oxygen sensor during idling.**

PREPARATION:

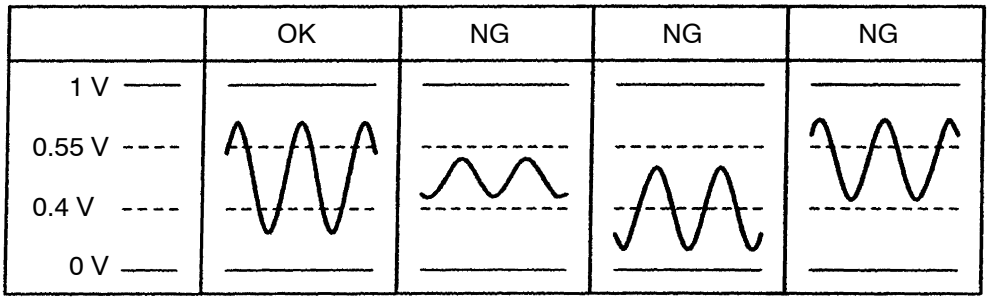
Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Use the hand–held tester read the output voltage of the oxygen sensor during idling.

OK:

Oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



OK → **Perform confirmation driving pattern.**

NG

Replace oxygen sensor.

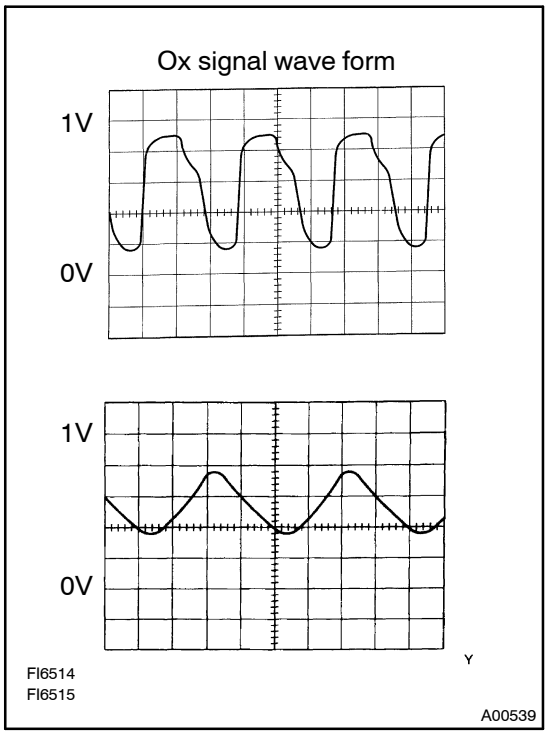
When not using hand–held tester

1	**Are there any other codes (besides code 21 and 28) being output?**

YES → **Go to relevant diagnostic trouble code chart (See page DI–17).**

NO

Replace heated oxygen sensor.



Reference: INSPECTION USING OSCILLOSCOPE

With the engine racing (4,000 rpm) measure waveform between terminals OXL1 and E1 of engine ECU.

HINT:

- The correct waveform is as shown oscillating between approx. 0.1 V and 0.9 V.
- If the oxygen sensor has deteriorated, the amplitude of the voltage will be reduced as shown on the left.

DTC	P0133/21	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153/28	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125/91 on page DI–49.

DTC No.	DTC Detecting Condition	Trouble Area
P0133/21 P0153/28	Response time for heated oxygen sensor voltage output to change from rich to lean, or from lean to rich, is 1.1 sec. or more at three times during idling after engine is warmed up (2 trip detection logic)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Injector • Engine ECU

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.

WIRING DIAGRAM

Refer to DTC P0125/91 on page DI–49.

INSPECTION PROCEDURE

When using hand–held tester:

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.

1	**Are there any other codes (besides DTC P0133 or P0153) being output?**

YES ⟩ **Go to relevant DTC chart (See page DI–17).**

NO

2	**Check output voltage of oxygen sensor during idling.**

PREPARATION:

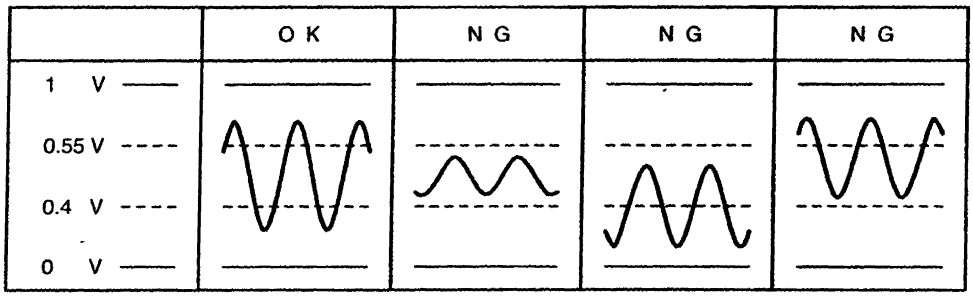
Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 90 sec.

CHECK:

Use the hand–held tester to read the output voltage of the oxygen sensor during idling.

OK:

Oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 7.**

NG

3	**Check for open and short in harness and connector between engine ECU and oxygen sensor (See page IN–34).**

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

OK

4	**Check air induction system (See page FI–1).**

NG → **Repair or replace.**

OK

5	Check fuel pressure (See page FI–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipeline and filter (See page FI–1).

OK

6	Check injector injection (See page FI–22).

NG → Replace injector.

OK

Replace oxygen sensor.

7	Perform confirmation driving pattern (See page DI–63).

GO

8	Is there DTC P0133 or P0153 being output again?

NO → Check for intermittent problems (See page DI–4).

YES

Check and replace engine ECU (See page IN–34).

When not using hand–held tester:

1	Are there any other codes (besides code 21 or 28) being output?

YES ⇒ Go to relevant DTC chart (See page DI–17).

NO

Replace oxygen sensor.

DI9HL–02

DTC	P0135/21	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

DTC	P0141/21	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0155/28	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)

DTC	P0161/28	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to Oxygen Sensor Circuit Malfunction on page DI–49.

DTC No.	DTC Detecting Condition	Trouble Area
P0135/21 P0141/21 P0155/28 P0161/28	When the heater operates, heater current exceeds 2 A (1 trip detection logic)	• Open or short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • Engine ECU
	Heater current of 0.2 A or less when the heater operates (1 trip detection logic)	

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

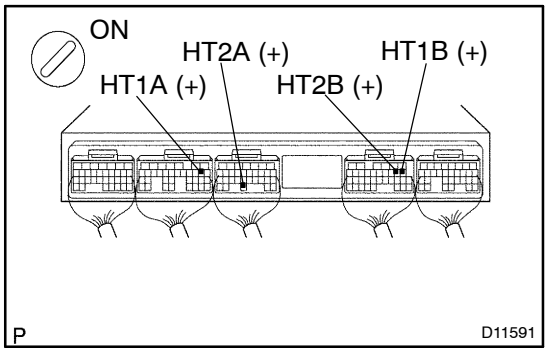
WIRING DIAGRAM

Refer to Oxygen Sensor Circuit Malfunction on page DI–49 for the WIRING DIAGRAM.

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 voltage between terminals HT1A, HT2A, HT1B, HT2B of engine ECU connector and body ground.**



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals HT1A, HT2A, HT1B, HT2B of the engine ECU connector and body ground.
- Connect terminal HT1B to bank 2 sensor 1.
- Connect terminal HT2B to bank 2 sensor 2.
- Connect terminal HT1A to bank 1 sensor 1.
- Connect terminal HT2A to bank 1 sensor 2.

HINT:

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace engine ECU (See page IN–34).**

NG

2	**Check resistance of oxygen sensor heater (See page FI–67).**

NG	**Replace oxygen sensor.**

OK

Check and repair harness or connector between main relay and oxygen sensor and engine ECU (See page IN–34).

DI2S7–04

DTC	P0136/27	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0156/29	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0130 to on page DI–49.

DTC No.	DTC Detecting Condition	Trouble Area
P0136/27 P0156/29	Voltage output of the heated oxygen sensor (bank 1 sensor 2, bank 2 sensor 2) remains at 0.4 V or more or 0.5 V or less when the vehicle is driven at 30 km/h (19 mph) or more after the engine is warmed up. (2 trip detection logic)	• Heated oxygen sensor

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to on page DI–49 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

When using hand–held tester

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	**Are there any other codes (besides DTC P0136 or P0156) being output?**

YES → **Go to relevant DTC chart (See page DI–17).**

NO

2	Check for open and short in harness and connector between engine ECU and oxygen sensor (See page IN–34).

NG → Repair or replace harness or connector.

OK

3	Check the output voltage of oxygen sensor (bank 1, 2 sensor 2).

PREPARATION:

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

(b) After warming up the engine, race engine at 2,500 rpm for 3 min.

CHECK:

Read voltage output of oxygen sensor (bank 1 sensor 2, bank 2 sensor 2) when engine suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 min. using accelerator pedal.

OK:

Oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

OK → Check that each connector is properly connected.

NG

Replace oxygen sensor.

When not using hand–held tester

1	Are there any other codes (besides code 27 or 29) being output?

YES → Go to relevant diagnostic trouble code chart (See page DI–17).

NO

Replace oxygen sensor.

DI9HM–01

DTC	P0171/25	Fuel Trim System too Lean (Air – Fuel Ratio Lean Malfunction, Bank1)

DTC	P0174/25	Fuel Trim System too Lean (Air – Fuel Ratio Lean Malfunction, Bank2)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against the basic injection time. Fuel trim includes short–term fuel trim and long–term fuel trim.

Short–term fuel trim is the short–term fuel compensation used to maintain the air–fuel ratio at its ideal theoretical value. The signal from the heated oxygen sensor indicates whether the air–fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air–fuel ratio is rich, and an increase in fuel volume if it is lean.

Long–term fuel trim is overall fuel compensation carried out long–term to compensate for continual deviation of the short–term fuel trim form the central value due to individual engine differences, wear over time and changes in the usage environment.

If both the short–term fuel trim and long–term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the CHECK ENG on the multi information display.

DTC No.	DTC Detecting Condition	Trouble Area
P0171/25	When the air fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the RICH side. (2 trip detection logic) Main oxygen sensor voltage is 0.45 or less (lean) for 90 sec under condition (a) and (b)	• Gas leakage on exhaust system • Air intake (hose loose) • Fuel line pressure • Injector blockage • Oxygen sensor (bank1 sensor1) malfunction • Air flow meter • Water temp. sensor
P0174/25		• Gas leakage on exhaust system • Fuel line pressure • Injector leak, blockage • Oxygen sensor (bank 2 sensor 1) malfunction • Air flow meter • Water temp. sensor

HINT:

- When DTC P0171/25 and DTC P0174/25 is recorded, the actual air–fuel ratio is on the LEAN side.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171/25 and DTC P0174/25 is recorded. The CHECK ENG then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 25 %, the system is functioning normally.

INSPECTION PROCEDURE

When using hand–held tester

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	**Ask customer whether vehicles runs out of fuel.**

YES → **DTC P0171 or P0174 was recorded because the vehicle runs out of fuel.**

NO

2	**Check air induction system (See page FI–1).**

NG → **Repair or replace.**

OK

3	**Check for oxygen sensor (bank 1, 2 sensor 1) data.**

PREPARATION:

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

(b) Warm up the engine to normal operating temperature.

CHECK:

Read the oxygen sensor (bank 1, 2 sensor 1) output voltage and short–term fuel trim.

HINT:

Read the values for the same bank.

RESULT:

Pattern	Oxygen sensor output voltage	Short–term fuel trim
1	Lean condition (Changes at 0.55 V or less)	Changes at about +20 %
2	Rich condition (Changes at 0.35 V or more)	Changes at about –20 %
3	Except 1 and 2	

3 → **Check for oxygen sensor (bank 1, 2 sensor 1) (See page FI–67).**

1, 2

4	Check fuel pressure (See page FI–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page FI–29).

OK →

5	Check injector injection (See page FI–22).

NG → Replace injector.

OK →

6	Check air flow meter and water temp. sensor (See page FI–31 and FI–61).

NG → Repair or replace.

OK →

7	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK →

8	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Check and replace engine ECU (See page IN–34).

When not using hand–held tester

1	Check air induction system (See page FI–1).

NG → Repair or replace.

OK

2	Check fuel pressure (See page FI–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page FI–67).

OK

3	Check injector injection (See page FI–22).

NG → Replace injector.

OK

4	Check air flow meter (See page FI–31).

NG → Repair or replace.

OK

5	Check water temp. sensor (See page FI–61).

NG → Repair or replace.

OK

6	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK

7	Does malfunction disappear when a good oxygen sensor installed?

YES → Repair oxygen sensor.

NO

Check and replace engine ECU.

DI63Z–06

DTC	P0300/93	Random/Multiple Cylinder Misfire Detected

DTC	P0301/93	Cylinder 1 Misfire Detected

DTC	P0302/93	Cylinder 2 Misfire Detected

DTC	P0303/93	Cylinder 3 Misfire Detected

DTC	P0304/93	Cylinder 4 Misfire Detected

DTC	P0305/93	Cylinder 5 Misfire Detected

DTC	P0306/93	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

Misfire: The engine ECU uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.

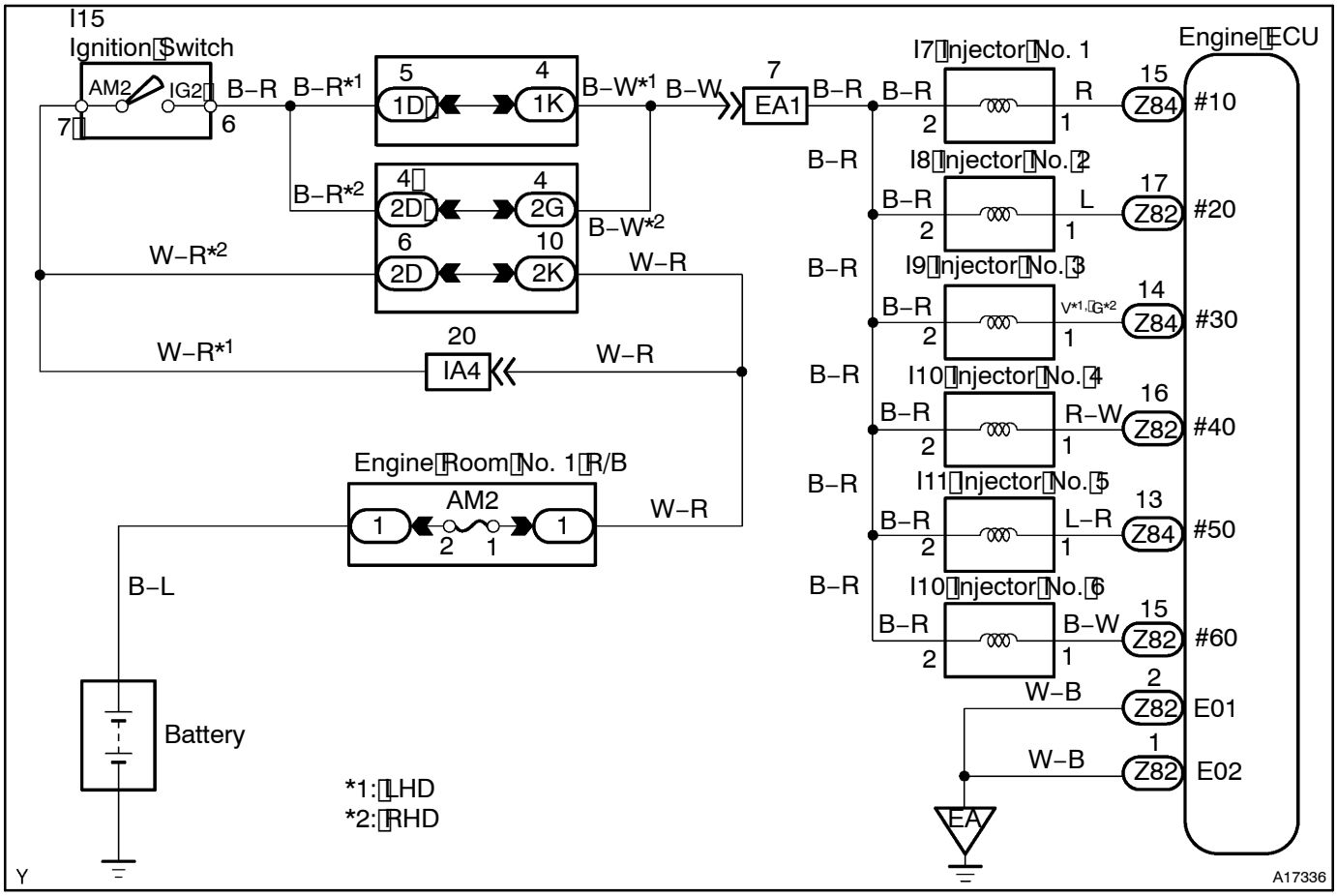
The engine ECU counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the CHK ENG lights up.

If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the CHK ENG blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300/93	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions 1 trip detection logic: CHK ENG to brink 2 trip detection logic: CHK ENG to light up	• Open or short in engine wire • Connector connection • Vacuum hose connection • Ignition system • Injector • Fuel pressure • Vacuum sensor • Water temp. sensor • Compression pressure • Valve clearance • Valve timing • Engine ECU
P0301/93 P0302/93 P0303/93 P0304/93 P0305/93 P0306/93	For any particular 200 revolutions of engine, misfiring is detected which can cause catalyst overheating (This causes CHK ENG to blink)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	

HINT:
When codes for a misfiring cylinder is recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the hand–held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand–held tester to set to the Check (Test) Mode (See page DI–17).
(d) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list.

If you have no hand–held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(e) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(f) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If it is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- 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.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See confirmation driving pattern).
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides the range of ± 20 %, there is a possibility that the air–fuel ratio is inclining either to RICH (–20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during warmed up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack of fuel, the use of improper fuel, a stain of the ignition plug, and etc.

1	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of wire harness and connector.

(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

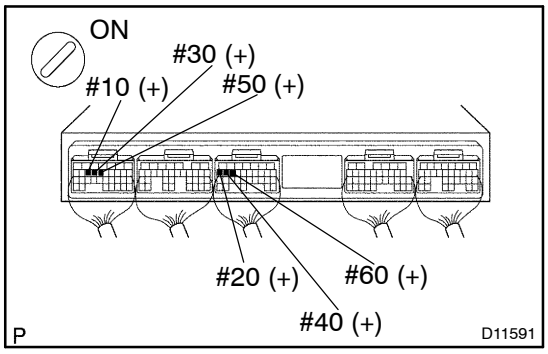
OK

2	**Check spark plug and spark of misfiring cylinder (See page IG–1).**

NG → **Replace or check ignition system (See page IG–1).**

OK

3	Check voltage of engine ECU terminals for injector of failed cylinder.



PREPARATION:

(a) Remove the engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminals #10 – #60 of the engine ECU connectors and body ground.

OK:

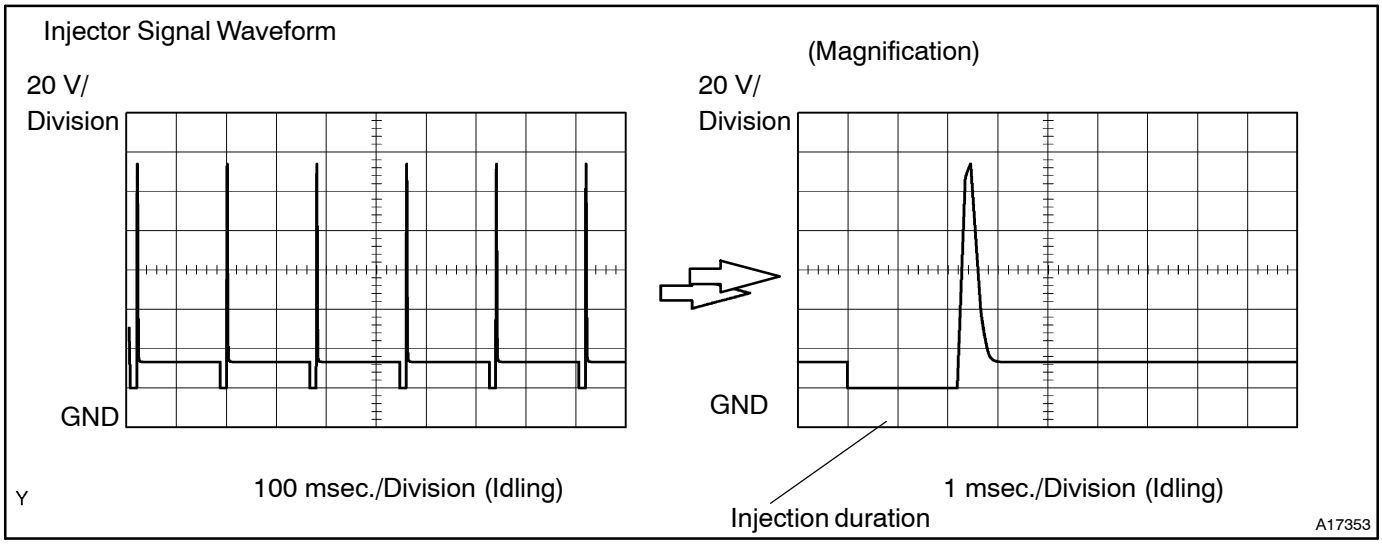
Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 – #60 and E01 of the engine ECU connectors.

HINT:

The correct waveform is as shown.



OK	Go to step 5.

NG

4	Check resistance of injector of misfiring cylinder (See page FI–1).

NG → Replace injector.

OK

Check for open and short in harness and connector between injector and engine ECU (See page IN–34).

5	Check fuel pressure (See page FI–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page FI–29).

OK

6	Check injector injection (See page FI–22).

NG → Replace injector.

OK

7	Check air flow meter (See page FI–31) and water temperature sensor (See page FI–61).

NG → Repair or replace.

OK

Check compression pressure (See page EM–3), valve clearance (See page EM–5) and valve timing (See page EM–24).

DI2SA–03

DTC	P0325/52	Knock Sensor 1 Circuit Malfunction

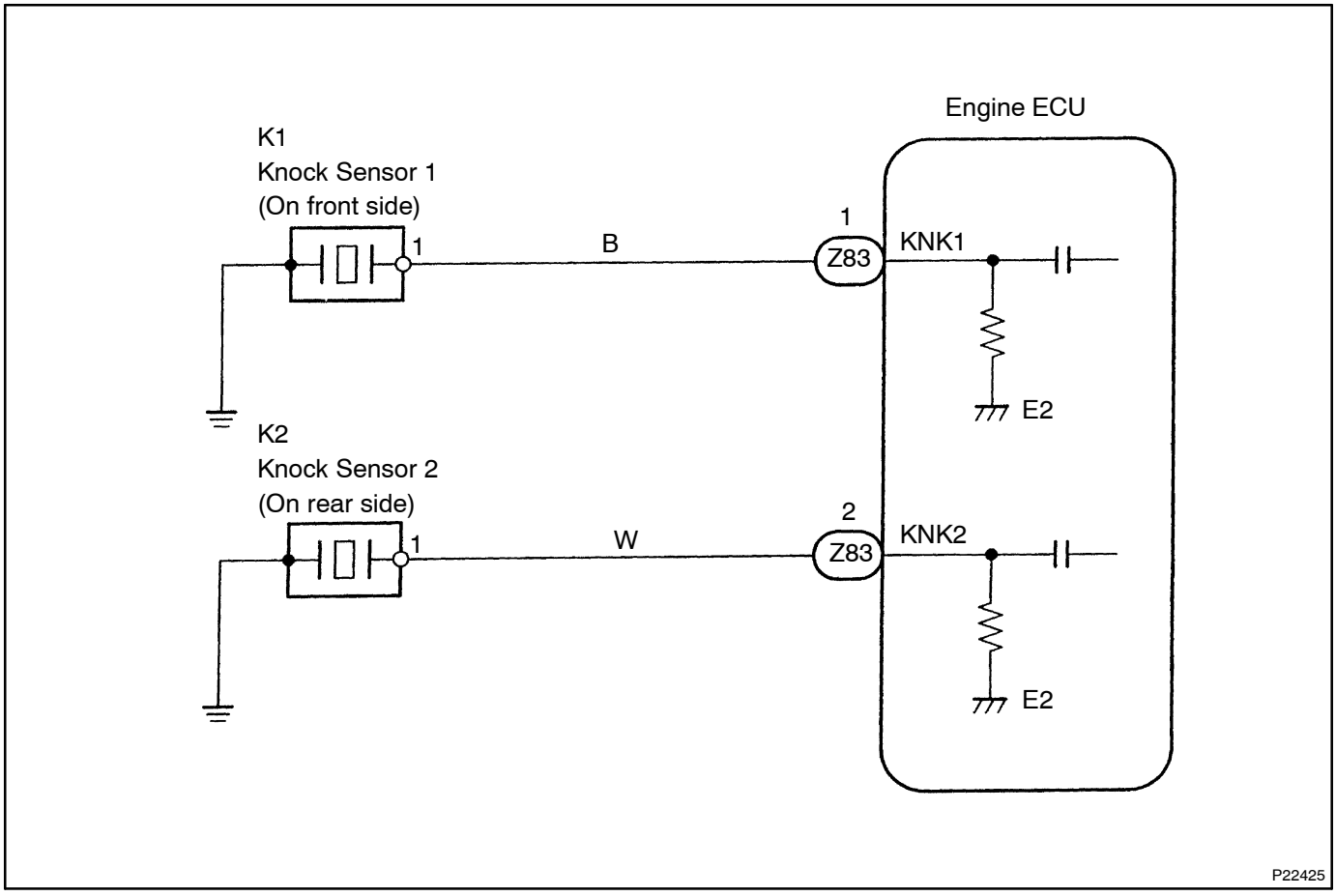
DTC	P0330/55	Knock Sensor 2 Circuit Malfunction

CIRCUIT DESCRIPTION

Knock sensors are fitted one to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325/52	No knock sensor 1 signal to engine ECU with engine speed between 1,600 rpm and 5,200 rpm	• Open or short in knock sensor 1 circuit • Knock sensor 1 (looseness) • engine ECU
P0330/55	No knock sensor 2 signal to engine ECU with engine speed between 1,600 rpm and 5,200 rpm	• Open or short in knock sensor 2 circuit • Knock sensor 2 (looseness) • engine ECU

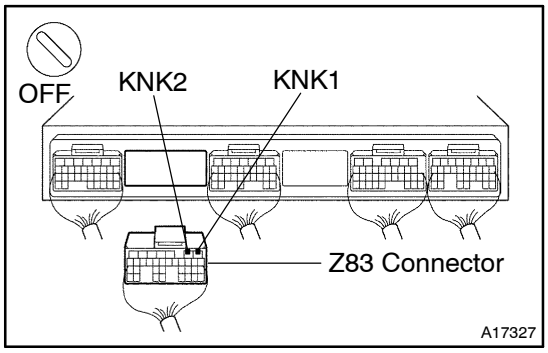
WIRING DIAGRAM



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.

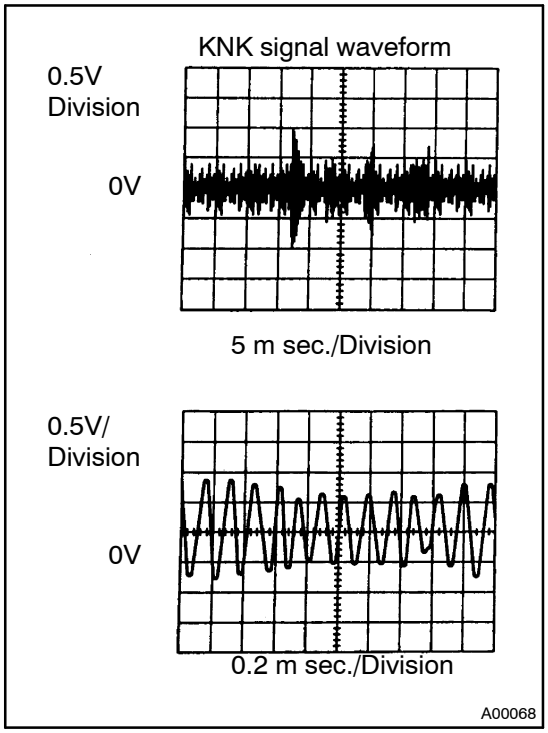
1	**Check continuity between terminal KNK1, KNK2 of engine ECU and body ground.**



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Disconnect the E2 connector from the engine ECU.

CHECK:
Measure resistance between terminal KNK1, KNK2 of the engine ECU and body ground.
HINT:
- Connect terminal KNK1 to knock sensor 1.
- Connect terminal KNK2 to knock sensor 2.

OK:
Resistance: 1 MΩ or higher



Reference: INSPECTION USING OSCILLOSCOPE
- With the engine racing (4,000 rpm) measure between terminal KNK1, KNK2 of the engine ECU connector and body ground.

HINT:
The correct waveforms are as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 0.141m sec.
  (Normal mode vibration frequency of knock sensor: 7.1 kHz)

HINT:
If normal mode vibration frequency is not 7.1 kHz, the sensor is malfunctioning.

OK	**Go to step 3.**

NG

2	Check knock sensor (See page FI–63).

NG → Replace knock sensor.

OK

3	Check for open and short in harness and connector between engine ECU and knock sensor (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Does malfunction disappear when a good knock sensor is installed?

YES → Replace knock sensor.

NO

Check and replace engine ECU (See page IN–34).

DI2SB–04

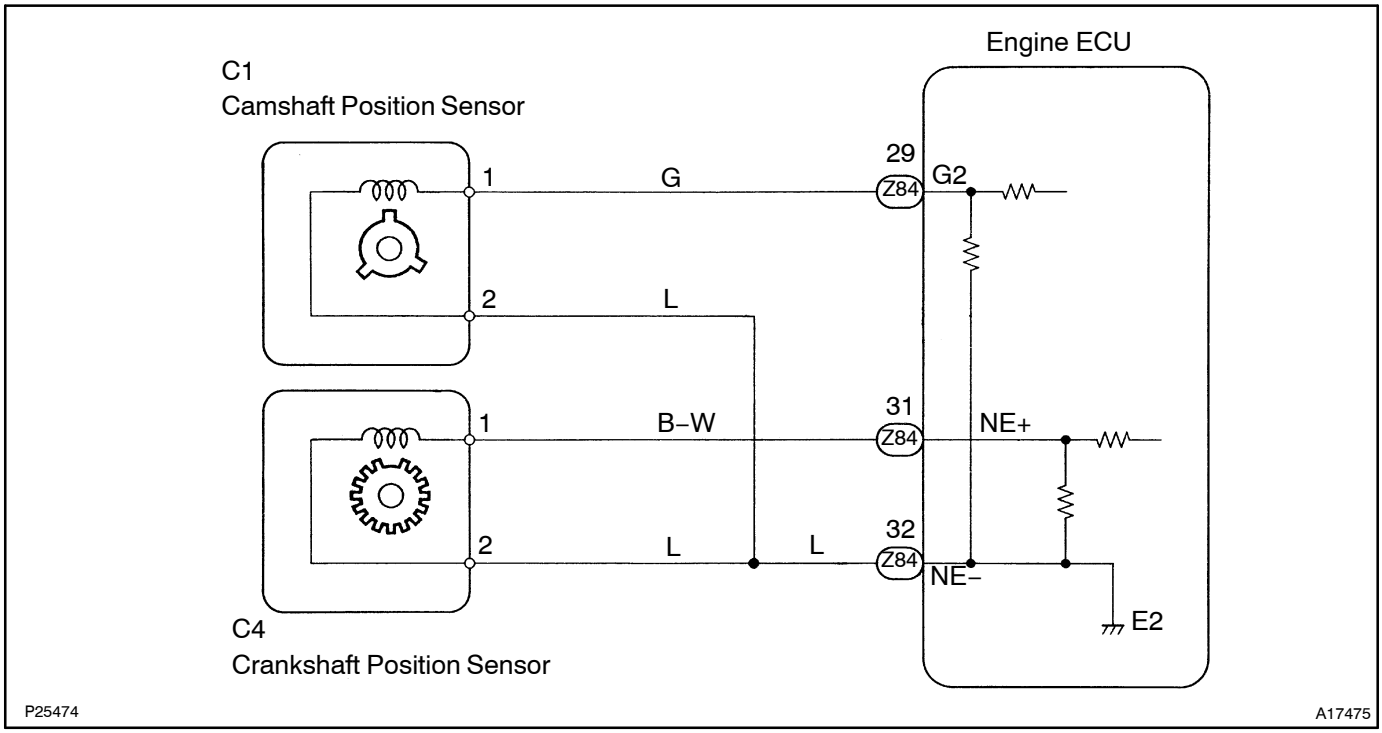
DTC	P0335/12, 13	Crankshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

The crankshaft position sensor, which detects the engine speed and crankshaft angle signal (NE signal), has been installed on the oil pump body.
The NE signal plate has 34 teeth. The NE signal sensor generates 34 signals of every engine revolution. The engine ECU detects the standard crankshaft angle based on the G2 signals, and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0335/12, 13	No crankshaft position sensor signal to engine ECU during cranking.(2 trip detection logic)	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Starter • Engine ECU
	No crankshaft position sensor signal to engine ECU with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM

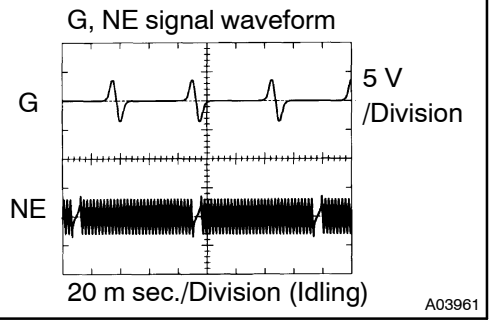


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335/12, 13 first. If no trouble is found, troubleshoot the following mechanical systems.
- 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 resistance of crankshaft position sensor (See page IG–1).**



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check between terminals G2 and NE–, NE and NE– of the engine ECU connector.

HINT:

The correct waveforms are as shown.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between engine ECU and crankshaft position sensor (See page IN–34).**

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

OK

3	**Inspect sensor installation and teeth of signal plate.**

NG → **Tighten sensor. Replace signal plate.**

OK

Check and replace engine ECU (See page IN–34).

DI2SC–05

DTC	P0340/12	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G2 signal) consist of a signal plate and pickup coil.
The G2 signal plate has 3 tooth, on its outer circumference and is mounted on the left bank camshafts.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The engine ECU detects the standard crankshaft angle based on the G2 signal and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0340/12	No camshaft position sensor signal to engine ECU during cranking. (2 trip detection logic)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Starter • engine ECU
	No camshaft position sensor signal to engine ECU with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335/12, 13 (Crankshaft Positio Sensor Circuit Malfunction) on page DI–841 for the WIRING DIAGRAM.

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 resistance of camshaft position sensor (See page IG–1).**

Reference: INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335/12, 13 (Crankshaft Position Sensor Circuit Malfunction) on page DI–841 for the Reference: INSPECTION USING OSCILLOSCOPE.

NG → **Replace camshaft position sensor.**

OK

2	Check for open and short in harness and connector between engine ECU and camshaft position sensor (See page IN–34).

NG → Repair or replace harness or connector.

OK

3	Inspect sensor installation.

NG → Tighten sensor.

OK

Check and replace engine ECU (See page IN–34).

DI643–05

DTC	P0420/94	Catalyst System Efficiency Below Threshold (Bank 1) (European spec. (Except Taiwan))

DTC	P0430/94	Catalyst System Efficiency Below Threshold (Bank 2) (European spec. (Except Taiwan))

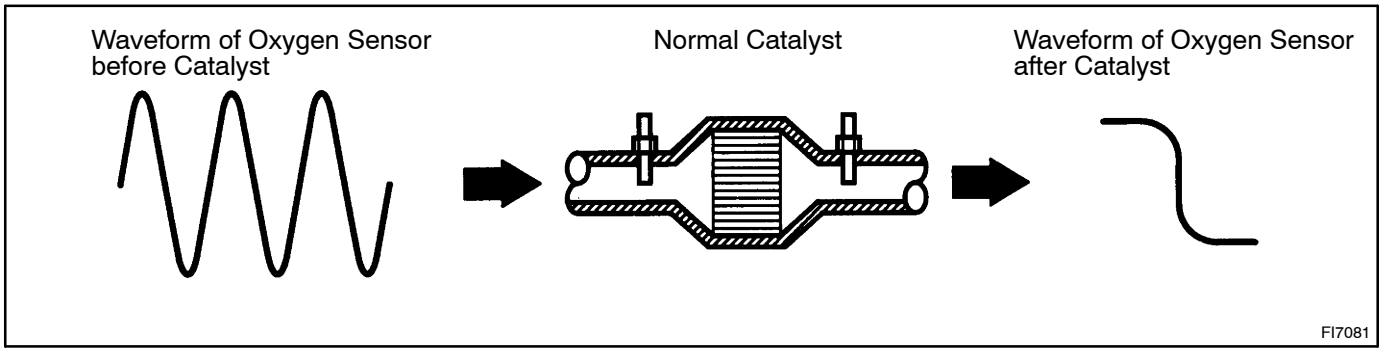
CIRCUIT DESCRIPTION

The engine ECU compares the waveform of the oxygen sensor located before the catalyst with the waveform of the oxygen sensor located after the catalyst to determine whether or not catalyst performance has deteriorated.

Air–fuel ratio feedback compensation keeps the waveform of the oxygen sensor before the catalyst repeatedly changing back and forth from rich to lean.

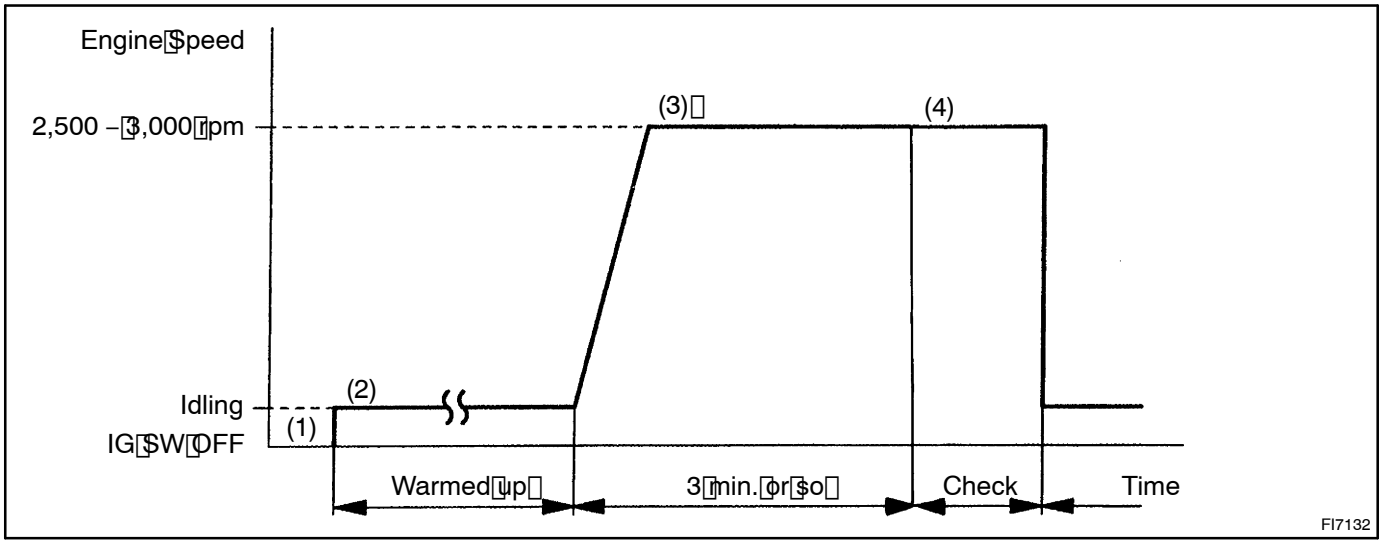
If the catalyst is functioning normally, the waveform of the oxygen sensor after the catalyst switches back and forth between rich and lean much more slowly than the waveform of the oxygen sensor before the catalyst.

But when both waveform change at a similar rate, it indicates that catalyst performance has deteriorated.

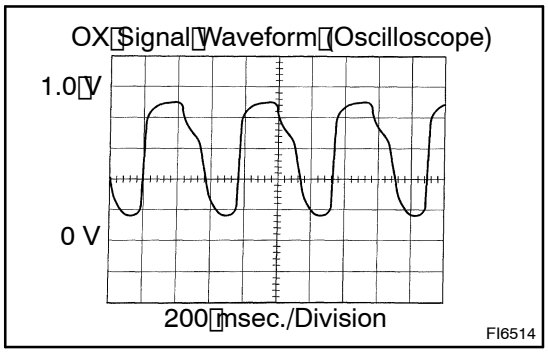


DTC No.	DTC Detecting Condition	Trouble Area
P0420/94 P0430/94	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of oxygen sensors have same amplitude (2 trip detection logic)	• Gas leakage on exhaust system • Oxygen sensor • Three–way catalytic converter

CONFIRMATION ENGINE RACING PATTERN



(1) Connect the hand–held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1A, OX1B, OX2A, and E1 of the engine ECU connectors.
(2) Start the engine and warm it up with all the accessories switched OFF until engine coolant temperature is stable.
(3) Race the engine at 2,500 – 3,000 rpm for about 3 min.
(4) After confirming that the waveform of the oxygen sensor (bank 1, 2 sensor 1) (OX1A, OX2A), oscillate around 0.5 V during feedback to the engine ECU, check the waveform of the oxygen sensor (bank 1 sensor 2) (OX1B).



HINT:
If there is a malfunction in the system, the waveform of the oxygen sensor (bank 1 sensor 2) (OX1B) is almost the same as that of the oxygen sensor (bank 1, 2 sensor 1) (OX1A, OX2A) on the left.
There are some cases where, even though a malfunction exists, the CHK ENG may either light up or not light up.

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 was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides P0420/94 or P0430/94) being output?**

YES → **Go to relevant DTC chart (See page DI–17).**

NO

2	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

3	Check oxygen sensor (bank 1, 2 sensor 1) (See page FI–67).

NG → Repair or replace.

OK

4	Check oxygen sensor (bank 1 sensor 2) (See page FI–67).

NG → Repair or replace.

OK

Replace three–way catalytic converter.

DI9HN–01

DTC	P0443/94	Evaporative Emission Control System Purge Control Vent Control Malfunction

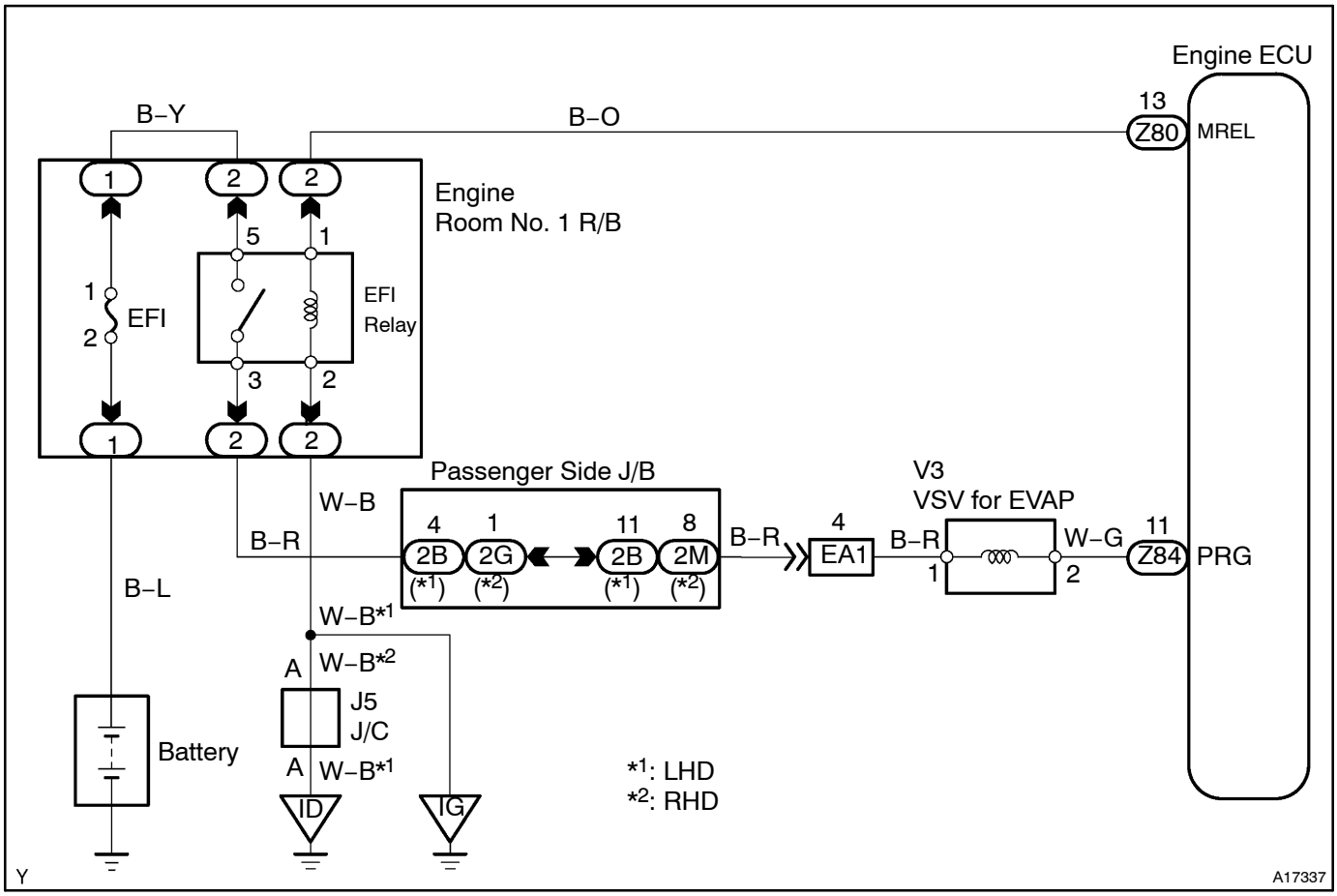
CIRCUIT DESCRIPTION

To reduce HC emissions, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.

The engine ECU changes the duty signal to the VSV for the EVAP so that the intake quantity of HC emissions is appropriate for the driving conditions (engine load, engine speed, vehicle speed, etc.) after the engine is wamed up.

DTC No.	DTC Detecting Condition	Trouble Area
P0443/94	Proper response to engine ECU command does not occur	• Open or short in VSV circuit for EVAP • VSV for EVAP • Engine ECU

WIRING DIAGRAM



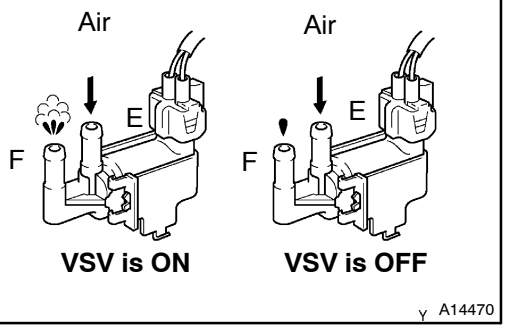
INSPECTION PROCEDURE

When using hand–held tester:

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.

1	**Connect hand–held tester and check operation of VSV for EVAP.**



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 the operation of the VSV when the VSV is operated by the hand–held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E does not flows out through port F filter.

OK	**Check for intermittent problems (See page DI–4).**

NG

2	**Check VSV for EVAP (See page FI–56).**

NG	**Replace VSV for EVAP.**

OK

3	Check for open and short in harness and connector between EFI main relay and engine ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

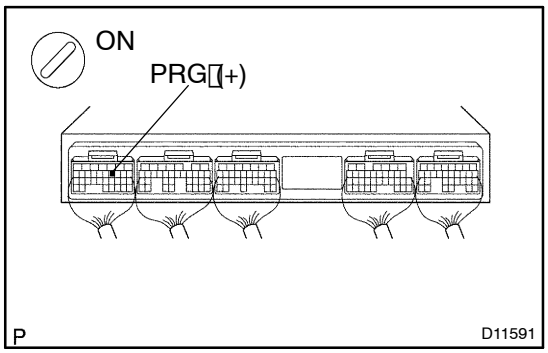
When not using hand–held tester:

1	Check VSV for EVAP (See page FI–56).

NG → Replace VSV for EVAP.

OK

2	Check voltage between terminal PRG of engine ECU connector and body ground.



PREPARATION:

(a) Remove the engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal PRG of the engine ECU connector and body ground.

OK:

Voltage: 9 – 14 V

NG → Check for open and short in harness and connector between EFI main relay and engine ECU (See page IN–34).

OK

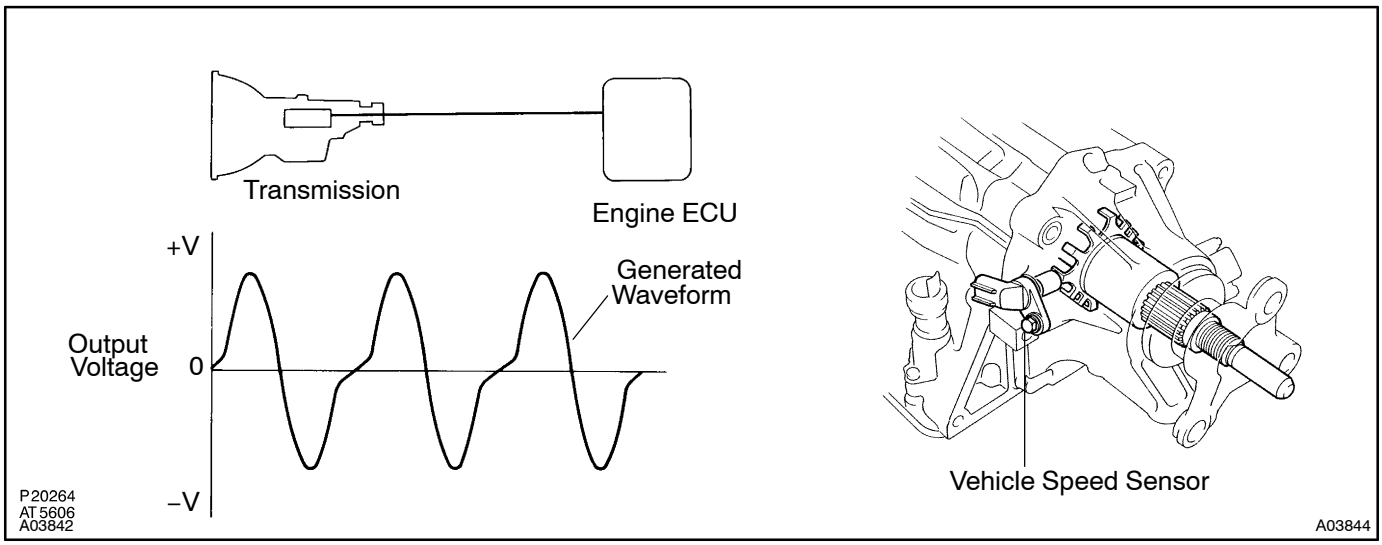
Check and replace engine ECU (See page IN–34).

DI2SD–04

DTC	P0500/42	Vehicle Speed Sensor Malfunction

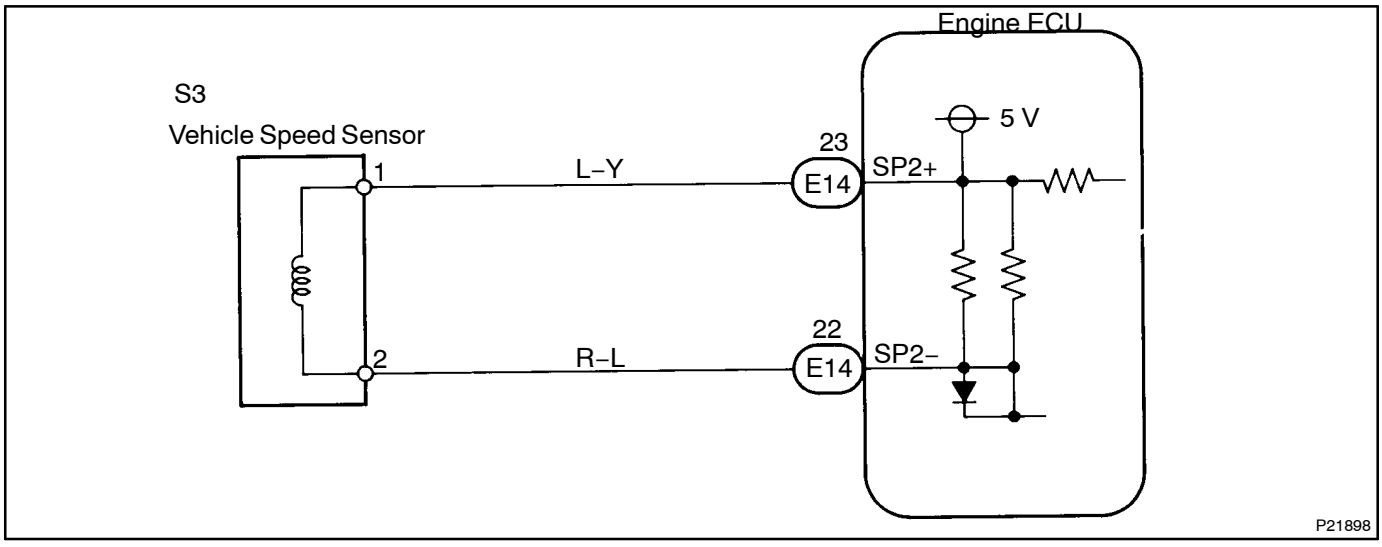
CIRCUIT DESCRIPTION

The vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the engine ECU. The engine ECU determines the vehicle speed based on these signals. An AC voltage is generated in the vehicle speed sensor coil as the rotor mounted on the output shaft rotates, and this voltage is sent to the engine ECU.



DTC No.	DTC Detecting Condition	Trouble Area
P0500/42	No vehicle speed sensor signal to engine ECU under conditions (a) and (b): (a) park/neutral position switch is OFF (b) Vehicle is being driven	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE
When using hand–held tester

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	**Connect hand–held tester and read value of vehicle speed value.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and the hand–held tester main switch ON.

CHECK:
Drive the vehicle and read vehicle speed value.

OK:
Vehicle speed matches tester speed value

OK → **Check and replace engine ECU (See page IN–34).**

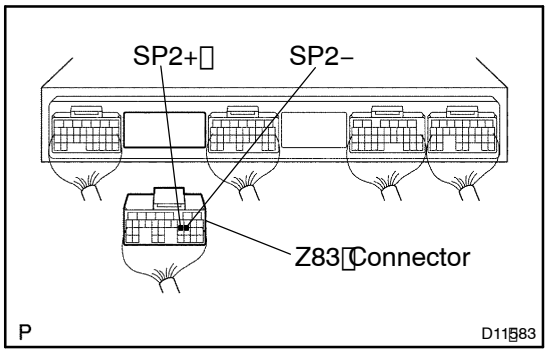
NG

2	**Check speedometer circuit (See page BE–35).**

NG → **Repair or replace speedometer circuit.**

OK

3	**Check resistance between terminals SP2+ and SP2– of engine ECU connector.**



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Disconnect the Z83 connector of the engine ECU.

CHECK:

Check resistance between terminals SP2+ and SP2– of the engine ECU connector.

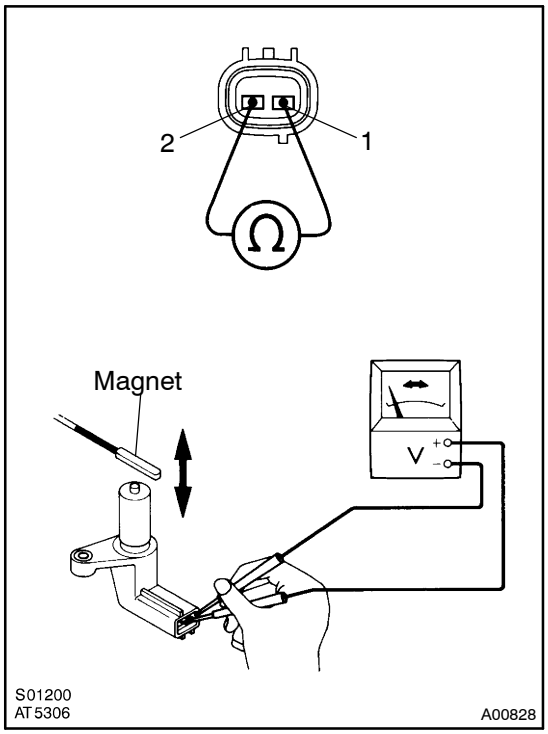
OK:

Resistance: 560 – 680 Ω

OK	**Check and replace engine ECU (See page IN–34).**

NG

4	**Check vehicle speed sensor.**



PREPARATION:

Remove the vehicle speed sensor from the transmission.

CHECK:

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

OK:

Resistance: 560 ~ 680 Ω

Reference

Check vehicle speed sensor's function

CHECK:

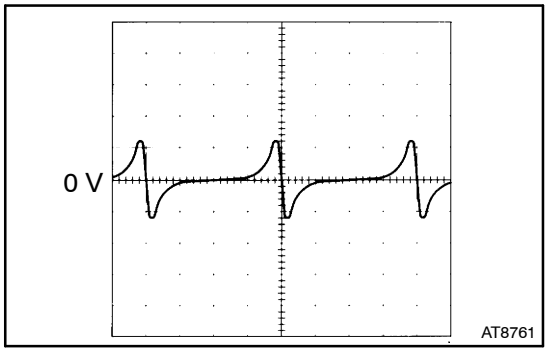
Check voltage between terminals 1 and 2 of the vehicle speed sensor when a magnet is put close to front end of the vehicle speed sensor then taken away quickly.

OK:

Voltage is generated intermittently

HINT:

Voltage generated is extremely low.



Reference INSPECTION USING OSCILLOSCOPE
Waveform between terminals SP2+ and SP2– When the vehicle speed is approx. 60 km/h (37 mph).

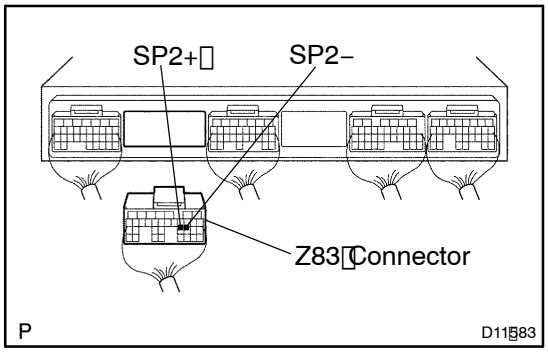
NG → **Replace vehicle speed sensor.**

OK

Check and repair harness and connector between engine ECU and vehicle speed sensor (See page IN–34).

When not using hand–held tester

1	Check resistance between terminals SP2+ and SP2– of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Disconnect the Z83 connector of the engine ECU.

CHECK:
Check resistance between terminals SP2+ and SP2– of the engine ECU connector.

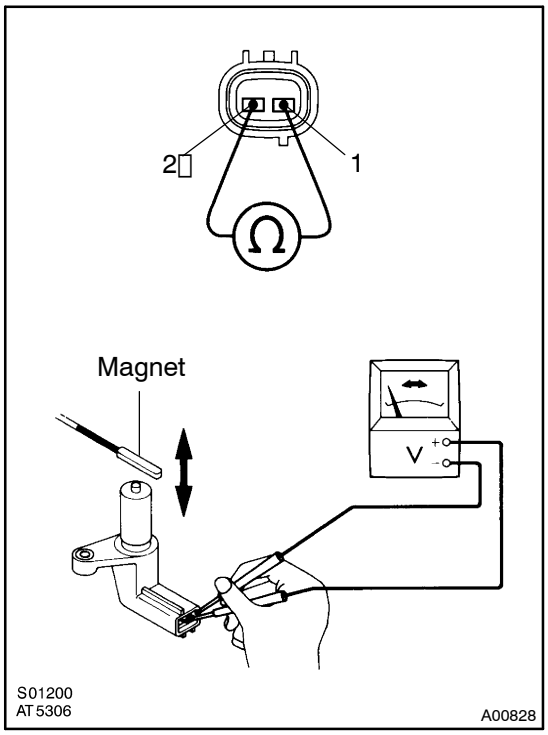
OK:

Resistance: 560 – 680 Ω

OK	Check and replace engine ECU (See page IN–34).

NG

2	Check vehicle speed sensor.



PREPARATION:
Remove the vehicle speed sensor from the transmission.

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

OK:

Resistance: 560 ~ 680 Ω

Reference

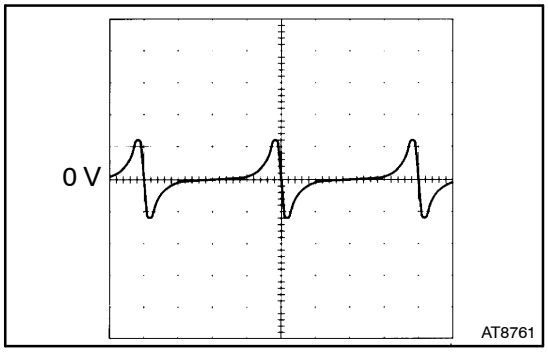
Check vehicle speed sensor's function

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

OK:

Voltage is generated intermittently

HINT:
Voltage generated is extremely low.



Reference: INSPECTION USING OSCILLOSCOPE
Waveform between terminals SP2+ and SP2– When the vehicle speed is approx. 60 km/h (37 mph).

NG → **replace vehicle speed sensor.**

OK

Check and repair harness and connector between engine ECU and vehicle speed sensor (See page IN–34).

DI2P2–08

DTC	P0505/33	Idle Control System Malfunction (European spec.)

CIRCUIT DESCRIPTION

The idle speed is controlled by the Electric Throttle Control System (ETCS).
ETCS is composed of the throttle motor to operate the throttle valve, the magnetic clutch to connect the throttle motor with the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the engine ECU to control the ETCS and the one valve type throttle body.
The engine ECU controls the throttle motor to make the throttle valve opening angle properly for the target idle speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505/33	Idle speed continues to vary greatly from target speed (2 trip detection logic)	• Air induction system • Electric throttle control system

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 was warmed up or not, the air–fuel was ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides P0505/33) being output?

YES → Go to relevant DTC chart (See page DI–17).

NO

2	Check air induction system (See page FI–1).

NG → Repair or replace.

OK

Check electric throttle control system (See page FI–32).

DI6ZR–03

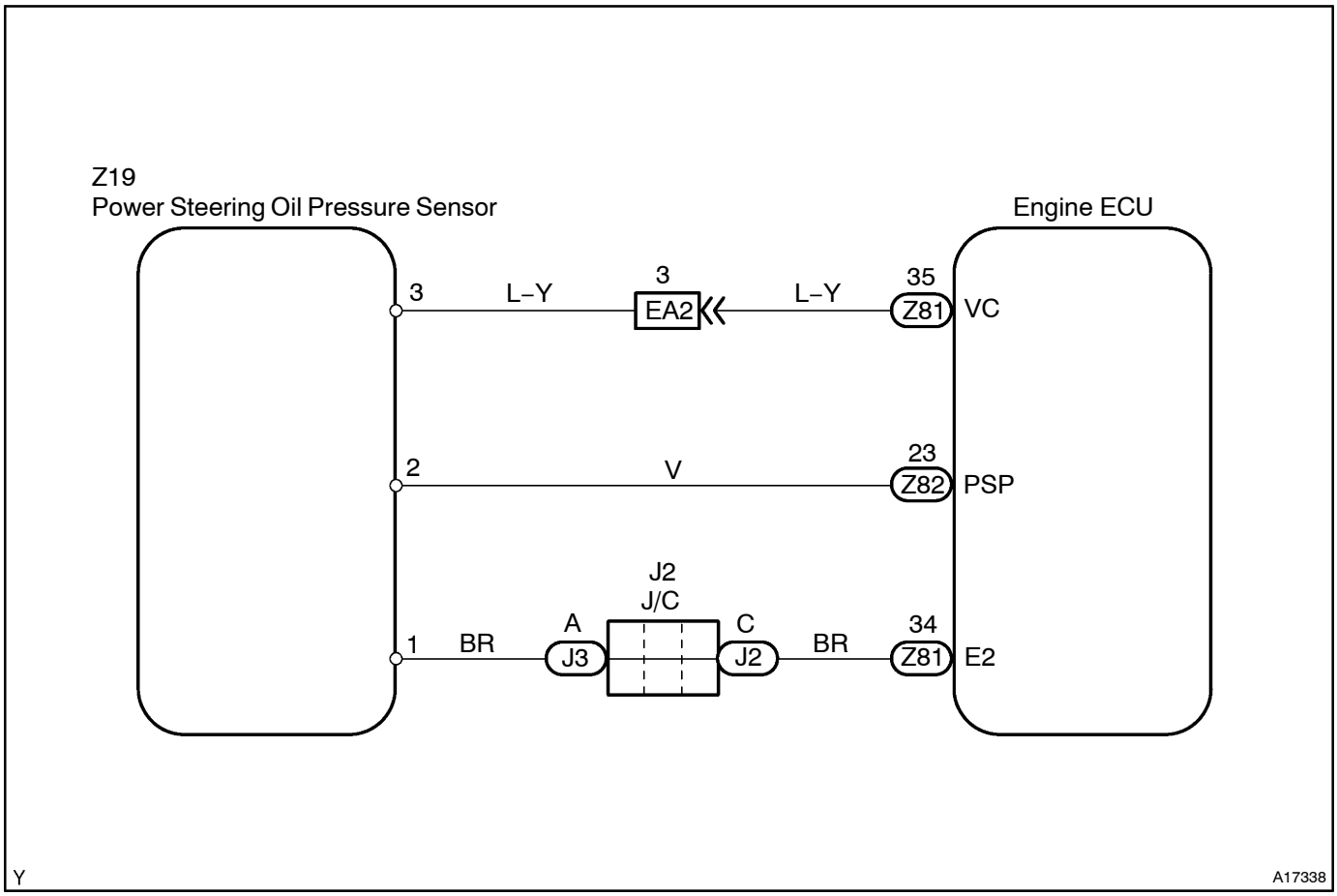
DTC	P0550/75	Power Steering Pressure Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Engine ECU controls the idle speed the most appropriate according to the signal from the power steering pressure sensor.

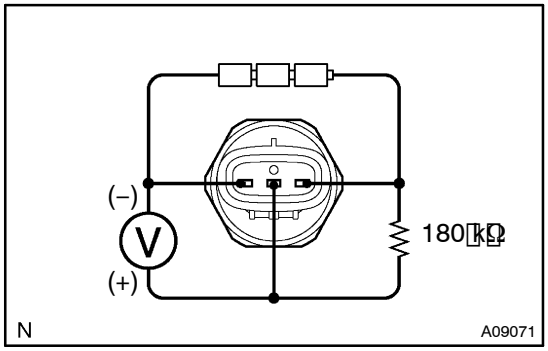
DTC No.	DTC Detecting Condition	Trouble Area
P0550/75	Condition (a) or (b) continues with more than 0.5 secs. (a) PNP < 0.28 V (b) PNP > 4.9 V	• Open in power steering pressure sensor circuit • Power steering oil pressure sensor • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check power steering oil pressure sensor.



PREPARATION:

(a) Connect the 3 dry batteries of 1.5 V in series.

(b) Connect the wire harness as shown in the illustration.

CHECK:

Measure voltage between terminals Vout and GND.

OK:

Power steering fluid pressure	Voltage (V)
0 kPa (0 kgf/cm², 0 psi)	Approx. 0.45
3,500 kPa (36 kgf/cm², 512 psi)	Approx. 2.25
7,000 kPa (71 kgf/cm², 1,010 psi)	Approx. 4.05

NG → Replace power steering oil pressure sensor.

OK

2	Check for open in harness and connector between engine ECU and power steering oil pressure sensor (See page IN–34).

NG → Repair or replace harness or connector.

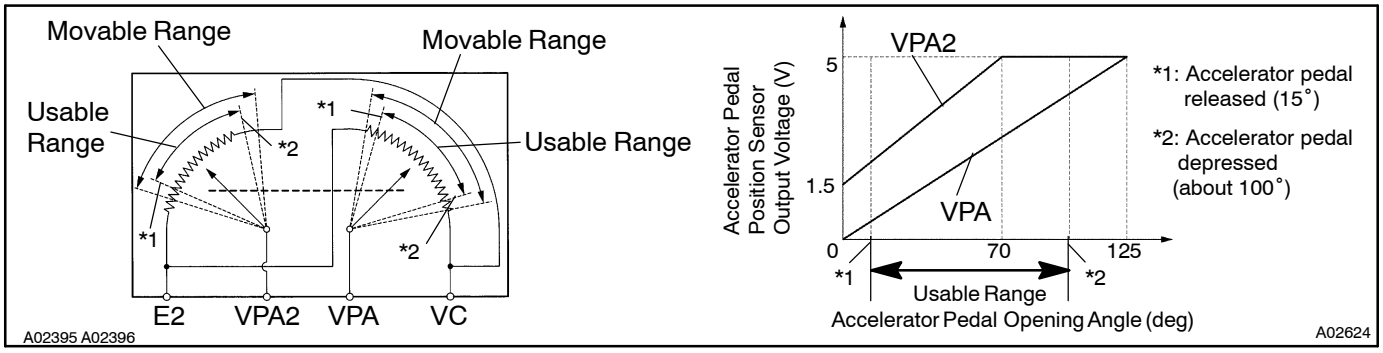
OK

Check and replace engine ECU.

DTC	P1120/19	Accelerator Pedal Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Accelerator pedal position sensor is mounted on the throttle body and it have the 2 sensors to detects the accelerator position and a malfunction of the accelerator position's own.
The accelerator pedal position sensor is connected with the accelerator pedal by the accelerator wire and the voltage applied to the terminals VPA and VPA2 of the ECU changes between 0 V and 5 V in proportion to the opening angle of the accelerator pedal.
The engine ECU judges the current opening angle of the accelerator pedal from these signals input from terminals VPA and VPA2 and the engine ECU controls the throttle motor based on these signals.
If this DTC is stored, the engine ECU shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

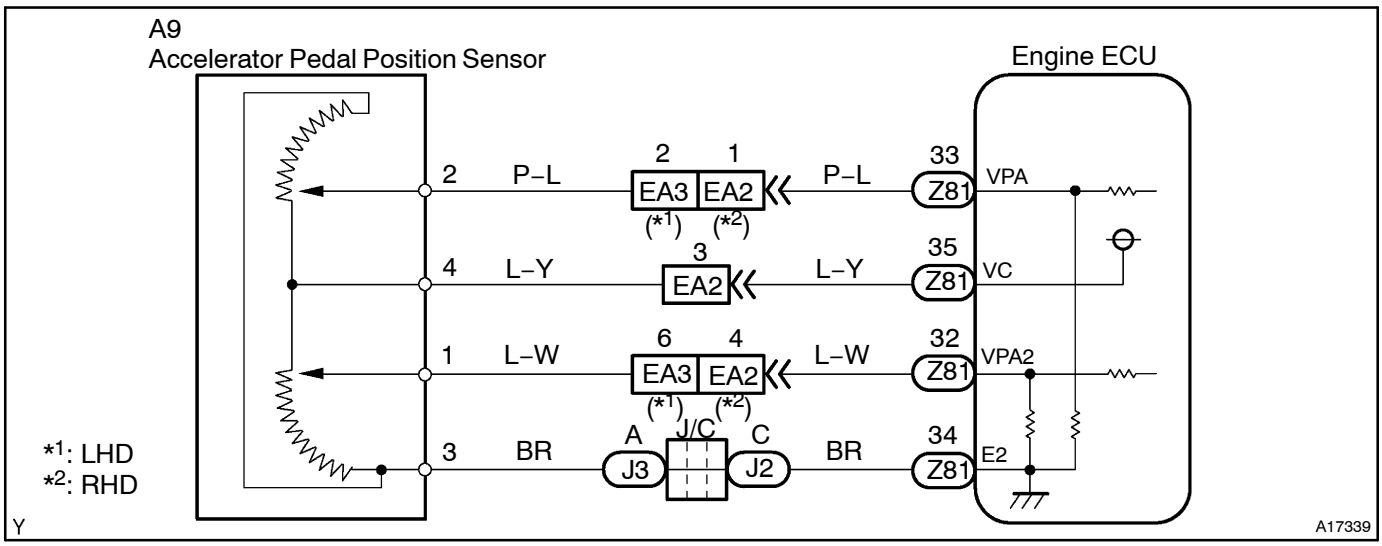


DTC No.	DTC Detecting Condition	Trouble Area
P1120/19	Condition (a), (b), (c) or (d) continues for 2.0 seconds: (a) VPA ≦ 0.2 V and VPAR20K ≧ 0.97 deg (b) VPA2 ≦ 0.5 V and VPAR10K ≧ 0.97 deg (c) VPA ≧ 4.7 V (d) When VPA ≧ 0.2 V and ≦ 1.8 V, and VPA2 ≧ 4.97 V (e) VPA–VPA2 ≦ 0.02 V	• Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • Engine ECU
	Condition (a) or (b) continues for 2.0 seconds: (a) VPA ≦ 0.2 V and VPA2 ≦ 0.5 V	

HINT:
After confirming DTC P1120/19 use the hand–held tester to confirm the accelerator pedal opening percentage.

Throttle valve position expressed as voltage				Trouble area
Accelerator pedal released		Accelerator pedal depressed		
ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2	
0 V	0 V	0 V	0 V	VC line open
0 V	1.8 ~ 2.7 V	0 V	4.7 ~ 5.1 V	VPA line open or grand short
0.3 ~ 0.9 V	0 V	3.2 ~ 4.8 V	0 V	VPA2 line open or grand short
5 V	5 V	5 V	5 V	E2 line open

WIRING DIAGRAM



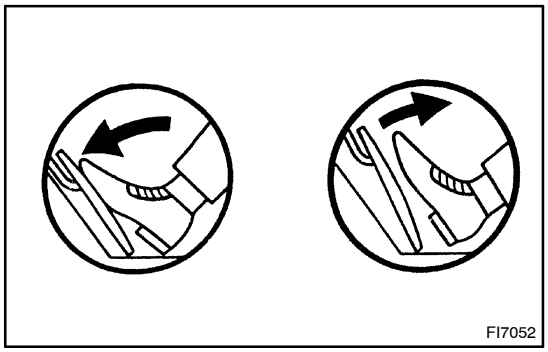
INSPECTION PROCEDURE

HINT:

- If DTC P0110/31 (Intake Air Temp. Circuit Malfunction), P0115/122 (Water Temp. Circuit Malfunction), P0120/41 (Throttle Position Sensor Circuit Malfunction), P1120/19 (Accelerator Pedal Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- 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.

When using hand–held tester

1	**Connect hand–held tester, read the voltage for accelerator pedal position sensor data.**



PREPARATION:

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

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

CHECK:

Read the voltage for the accelerator pedal position sensor data.

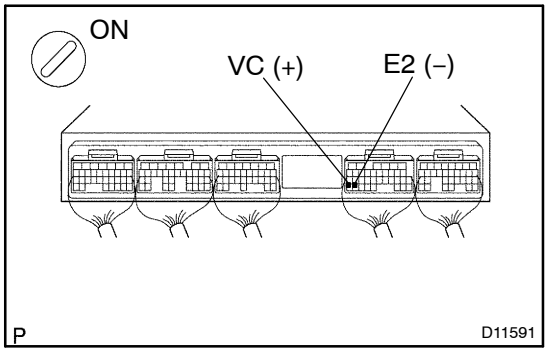
OK:

Accelerator pedal	VPA	VPA2
Released	0.3 ~ 0.9 V	1.8 ~ 2.7 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK → **Check and replace engine ECU (See page IN–34).**

NG

2	**Check voltage between terminals VC and E2 of engine ECU connector.**



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the engine ECU connector.

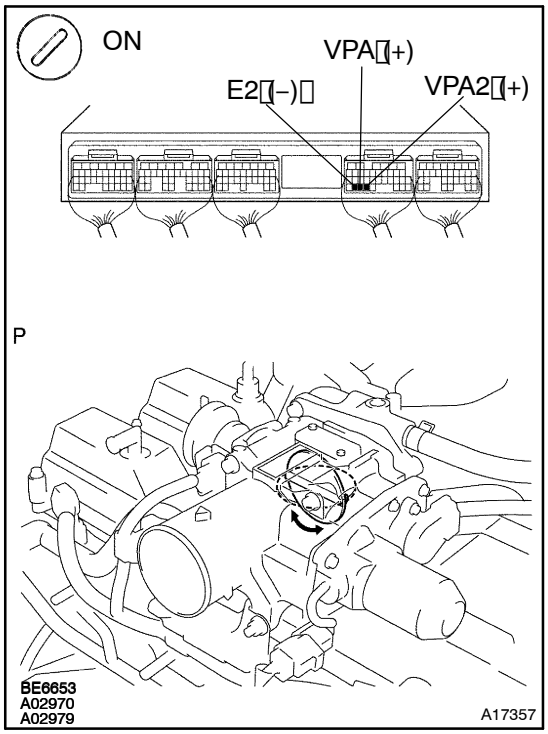
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace engine ECU (See page IN–34).**

OK

3	Check voltage between terminals VPA, VPA2 and E2 of engine ECU connector.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VPA, VPA2 and E2 of the engine ECU connector.

OK:

Accelerator pedal	Voltage	
	VPA	VPA2
Released	0.3 – 0.9 V	1.8 – 2.7 V
Depressed	3.2 – 4.8 V	4.7 – 5.1 V

OK → Check and replace engine ECU (See page IN–34).

NG

4	Check accelerator pedal position sensor (See page FI–32).

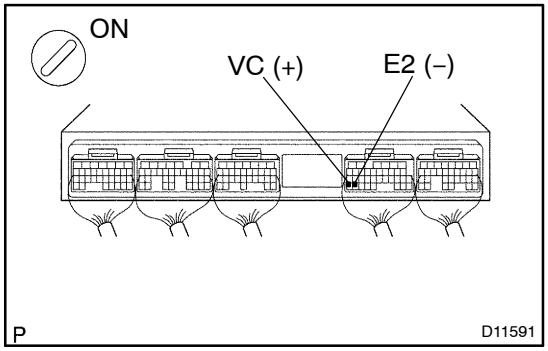
NG → Replace accelerator pedal position sensor (See page FI–37).

OK

Check for open and short in harness and connector between engine ECU and accelerator pedal position sensor (VC, VPA, VPA2, E2 line) (See page IN–34).

When not using hand–held tester

1	Check voltage between terminals VC and E2 of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

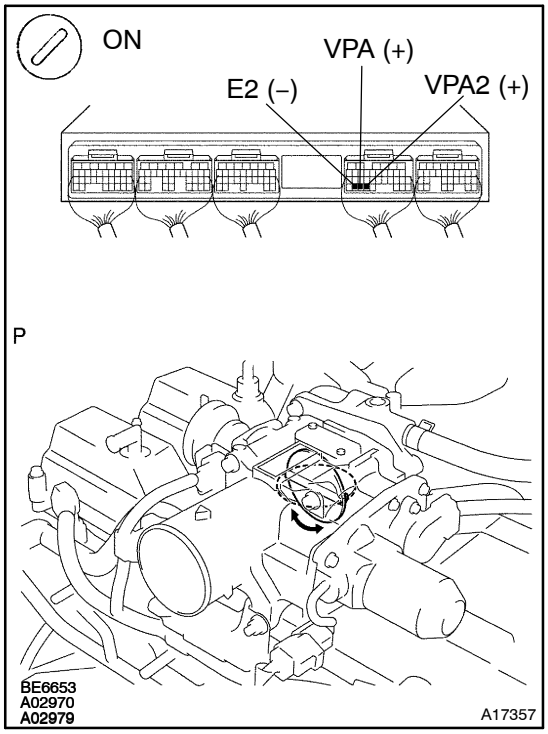
CHECK:
Measure voltage between terminals VC and E2 of the engine ECU connector.

OK:
Voltage: 4.5 ~ 5.5 V

NG → **Check and replace engine ECU (See page IN–34).**

OK

2	Check voltage between terminals VPA, VPA2 and E2 of engine ECU connector.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals VPA, VPA2 and E2 of the engine ECU connector.

OK:

Accelerator pedal	Voltage	
	VPA	VPA2
Released	0.3 ~ 0.9 V	1.8 ~ 2.7 V
Depressed	3.2 ~ 4.8 V	4.7 ~ 5.1 V

OK → **Check and replace engine ECU (See page IN–34).**

NG

3	Check accelerator pedal position sensor (See page FI–32).

NG → Replace accelerator pedal position sensor (See page FI–37).

OK →

Check for open and short in harness and connector between engine ECU and accelerator pedal position sensor (VC, VPA, VPA2, E2 line) (See page IN–34).

DI2T3–03

DTC	P1121/19	Accelerator Pedal Position Sensor Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P1120/19 on page DI–103.

DTC No.	DTC Detecting Condition	Trouble Area
P1121/19	Condition (a) continues for 2.0 seconds: (a) Difference between VPA and VPA2 is out of threshold	• Accelerator pedal position sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester or OBD scan tool. 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.

Replace accelerator pedal position sensor (See page FI–37).

DI2SF–04

DTC	P1125/89*	Throttle Control Motor Circuit Malfunction

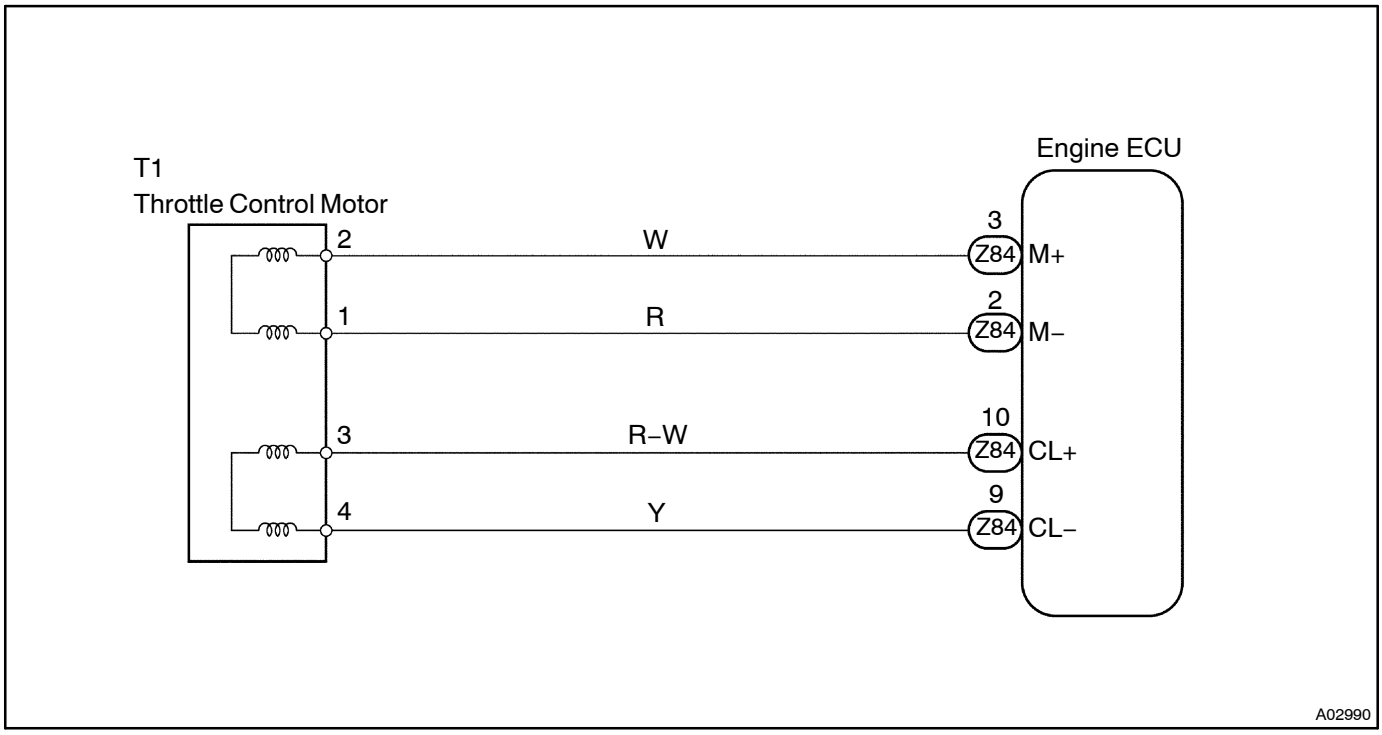
***: ETCS trouble code No. is 21.**

CIRCUIT DESCRIPTION

Throttle motor is operated by the engine ECU and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the engine ECU to control the throttle motor in order to the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the engine ECU shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1125/89*	Condition (a) and (b) continues for 0.5 seconds: (a) Throttle control motor output duty ≧ 80 % (b) Throttle control motor current < 0.5 A	• Open or short in throttle control motor circuit • Throttle control motor • Engine ECU
	Throttle control motor current ≧ 16 A	
	Under condition continue for 0.6 seconds: Throttle control motor current ≧ 7 A	

WIRING DIAGRAM

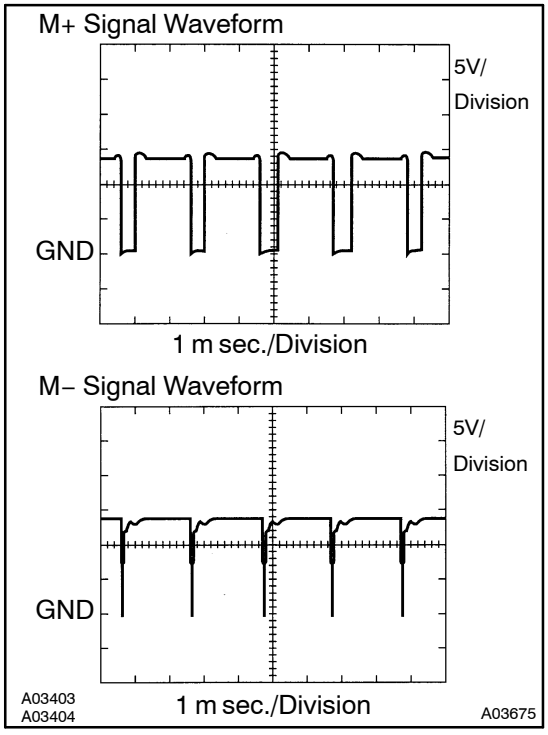


INSPECTION PROCEDURE

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 throttle control motor circuit.**



PREPARATION:

(a) Connect the oscilloscope between terminals M+ or M– and E1 of the engine ECU.

(b) Start the engine.

CHECK:

Check the waveform between terminals M+ or M– and E1 of the engine ECU when engine is idling.

OK:

The correct waveforms are as shown.

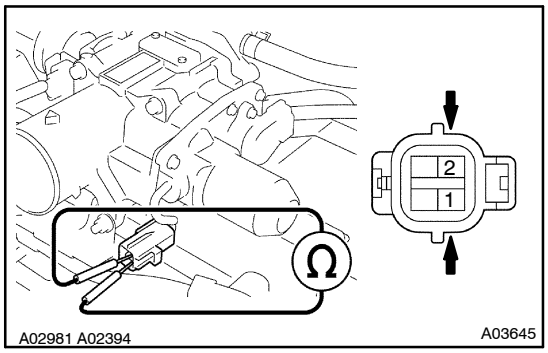
HINT:

The waveform frequency varies depending on the throttle opening.

OK → **Check and replace engine ECU (See page IN–34).**

NG

2	Check throttle control motor.



PREPARATION:

Disconnect the throttle control motor and magnetic clutch connector.

CHECK:

Measure resistance between terminals 1 and 2 of the throttle control motor and magnetic clutch.

OK:

Resistance: 0.3 – 100 Ω at 20°C (68°F)

NG → Replace throttle control motor (See page FI–37).

OK

3	Check for open and short in harness and connector between throttle control motor and engine ECU (See page IN–34).

NG → Repair or replace.

OK

Check and replace engine ECU (See page IN–34).

DI2SG–04

DTC	P1126/89*	Magnetic Clutch Circuit Malfunction

*: ETCS trouble code No. is 22.

CIRCUIT DESCRIPTION

Magnetic clutch is mounted between the throttle motor and the valve, and it connects the throttle motor with the throttle valve.
Therefore, the throttle motor opens and closes the throttle valve through the magnetic clutch.
If the electric throttle control system has a malfunction, the magnetic clutch separates the throttle motor from the throttle valve in order not to operate the throttle valve by the throttle motor.
If this DTC is stored, the engine ECU shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1126/89	Condition (a) continue for 0.8 seconds: (a) Magnetic clutch current ≧ 1.4 A or ≦ 0.4 A	• Open or short in magnetic clutch circuit • Magnetic clutch • Engine ECU
	Condition (a) continues for 1.5 seconds: (a) Magnetic clutch current ≧ 1.0 A or ≦ 0.8 A	

WIRING DIAGRAM

Refer to DTC P1125/89 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

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 magnetic clutch circuit.**

When using hand–held tester:

PREPARATION:

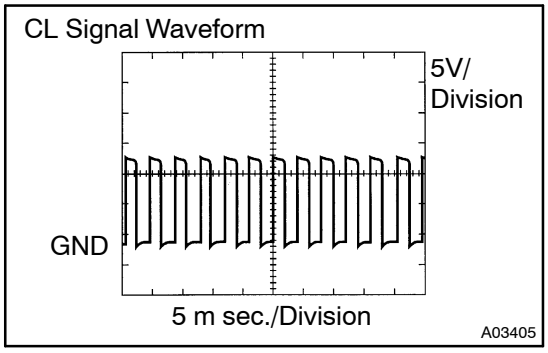
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and hand–held tester main switch ON.

CHECK:

Read the magnetic clutch current value on the hand–held tester.

OK:

Current: 0.8 – 1.0 A



When not using hand–held tester:

PREPARATION:

(a) Connect the oscilloscope between terminals CL+ and CL– of the engine ECU.

(b) Start the engine.

CHECK:

Check the waveform between terminals CL+ and CL– of the engine ECU when engine is idling.

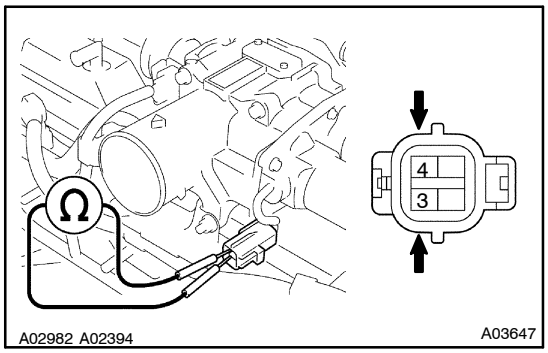
OK:

The correct waveform is as shown.

NG	**Go to step 4.**

OK

2	**Check magnetic clutch.**



PREPARATION:

Disconnect the throttle control motor and magnetic clutch connector.

CHECK:

Measure resistance between terminals 3 and 4 of the throttle control motor and magnetic clutch.

OK:

Resistance: 4.2 ~ 5.2 Ω at 20°C (68°F)

NG	**Replace throttle control motor (with magnetic clutch) (See page FI–37).**

OK

3	**Check for open and short in harness and connector between magnetic clutch and engine ECU (See page IN–34).**

NG	**Repair or replace.**

OK

4	Check operation of magnetic clutch.

CHECK:

(a) Clear the DTC.

(b) Perform the following steps and check the DTC.

(1) Turn the ignition switch ON.

(2) Start the engine.

(3) Turn the ignition switch OFF and wait 3 seconds.

(4) Turn the ignition switch ON.

OK:

DTC P1126/89 is not stored

NG → **Replace throttle control motor (with magnetic clutch) (See page FI–37).**

OK

Check and replace engine ECU (See page IN–34).

DI2SH–04

DTC	P1127/89*	ETCS Actuator Power Source Circuit Malfunction

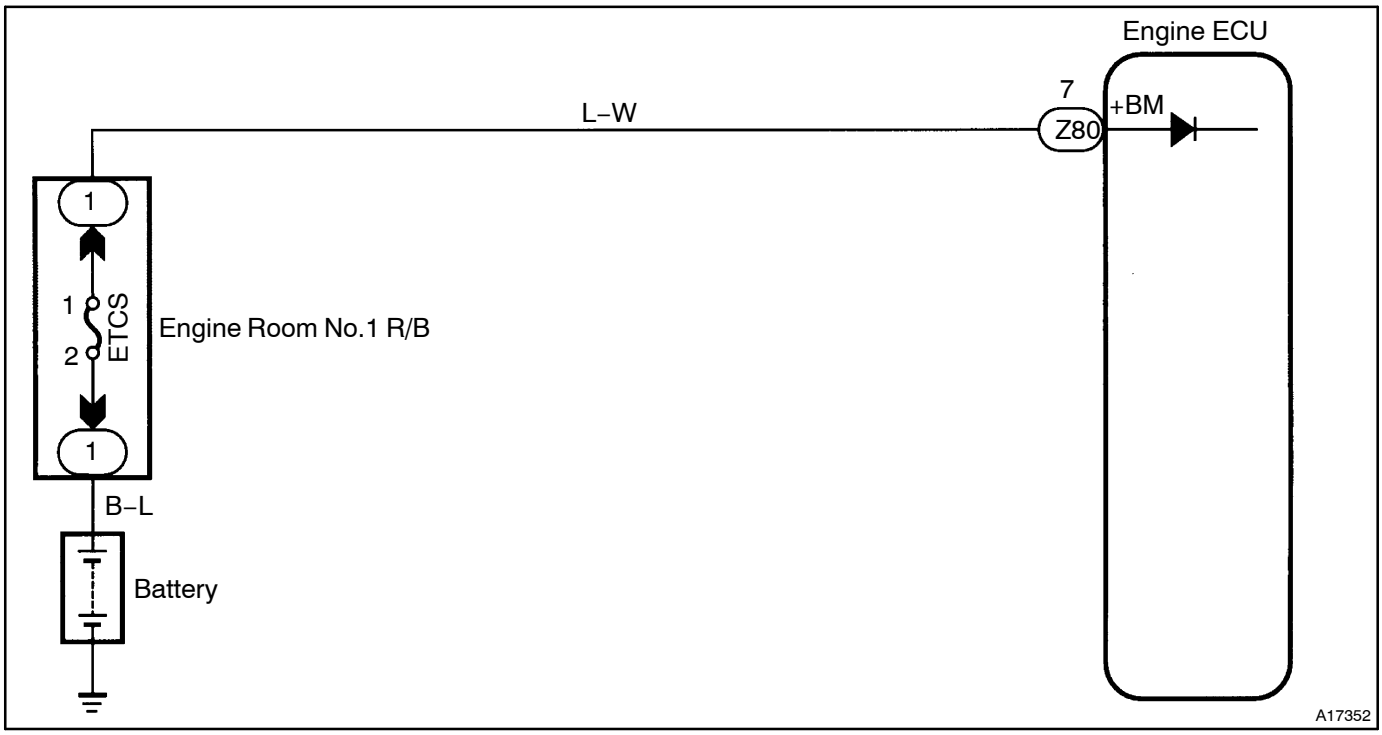
***: ETCS trouble code No. is 23.**

CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal +BM of the engine ECU even once when the ignition switch is OFF for the electric throttle control system.
If this DTC is stored, the engine ECU shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1127/89	Open in ETCS power source circuit	• Open in ETCS power source circuit • Engine ECU

WIRING DIAGRAM

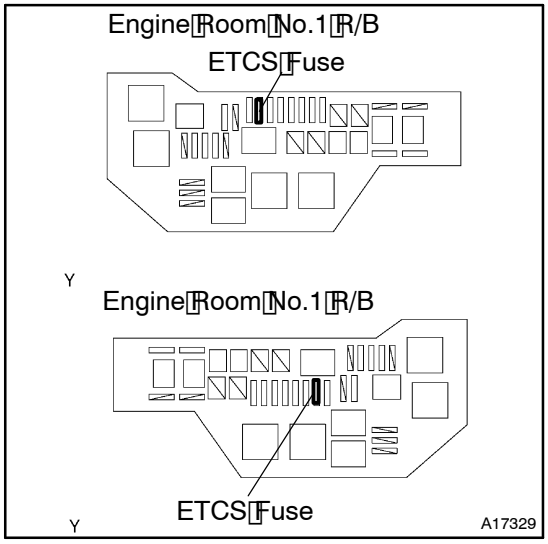


INSPECTION PROCEDURE

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 ETCS fuse.**



PREPARATION:

Remove the ETCS fuse from the engine room No.1 R/B.

CHECK:

Check continuity of the ETCS fuse.

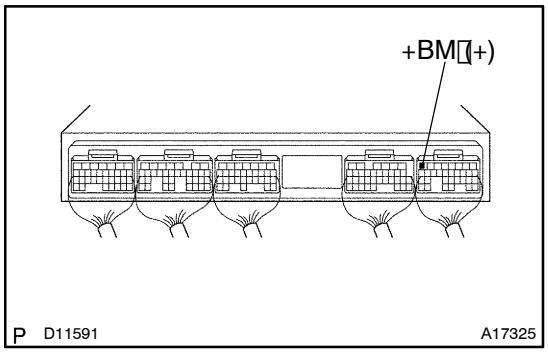
OK:

Continuity

NG → **Check for short in all harness and components connected to ETCS fuse.**

OK

2	**Check voltage between terminal +BM of engine ECU connector and body ground.**



PREPARATION:

Remove the engine room engine ECU hood and cover.

CHECK:

Measure voltage between terminal +BM of the engine ECU connector and body ground.

OK:

Voltage: 9 – 14 V

OK → **Check and replace engine ECU (See page IN–34).**

NG

Check and repair harness or connector between battery and ETCS fuse and engine ECU (See page IN–34).

DI2SI–04

DTC	P1128/89* Throttle Control Motor Lock Malfunction

*: ETCS trouble code No. is 31.

CIRCUIT DESCRIPTION

Throttle motor is operated by the ECU and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the engine ECM to control the throttle motor in order the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the engine ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1128/89	Lock throttle control motor during control throttle control motor	• Throttle control motor • Throttle body • Engine ECM

WIRING DIAGRAM

Refer to DTC P1125/89 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

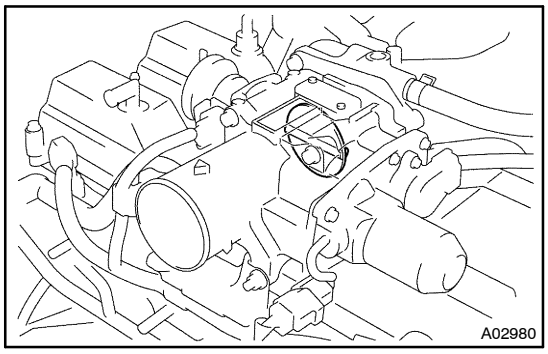
HINT:
Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at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

1	Check throttle control motor (See page DI–110, step 2).

NG → Replace throttle control motor (See page FI–37).

OK

2	**Visualy check throttle valve.**



PREPARATION:
Remove the intake air duct.
CHECK:
Check whether or not a foreign body is caught between the throttle valve and the housing.

NG → **Remove a foreign body and clean throttle body.**

OK

Replace throttle body.

DI2SJ–04

DTC	P1129/89*	Electric Throttle Control System Malfunction

*: ETCS trouble code No. is 32.

CIRCUIT DESCRIPTION

Electric Throttle Control System (ETCS) is composed of the throttle motor to operate the throttle valve, the electromagnetic clutch to connect the throttle motor with the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the engine ECU to control the ETCS and the one valve type throttle body.
The engine ECU controls the throttle motor to make the throttle valve opening angle properly in response driving condition.
The throttle position sensor which is mounted on the throttle body detects the opening angle of the throttle valve, and it provides feedback to the engine ECU to control the throttle motor.
If the ETCS has a malfunction, the engine ECU shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1129/89	Throttle opening angle continues to vary great from target throttle opening angle	• Electric throttle control system • Engine ECU

WIRING DIAGRAM

Refer to DTC P1125/89 (Throttle Control Motor Circuit Malfunction) on page DI–110 for the WIRING DIAGRAM.

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	**Are there any other codes (besides DTC P1129) being output?**

YES → **Go to relevant DTC chart (See page DI–17).**

NO →

Replace engine ECU, and clear DTC. If DTC P1129 is memorized again, and then replace throttle body.

DI9HO–01

DTC	P1200/78	Fuel Pump Relay/ECU Circuit Malfunction

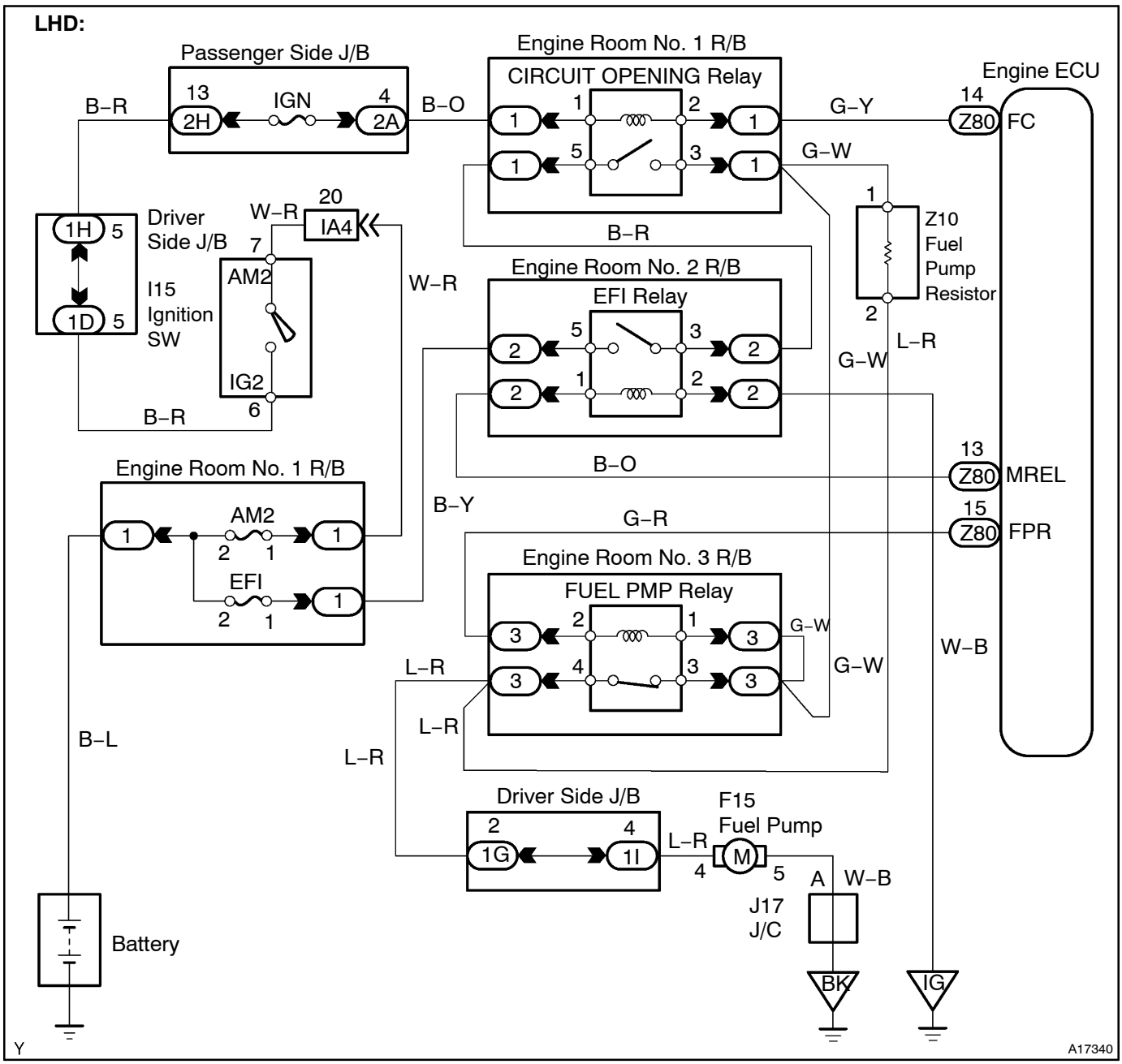
CIRCUIT DESCRIPTION

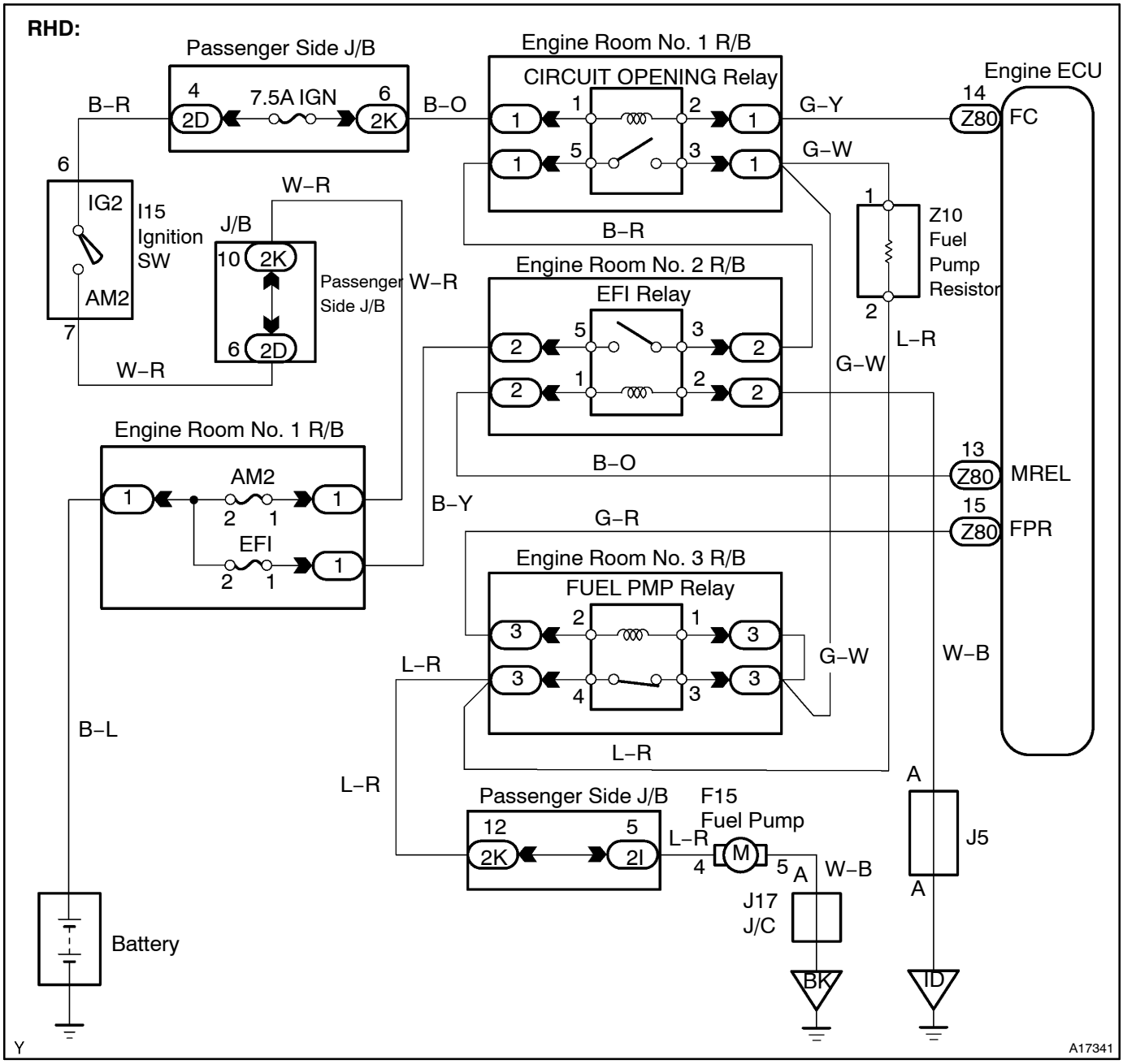
The fuel pump speed is controlled at 2 steps (high speed, low speed) according to the condition of the engine (starting, light load, heavy load).
When the engine starts, the engine ECU turns the fuel pump relay OFF to operate the fuel pump at high speed.
After the engine has started, during idling or when the load is light, the engine ECU turns the fuel pump relay ON to operate the fuel pump at low speed. When the intake air increases (heavy load), the engine ECU turns the fuel pump relay OFF to operate the fuel pump at high speed. There are two fuel pumps. The engine ECU switches from main to sub or sub to main every time the ignition switch is turned ON and OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P1200/78	When open or short is detected in the fuel pump relay circuit for 0.5 sec. or more during cranking.	• Open or short in fuel pump relay circuit • Fuel pump relay • Engine ECU

HINT:
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI–24.

WIRING DIAGRAM




RHD:
Passenger Side J/B
4
2D
7.5A IGN
6
2K
B–R
B–O
Engine Room No. 1 R/B
CIRCUIT OPENING Relay
1
2
1
5
3
1
G–Y
G–W
Engine ECU
14
Z80
FC
6
IG2
I15
Ignition
SW
AM2
7
W–R
J/B
10
2K
6
2D
Passenger
Side J/B
W–R
B–R
Engine Room No. 2 R/B
EFI Relay
5
3
2
1
2
2
2
2
1
Z10
Fuel
Pump
Resistor
2
L–R
G–W
Engine Room No. 1 R/B
AM2
EFI
2
1
B–Y
B–O
13
Z80
MREL
G–R
15
Z80
FPR
Engine Room No. 3 R/B
FUEL PMP Relay
2
1
3
3
4
3
G–W
W–B
L–R
L–R
B–L
L–R
Passenger Side J/B
12
2K
5
2I
F15
Fuel Pump
L–R
M
4
5
A
W–B
A
J5
A
J17
J/C
Battery
BK
ID
Y
A17341

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 fuel pump relay (See page FI–52).

NG → Replace fuel pump relay.

OK

2	Check fuel pump resister (See page FI–52).

NG → Replace fuel pump resister.

OK

3	Check for open and short in harness and connector between terminal FPR of engine ECU and fuel pump relay (See page IN–34).

NG → Repair or replace harness and connector.

OK

Check and replace engine ECU (See page IN–34).

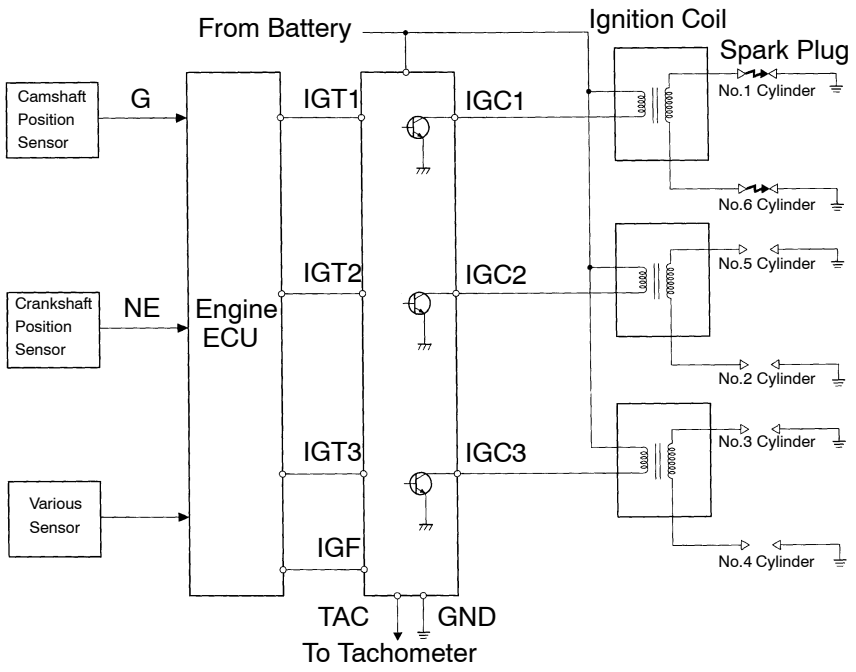
DI9HP–01

DTC	P1300/14	Igniter Circuit Malfunction

CIRCUIT DESCRIPTION

A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces high–voltage loss, and enhances the the overall reliability of the ignition system by eliminating the distributor. The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug pass from the center elecrtode to the ground electrode.

The engine ECU determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the power transistors in the igniter cuts off the current to the primary coil in the ignition coil is supplied to the spark plug that are connected to the end of the secondary coil. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the engine ECU.

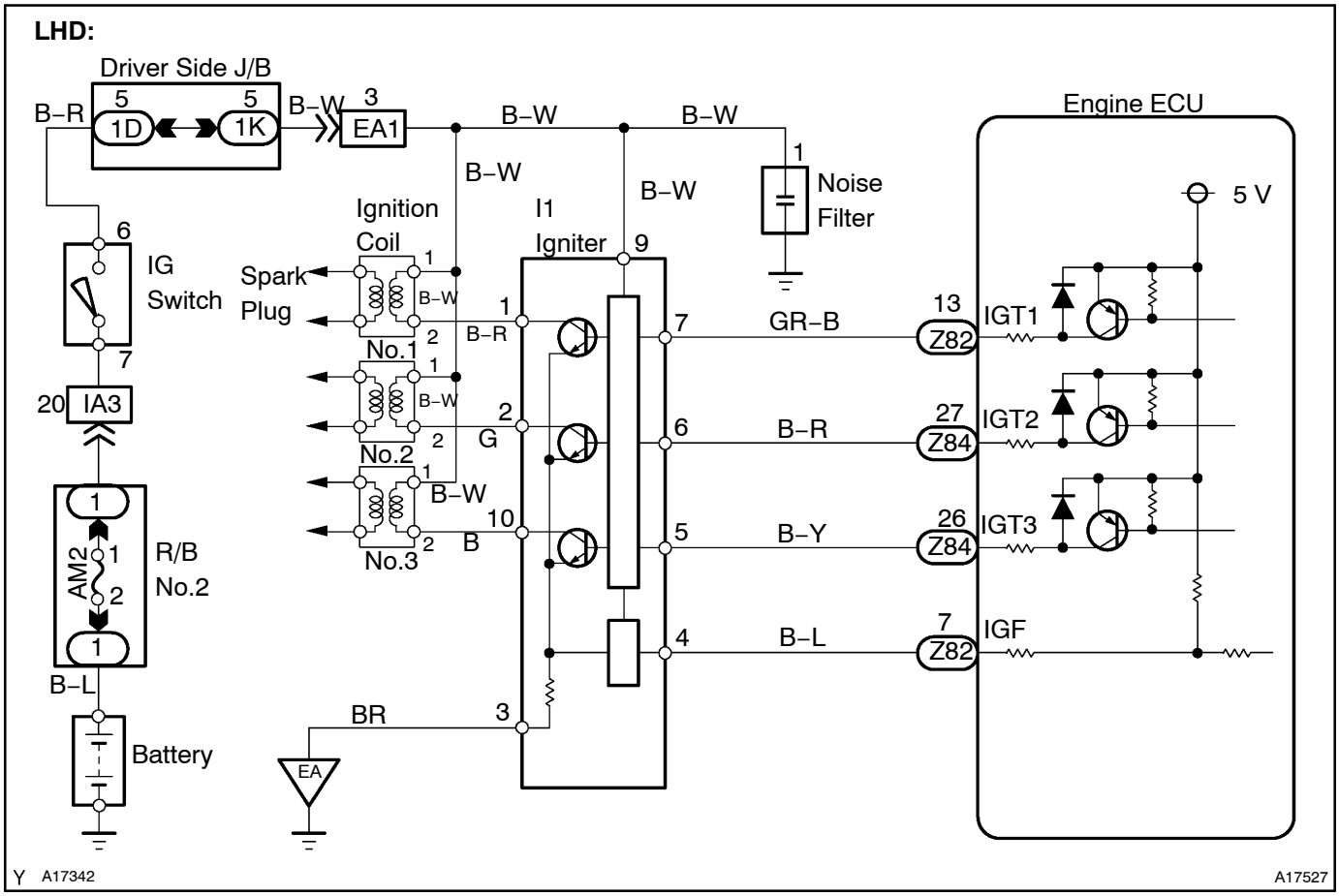


S00251

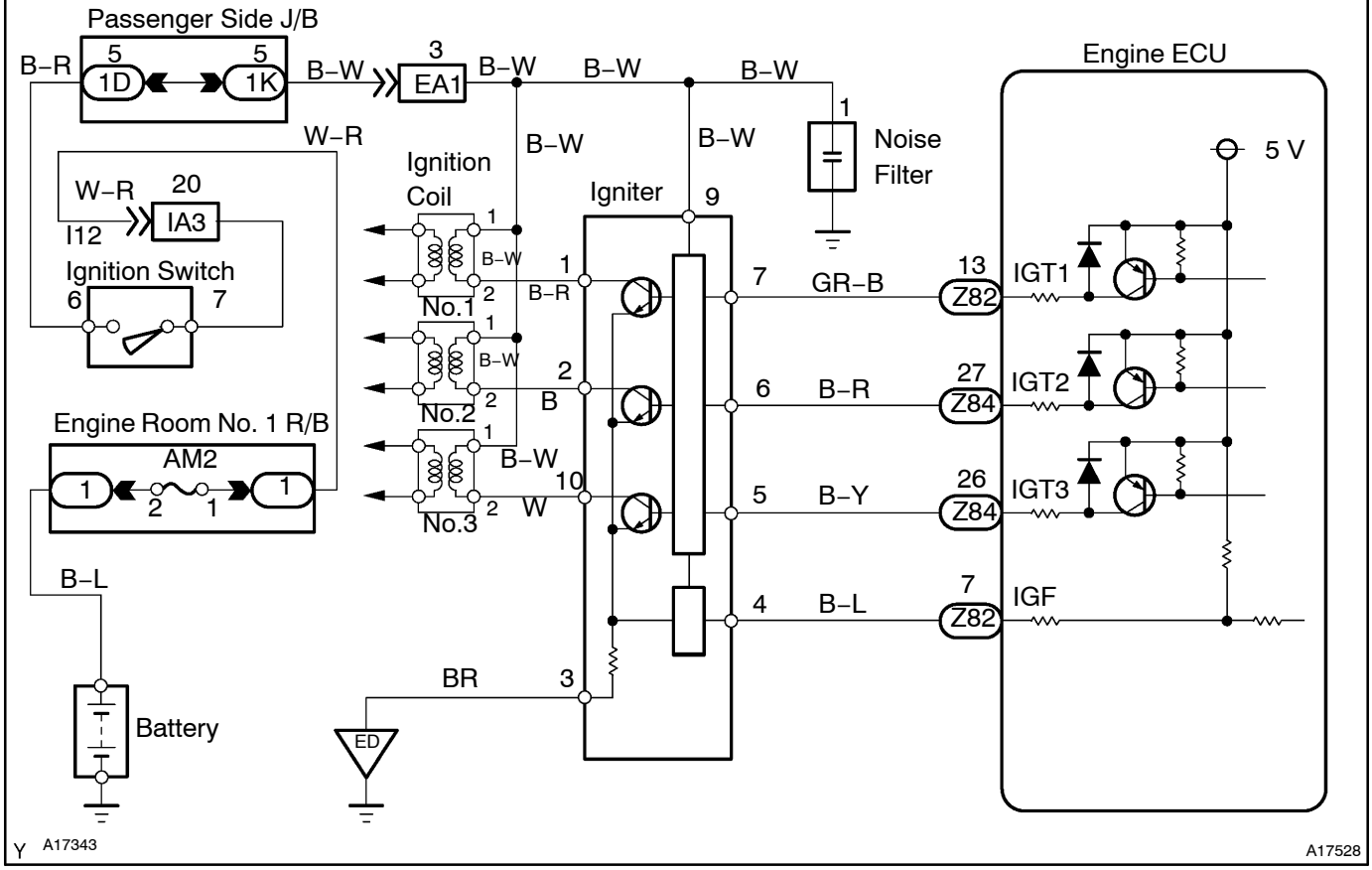
DTC No.	DTC Detecting Condition	Trouble Area
P1300/14	No IGF signals to engine ECU while engine is running	• Open or short in IGF or IGT circuit from igniter to engine ECU • Igniter • Engine ECU

WIRING DIAGRAM

LHD:



RHD:



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 spark plug and spark (See page IG–1).

NG → Go to step 4.

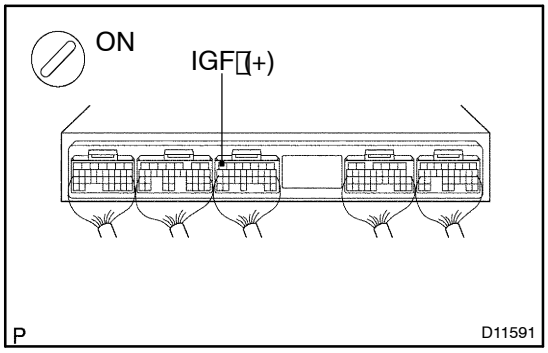
OK

2	Check for open and short in harness and connector in IGF signal circuit between engine ECU and ignition coil with igniter (See page IN–34).

NG → Repair or replace harness or connector.

OK

3	Disconnect ignition coil with igniter connector and check voltage between terminals IGF of engine ECU connector and body ground.



PREPARATION:

(a) Disconnect the igniter connector.
(b) Remove the enigne room engine ECU hood and cover.
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals IGF of the engine ECU connector and body ground.

OK:

Voltage: 4.5 – 5.5 V

OK → Replace igniter.

NG

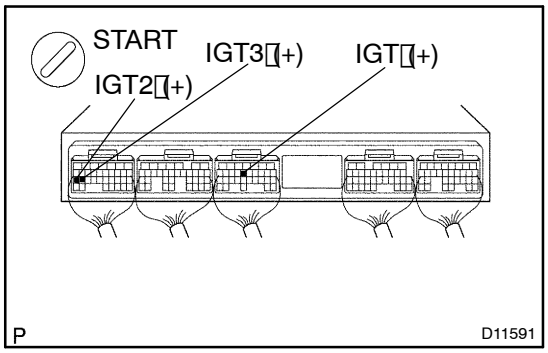
Check and replace engine ECU (See page IN–34).

4	Check for open and short in harness and connector in IGT1 – 3 signal circuit between engine ECU and ignition coil with igniter (See page IN–34).

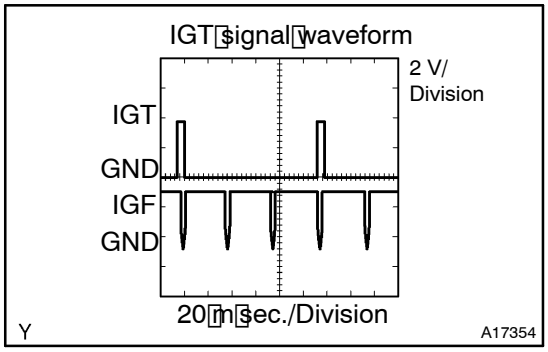
NG → Repair or replace harness or connector.

OK

5	Check voltage between terminals IGT1 – 3 of engine ECU connector and body ground.



PREPARATION:
Remove the engine room engine ECU hood and cover.
CHECK:
Measure voltage between terminals IGT1 ~ 3 of the engine ECU connector and body ground when engine is cranked.
OK:
Voltage: More than 0.1 V and less than 4.5 V

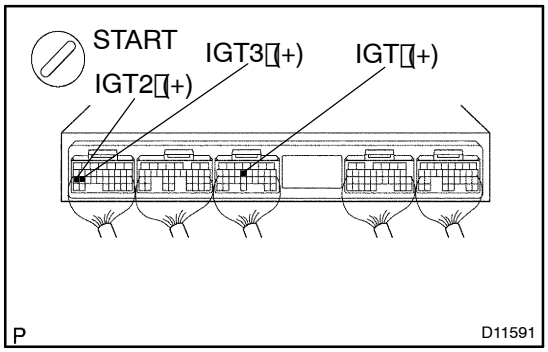


Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check waveform between terminals IGT1 – 3 and E1 of the engine ECU connector.
HINT:
Correct waveform appears as shown, with rectangle waves.

NG → Check and replace engine ECU (See page IN–34).

OK

6	**Disconnect connector and check voltage between terminals IGT1 – 3 of engine ECU connector and body ground.**



PREPARATION:

(a) Remove the engine room engine ECU hood and cover..

(b) Disconnect the igniter connector.

CHECK:

Measure voltage between terminals IGT1 ~ 3 of the engine ECU connector and body ground when engine is cranked.

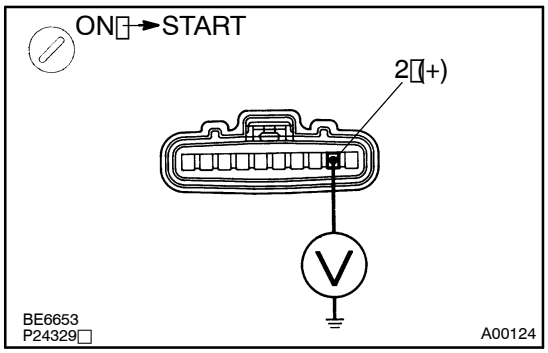
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG	**Check and replace engine ECU (See page IN–34).**

OK

7	**Check voltage between terminal 2 of igniter connector and body ground.**



PREPARATION:

Disconnect the igniter connector.

CHECK:

Measure voltage between terminal 1 of igniter connector and body ground, when ignition switch is turned to "ON" and "START" position.

OK:

Voltage: 9 – 14 V

OK	**Repair igniter power source circuit.**

NG

8	**Check for open and short in harness and connector between ignition switch and igniter (See page IN–34).**

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

OK

9	Check EFI main relay (Marking: EFI) (See page FI–50).

NG → Replace EFI main relay (marking: EFI).

OK

Replace igniter.

DI9HQ–01

DTC	P1335/12,13	Crankshaft Position Sensor Circuit Malfunction (during engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335/12, 13 (Crankshaft Position Sensor Circuit Malfunction) on page DI–84.

DTC No.	DTC Detecting Condition	Trouble Area
P1335/13	No crankshaft position sensor signal to engine ECU with engine speed 1,000 rpm or more	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Starter • Engine ECU

WIRING DIAGRAM

Refer to DTC P0335/12, 13 (Crankshaft Position Sensor Circuit Malfunction) on page DI–84 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

Refer to DTC P0335/12, 13 (Crankshaft Position Sensor Circuit Malfunction) on page DI–84.

DI64F–05

DTC	P1346/18	VVT Sensor/Camshaft Position Sensor Circuit Range/Performance Problem (Bank 1)

CIRCUIT DESCRIPTION

Refer to DTC P0335/12, 13 on page DI–84.

DTC No.	DTC Detecting Condition	Trouble Area
P1346	Deviation in crankshaft position sensor signal and camshaft position sensor signal (2 trip detection logic)	• Mechanical system (Jumping teeth of timing belt, belt stretched) • Engine ECU

WIRING DIAGRAM

Refer to DTC P0335/12, 13 on page DI–84.

INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335/12, 13 first. If no trouble is found, troubleshoot the following mechanical systems.
- 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.

1	**Check valve timing (Check for loose and jumping teeth of timing belt) (See page EM–22).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Check and replace engine ECU (See page IN–34).

DI2SN–04

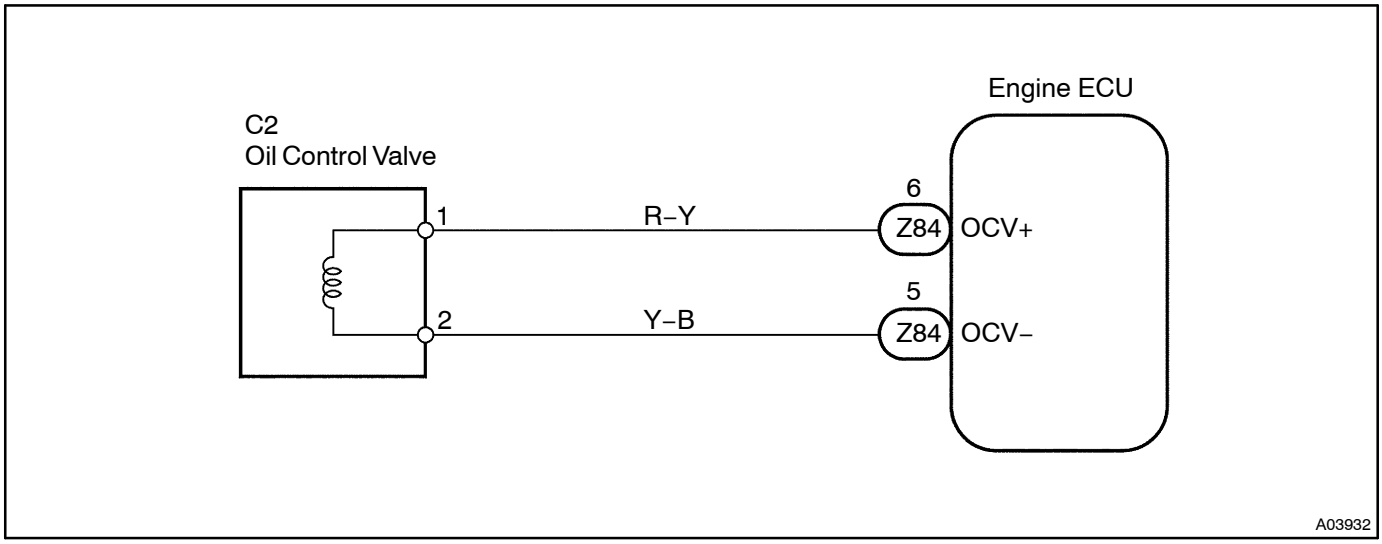
DTC	P1349/59	VVT System Malfunction

CIRCUIT DESCRIPTION

VVT system controls the intake valve timing to proper timing in response to driving condition.
ECU controls OCV (Oil Control Valve) to make the intake valve timing properly, and, oil pressure controlled with OCV is supplied to the VVT controller, and then, VVT controller changes relative position between the camshaft and the crankshaft.

DTC No.	DTC Detecting Condition	Trouble Area
P1349/59	Condition (a) or (b) continues for after the engine is warmed up and engine speedat 400 ~ 4,000 rpm : (a) Valve timing does not change from of current valve timing (b) Current valve timing is fixed.	• Valve timing • Oil control valve • VVT controller assembly • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1349/59 is displayed, check left bank VVT system circuit.
- 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.

When using hand–held tester

1	**Check valve timing (See page EM–22).**

NG → **Repair valve timing.**

OK

2	**Check operation of OCV.**

PREPARATION:

(a) Start the engine and warmed it up.

(b) Connect the hand–held tester and select VVT from ACTIVE TEST menu.

CHECK:

Check the engine speed when operate the OCV by the hand–held tester.

OK:

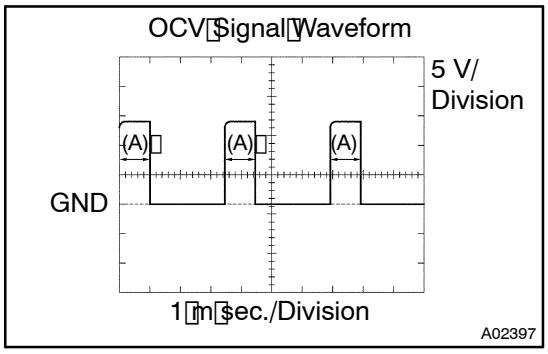
OCV is OFF:
Normal engine speed
OCV is ON:
Rough idle or engine stall

OK → **VVT system is OK.***

*: DTC P1349 is also output after the foreign object is caught in some part of the system in the engine oil and the system returns to normal in a short time. As engine ECU controls so that foreign objects are ejected, there is no problem about VVT. There is also no problem since the oil filter should get the foreign object in the engine oil.

NG

3	**Check voltage between terminals OCV+ and OCV– of engine ECU connector.**

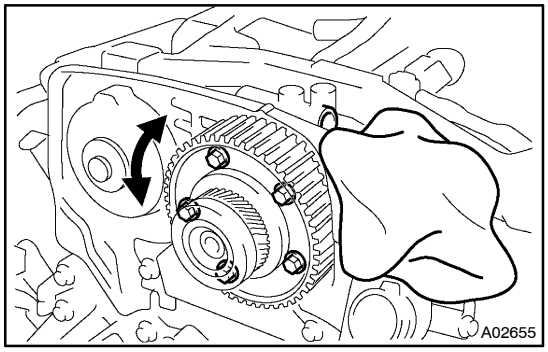


Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, check waveform between terminals OCV+ and OCV– of the engine ECU connector.
HINT:
- The correct waveform is as shown.
- The waveform frequency (A) is lengthened as the engine speed becomes higher.

NG → **Check and replace engine ECU (See page IN–34).**

OK

4	**Check VVT controller assembly.**



PREPARATION:
(a) Remove the timing belt cover.
(b) Remove the timing belt (See page EM–17).
(c) Remove the oil control valve.
(d) Drain oil into the VVT controller assembly (See page EM–17).

CHECK:
Check whether the oil into VVT controller assembly is drained or not.

OK:
The oil into VVT controller assembly is drained.

NG → **Replace VVT controller assembly, and then go to step 5.**

OK

5	**Check oil control valve (See page EM–41).**

NG → **Replace oil control valve, and then go to step 6.**

OK

6	Check blockage of oil control valve, oil check valve and oil pipe No.1.

NG → Repair or replace.

OK

7	Check whether or not DTC P1349 is stored.

PREPARATION:

(a) Clear the DTC (See page DI–4).

(b) Perform simulation test.

CHECK:

Check whether or not DTC P1349 is stored (See page DI–133).

OK:

DTC P1349 is not stored

OK → VVT system is OK.*

*: DTC P1349 is also output after the foreign object is caught in some part of the system in the engine oil and the system returns to normal in a short time. As engine ECU controls so that foreign objects are ejected, there is no problem about VVT. There is also no problem since the oil filter should get the foreign object in the engine oil.

NG

Replace engine ECU

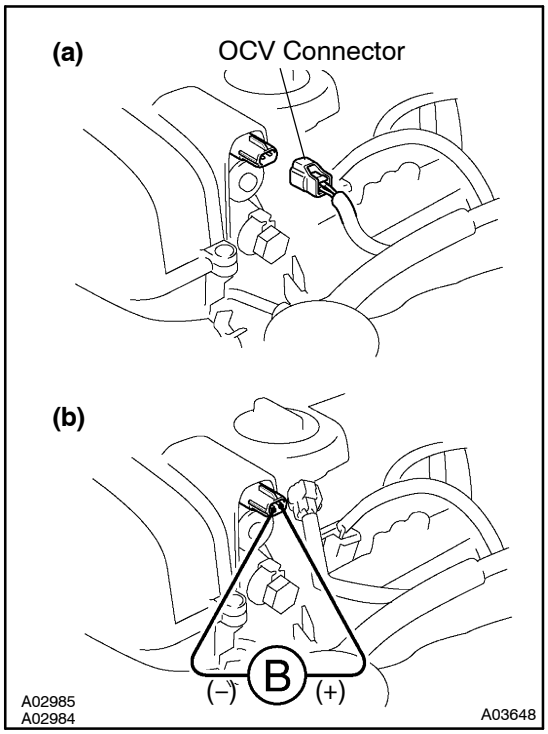
When not using hand–held tester

1	Check valve timing (See page EM–22).

NG → Repair valve timing.

OK

2	Check operation of OCV.



PREPARATION:

Start the engine.

CHECK:

(a) Check the engine speed when disconnect the OCV connector.

(b) Check the engine speed when apply battery positive voltage between terminals of OCV.

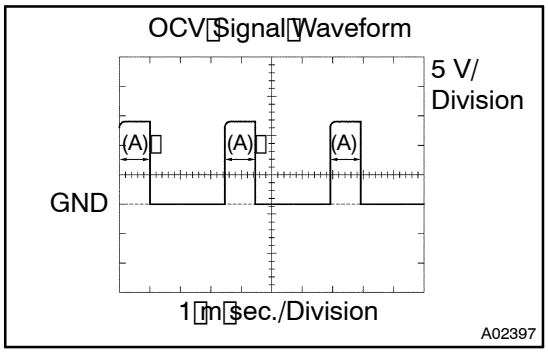
RESULT:

Result	Check (a)	Check (b)
1	Normal engine speed	Rough idle or engine stall
2	Except 1	

1

2	Go to step 4.

3	Check voltage between terminals OCV+ and OCV– of engine ECU connector.



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, check waveform between terminals OCV+ and OCV– of the engine ECU connector.
HINT:
- The correct waveform is as shown.
- The waveform frequency (A) is lengthened as the engine speed becomes higher.

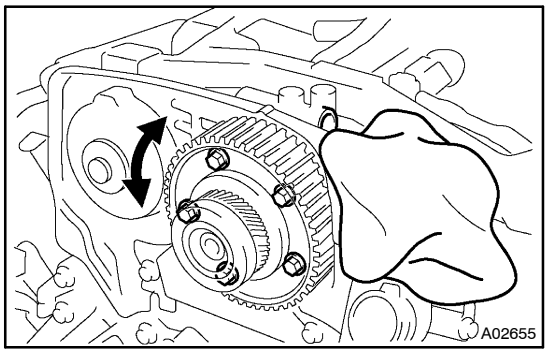
OK	VVT system is OK.*

*: DTC P1349 are also output after the foreign object is caught in some part of the system in the engine oil and the system returns to normal in a short time. As engine ECU controls so that foreign objects are ejected, there is no problem about VVT. There is also no problem since the oil filter should get the foreign object in the engine oil.

NG

Check and replace engine ECU (See page IN–34).

4	Check VVT controller assembly.



PREPARATION:
(a) Remove the timing belt cover.
(b) Remove the timing belt (See page EM–17).
(c) Remove the oil control valve.
(d) Drain oil into the VVT controller assembly (See page EM–17).

CHECK:
Check whether the oil into VVT controller assembly is drained or not.

OK:
The oil into VVT controller assembly is drained.

NG	Replace VVT controller assembly, and then go to step 5.

OK

5	Check oil control valve (See page EM–41).

NG → Replace oil control valve, and then go to step 6.

OK

6	Check for blockage of oil control valve, oil check valve and oil pipe No.1.

NG → Repair or replace.

OK

7	Check whether or not DTC P1349 is stored.

PREPARATION:

(a) Clear the DTC (See page DI–4).

(b) Perform simulation test.

CHECK:

Check whether or not DTC P1349 is stored (See page DI–133).

OK:

DTC 59 is not stored

OK → **VVT system is OK.***

*: DTC P1349 are also output after the foreign object is caught in some part of the system in the engine oil and the system returns to normal in a short time. As engine ECU controls so that foreign objects are ejected, there is no problem about VVT. There is also no problem since the oil filter should get the foreign object in the engine oil.

NG

Replace engine ECU

DI9HR–01

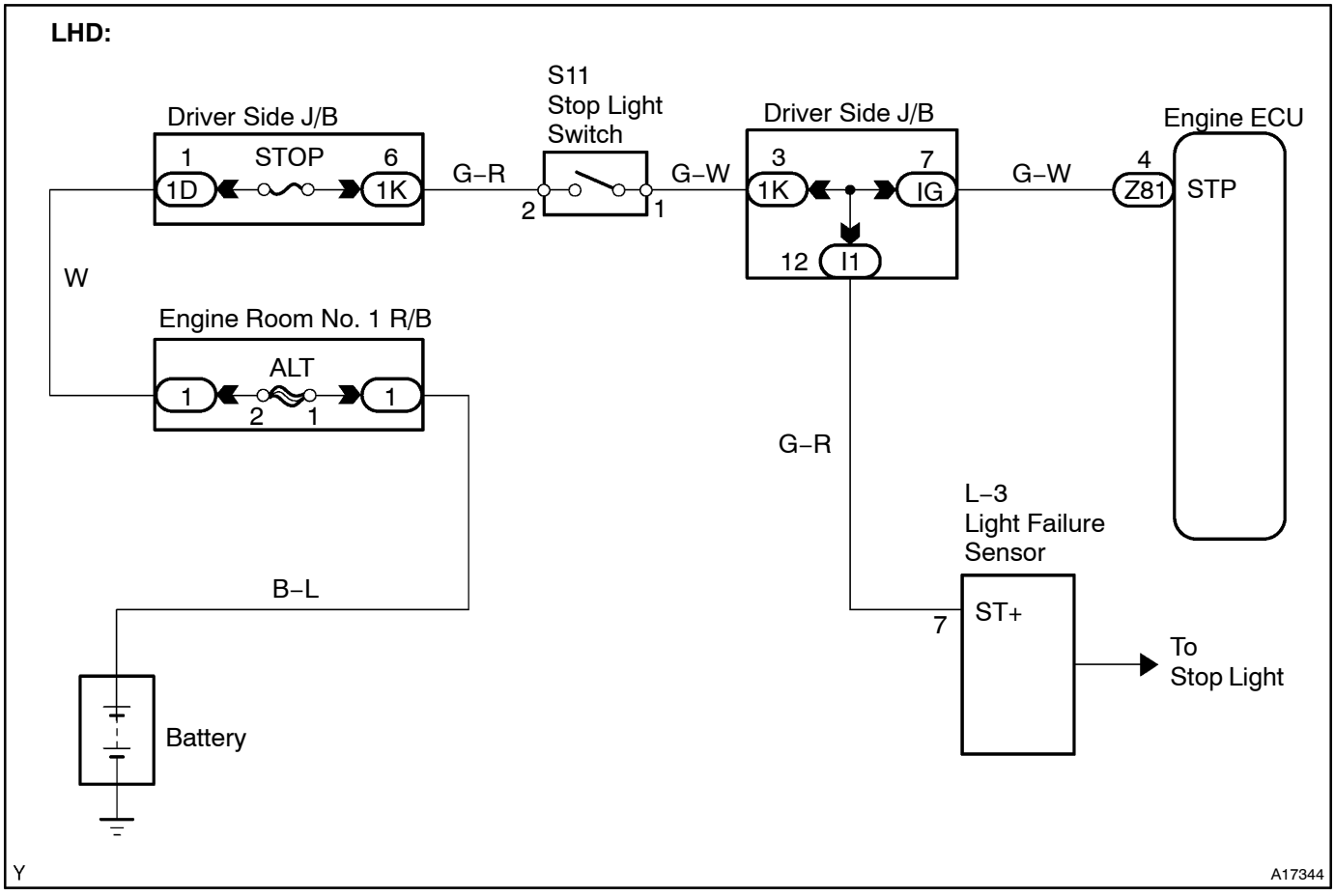
DTC	P1520	Stop Light Switch Signal Malfunction

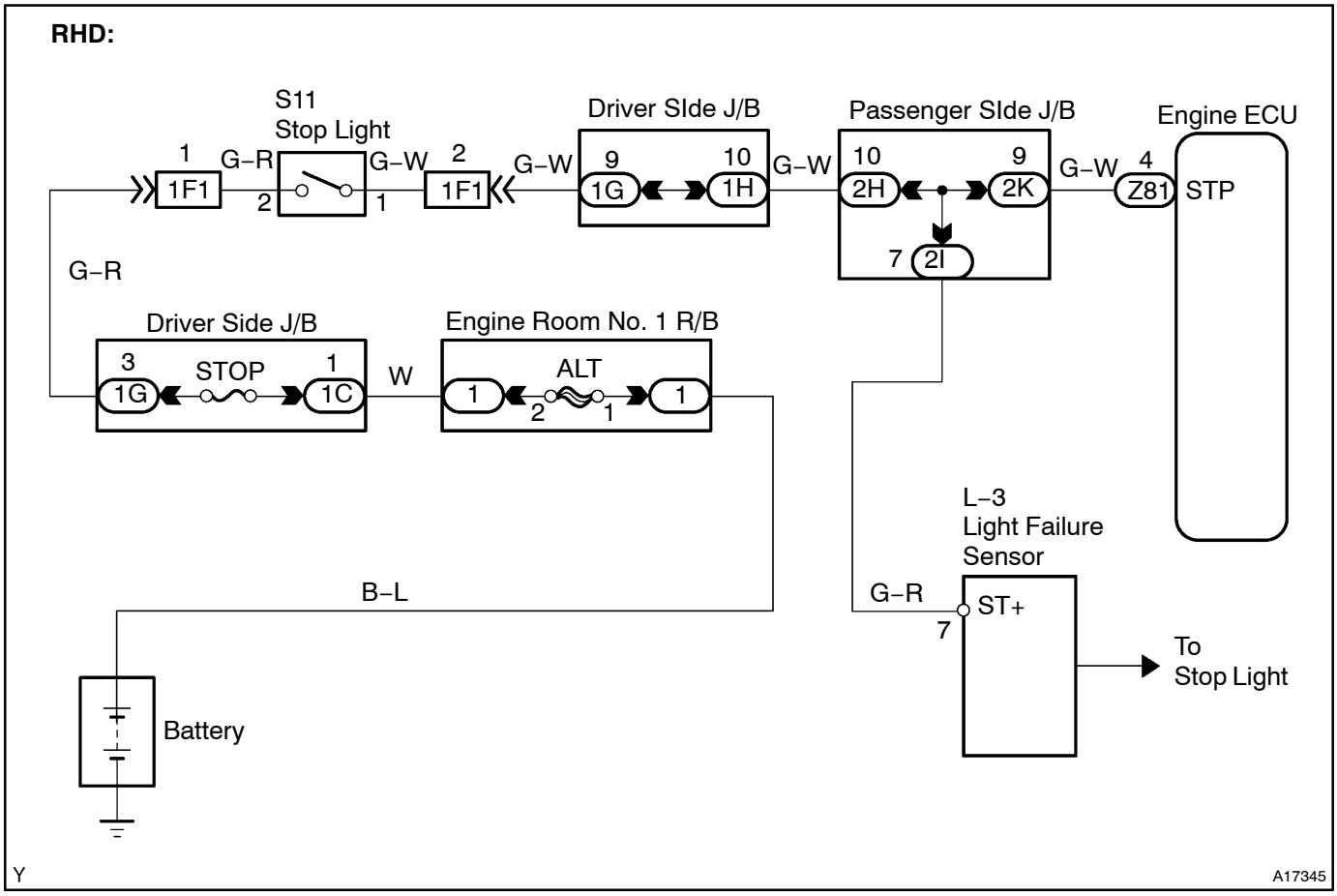
CIRCUIT DESCRIPTION

This signal is used to detect when the brakes have been applied. The STP signal voltage is the same as the voltage supplied to the stop lights.
The STP signal is used mainly to control the fuel cut–off engine speed (The fuel cut–off engine speed is reduced slightly when the vehicle is braking.).

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

WIRING DIAGRAM





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 was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check operation of stop light.**

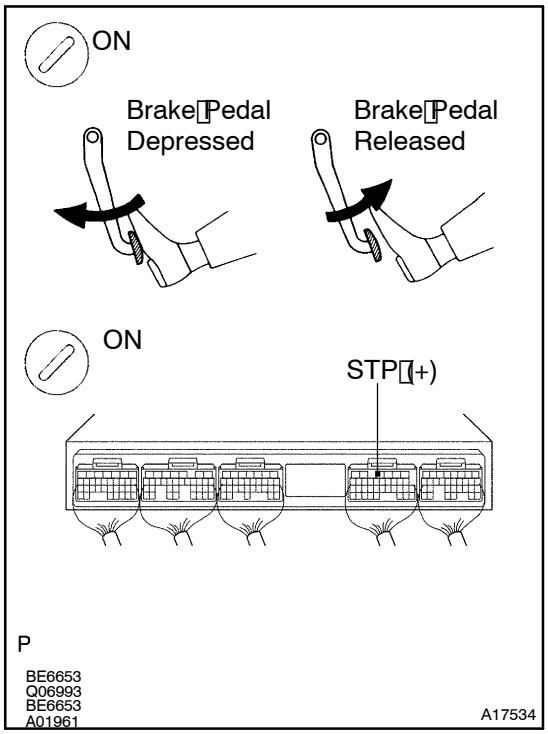
CHECK:

Check if the stop lights go on and off normally when the brake pedal is operated 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 TOYOTA hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal STP of the engine 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–4).**

NG

3	**Check harness and connector between engine ECU and stop light switch (See page IN–34).**

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

OK

Check and replace engine ECU (See page IN–34).

DI2SO–04

DTC	P1633/89	ECU Malfunction (ETCS Circuit)

CIRCUIT DESCRIPTION

Refer to DTC P1125 (Electric Throttle Control System Malfunction) on page DI–110.

DTC No.	DTC Detecting Condition	Trouble Area
P1633/89	Engine ECU malfunction	• Engine ECU

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.

Replace engine ECU.

DI2SP–04

DTC	P1645/82	Body ECU Malfunction

CIRCUIT DESCRIPTION

ECU receives the operating condition (ON/OFF) of A/C from A/C ECU and it also receives the electrical load information from the body ECU.
ECU uses these information to control the engine (idle up, etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P1645/82	Condition (a) or (b) continues for 5.0 seconds or more. (a) No communication from body ECU (b) No communication from A/C ECU	• Body ECU • A/C ECU • Communication bus

INSPECTION PROCEDURE

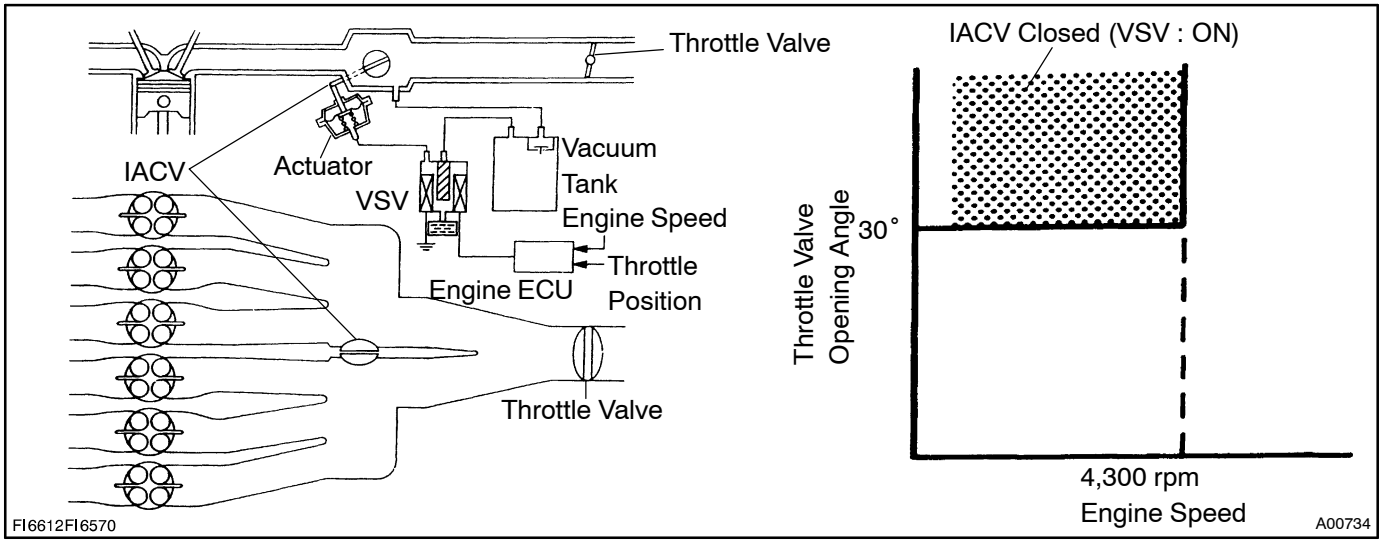
Perform troubleshooting the Multiplex Communication System (See page DI–565).

DI64K–07

DTC	P1651/96	VSV for ACIS Circuit Malfunction

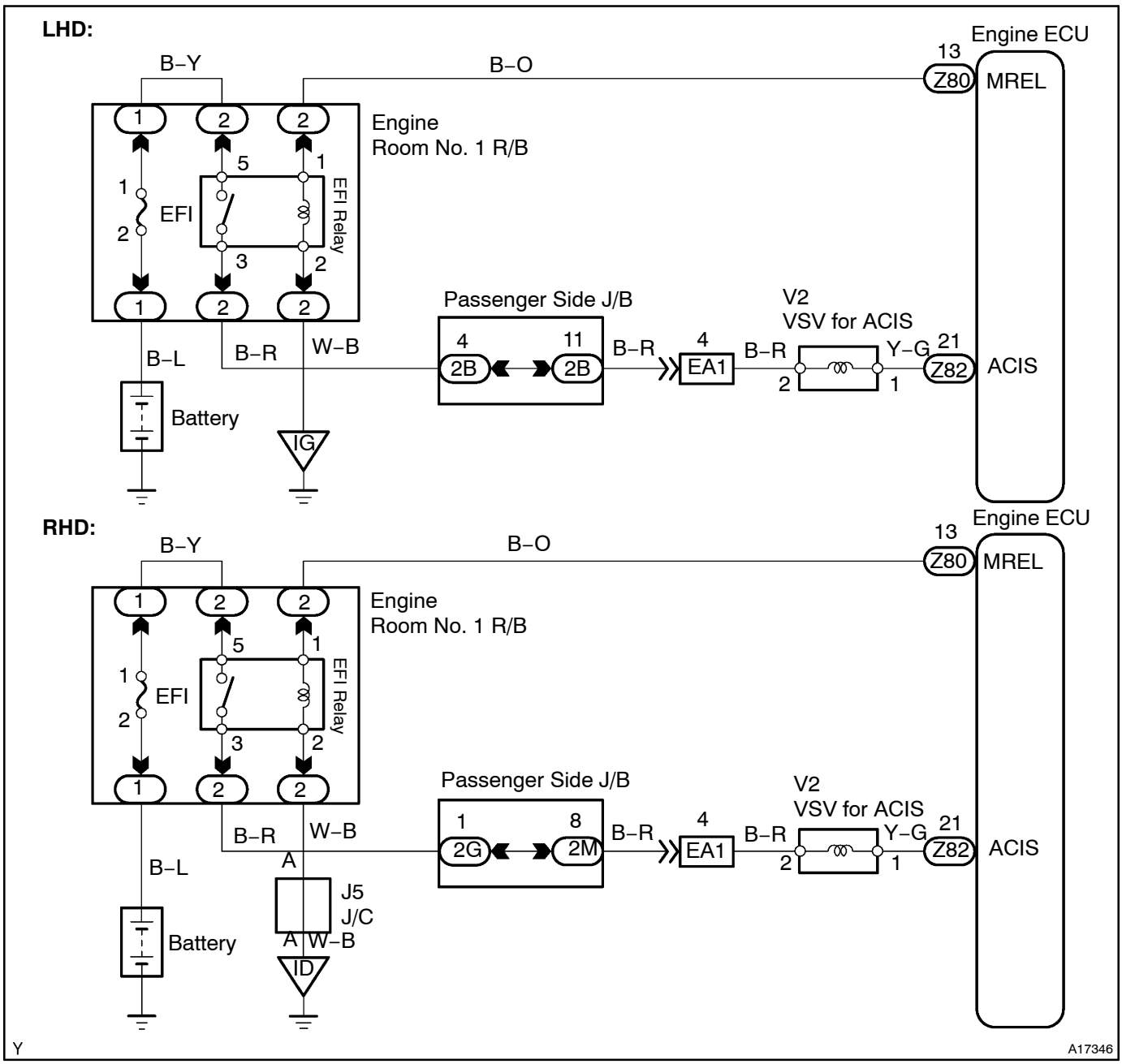
CIRCUIT DESCRIPTION

This circuit opens and closes the Intake Air Control Valve (IACV) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 4,300 rpm or less and the throttle valve opening angle is 30° or more, the engine ECU turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.



DTC No.	DTC Detecting Condition	Trouble Area
P1651/96	Proper response to engine ECU command does not occur (2 trip detection logic)	• Open or short in VSV circuit for ACIS • VSV for ACIS • Engine ECU

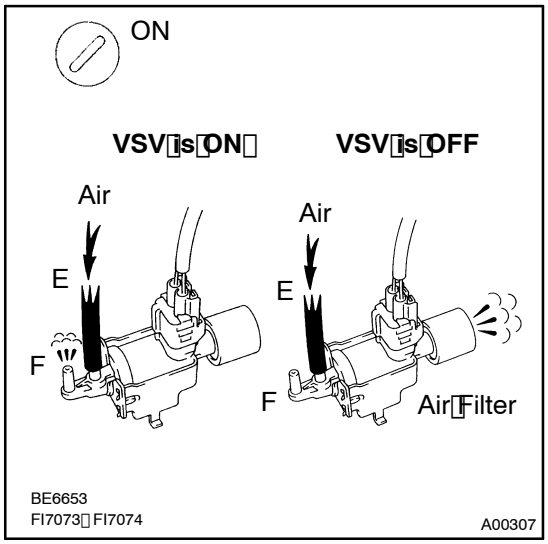
WIRING DIAGRAM



INSPECTION PROCEDURE

When using hand–held tester

1	Connect hand–held tester, and check operation of VSV for ACIS.



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 the operation of the the VSV when the VSV is operated by the hand–held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through air filter.

OK	Check for vacuum tank.

NG

2	Check VSV for ACIS (See page FI–58).

NG	Replace VSV for ACIS.

OK

3	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and engine ECU (See page IN–34).

NG	Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

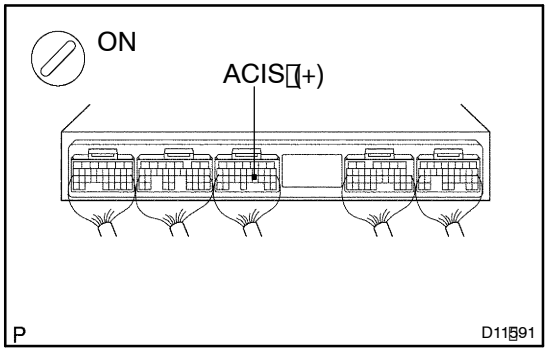
When not using hand–held tester

1	Check VSV for ACIS (See page FI–58).

NG → Replace VSV for ACIS.

OK

2	Check voltage between terminal ACIS of engine ECU connector and body ground.



PREPARATION:

(a) Remove the engine room engine ECU cover and hood.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal ACIS of the engine ECU connector and body ground.

OK:

Voltage: 9 – 14 V

NG → Check for open and short in harness and connector between EFI main relay (Marking: EFI) and engine ECU (See page IN–34).

OK

3	Check for vacuum tank.

NG → Repair or replace.

OK

Check and replace engine ECU (See page IN–34).

DI2SQ–04

DTC	P1656/39	OCV Circuit Malfunction (bank 1)

CIRCUIT DESCRIPTION

Refer to DTC P1349/39 (VVT System Malfunction) on page DI–133.

DTC No.	DTC Detecting Condition	Trouble Area
P1656/39	Open or short in oil control valve circuit	• Open or short in oil control valve circuit • Oil control valve • Engine ECU

WIRING DIAGRAM

Refer to DTC P1349/39 (VVT System Malfunction) on page DI–133.

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.

When using hand–held tester

1	**Check OCV circuit.**

PREPARATION:

(a) Start the engine and warmed it up.

(b) Connect the hand–held tester and select VVT from ACTIVE TEST menu.

CHECK:

Check the engine speed when operate the OCV by the hand–held tester.

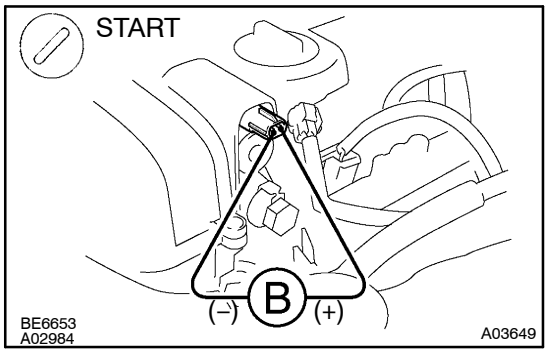
OK:

VVT system is OFF (OCV is OFF):
Normal engine speed
VVT system is ON (OCV is ON):
Rough idle or engine stalled

OK	**Check for intermittent problems (See page DI–4).**

NG

2	Check operation of OCV.



PREPARATION:

(a) Start the engine and warmed it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between terminals of the OCV.

CHECK:

Check the engine speed.

OK:

Rough idle or engine stalled.

NG → Replace OCV.

OK

3	Check voltage between terminals OCV+ and OCV– of engine ECU connector (See page DI–133, step 3).

NG → Check and replace engine ECU (See page IN–34).

OK

4	Check for open and short in harness and connector between OCV and engine ECU (See page IN–34).

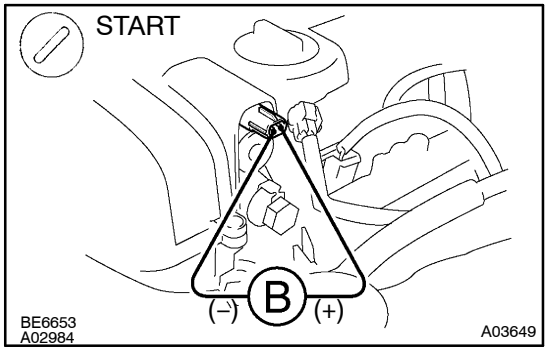
NG → Repair or replace.

OK

Check for intermittent problems (See page DI–4).

When not using hand-held tester

1	Check operation of OCV.



PREPARATION:
(a) Start the engine and warmed it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between terminals of the OCV.

CHECK:
Check the engine speed.

OK:
Rough idle or engine stalled

NG → Replace OCV.

OK

2	Check voltage between terminals OCV+ and OCV– of engine ECU connector (See page DI–133, step 3).

NG → Check and replace engine ECU (See page IN–34).

OK

3	Check for open and short in harness and connector between OCV and engine ECU (See page IN–34).

NG → Repair or replace.

OK

Check for intermittent problems (See page DI–4).

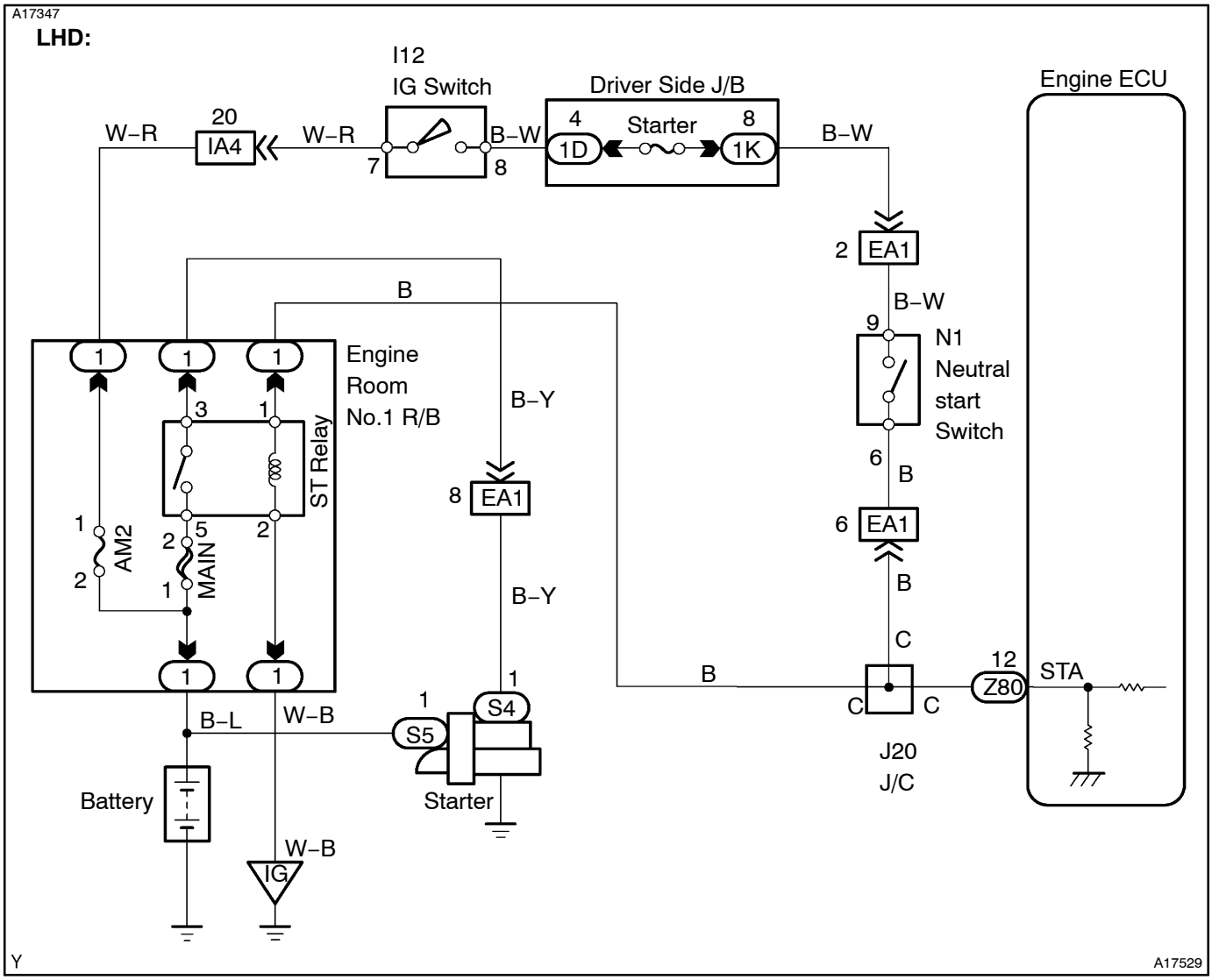
DI9HS–01

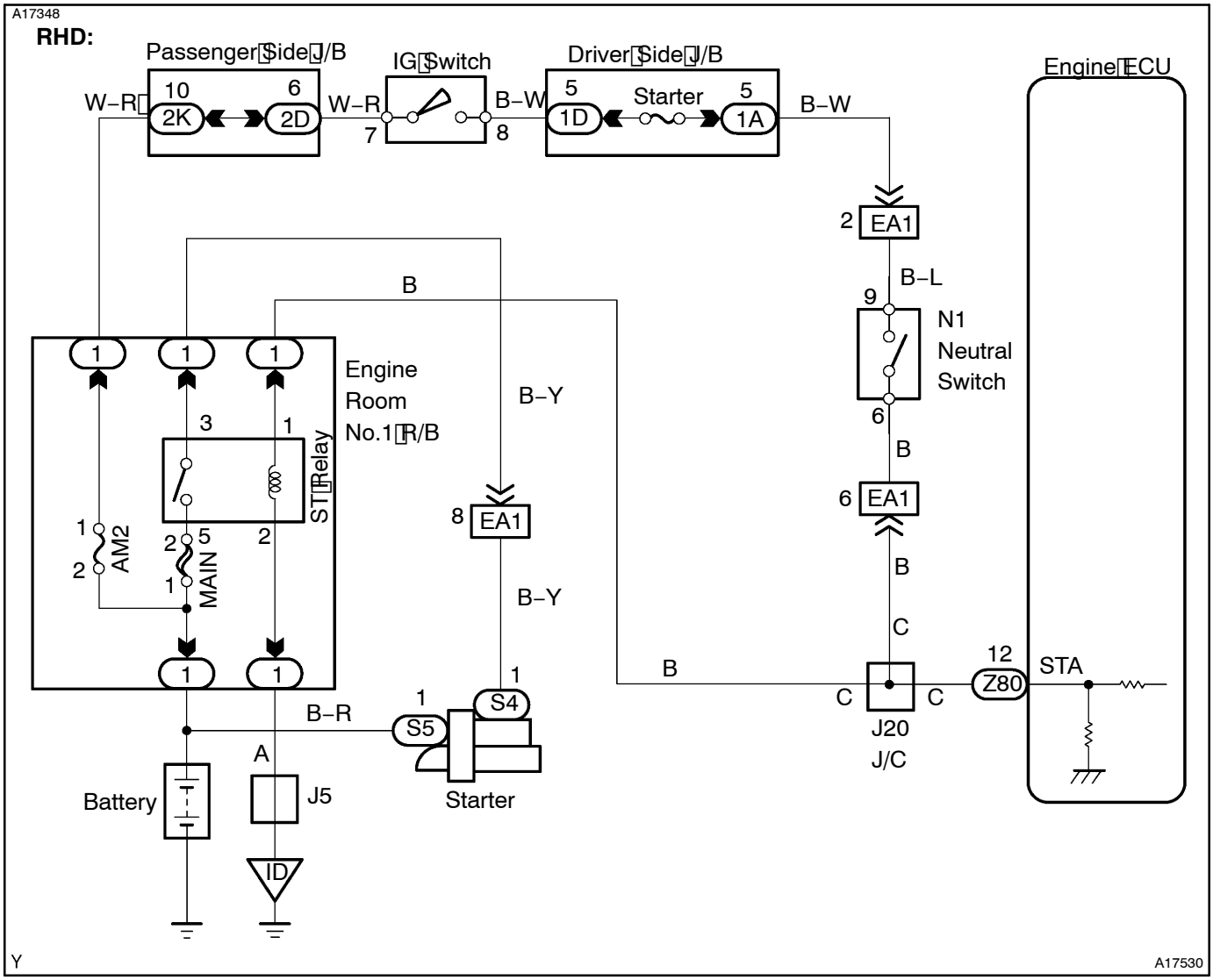
Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the engine ECU. The starter signal id mainly used to increase the fuel injection volume for the starting injection control and after–start injection control.

WIRING DIAGRAM





INSPECTION PROCEDURE

HINT:

This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page DI–24.

When using hand–held tester

1	**Connect hand–held tester and check STA signal.**

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.

CHECK:

Read STA signal on the hand–held tester while starter operates.

OK:

Ignition Switch Position	ON	START
STA signal	OFF	ON

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–24).**

NG

2	Check for open in harness and connector between engine ECU and starter relay (Marking: STARTER) (See page IN–34).

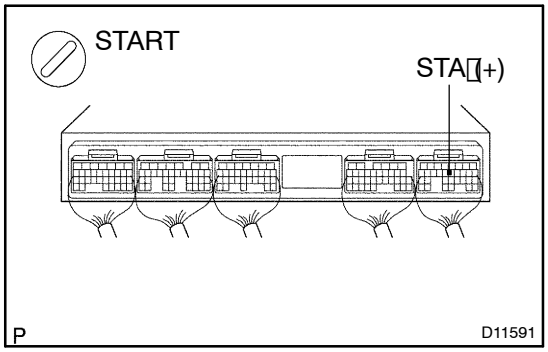
NG → Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

When not using hand–held tester

1	Check voltage between terminal STA of engine ECU connector and body ground.



PREPARATION:
(a) Remove the engine room engine ECU hood and cover.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal STA of the engine ECU connector and body ground, during engine cranking.

OK:
Voltage: 6 V or more

OK → Proceed to next circuit inspection shown on problem symptoms table (See page DI–24).

NG

2	Check for open in harness and connector between engine ECU and starter relay (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

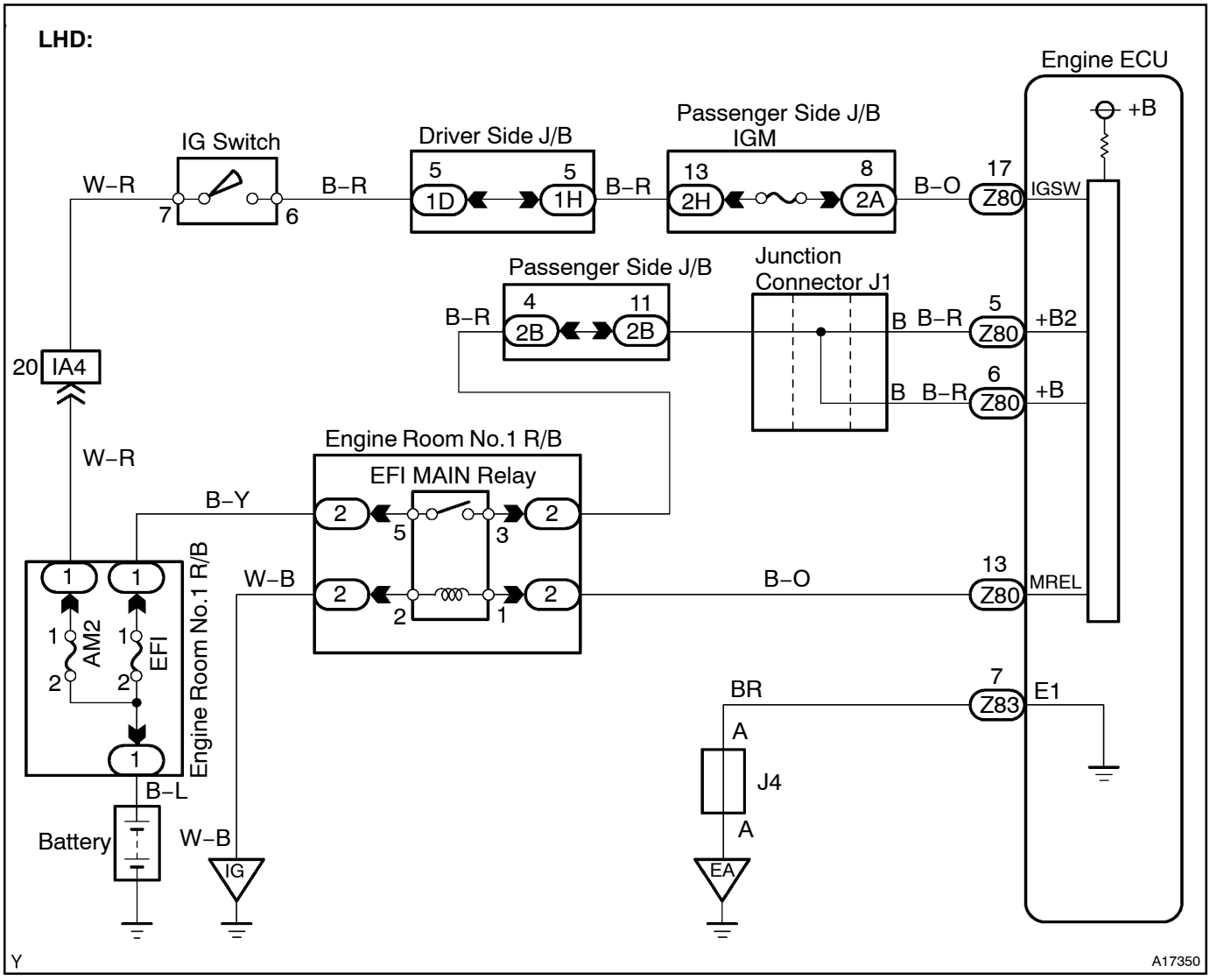
DI9HT–01

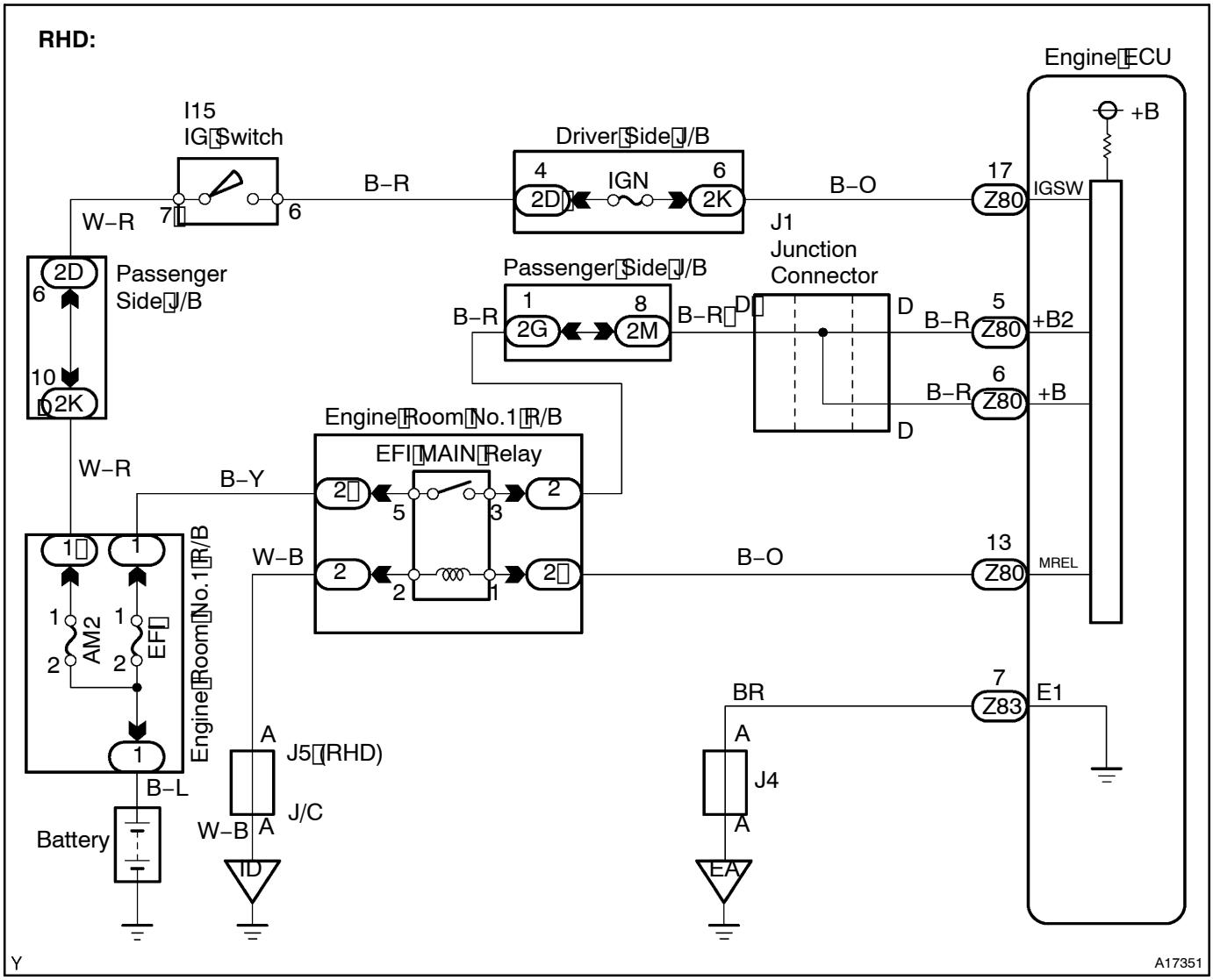
ECU Power Source Circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to the terminal IGSW of the engine ECU and the EFI main relay (Making: EFI) control circuit in the engine ECU sends a signal to the terminal MREL of the engine ECU switching on the EFI main relay.
This signal causes current to flow to the coil, closing the contacts of the EFI main relay and supplying power to the terminals +B of the engine ECU.
If the ignition switch is turned off, the engine ECU continues to switch on the EFI main relay for a maximum of 2 seconds for the initial setting of the ISC valve.

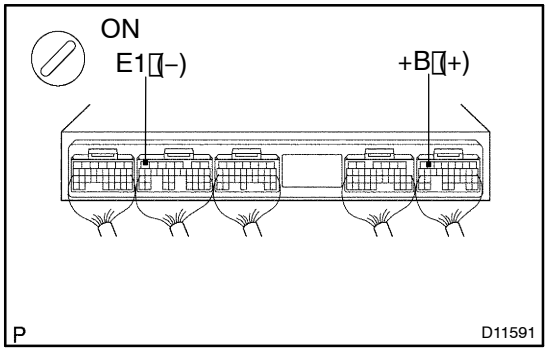
WIRING DIAGRAM





INSPECTION PROCEDURE

1	**Check voltage between terminals +B and E1 of engine ECU connector.**



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals +B and E1 of the engine ECU connector.

OK:

Voltage: 9 – 14 V

OK	**Proceed to next circuit inspection shown on Problem symptoms table (See page DI–24).**

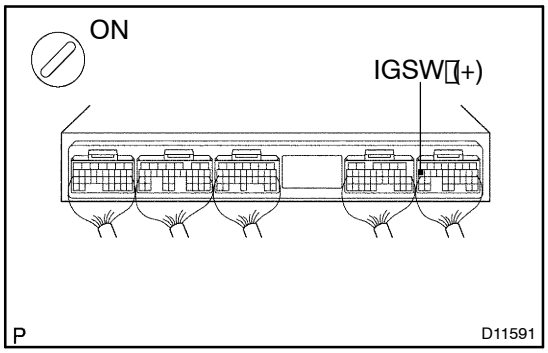
NG

2	Check for open in harness and connector between terminal E1 of engine ECU and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

3	Check voltage between terminal IGSW of engine ECU connector and body ground.

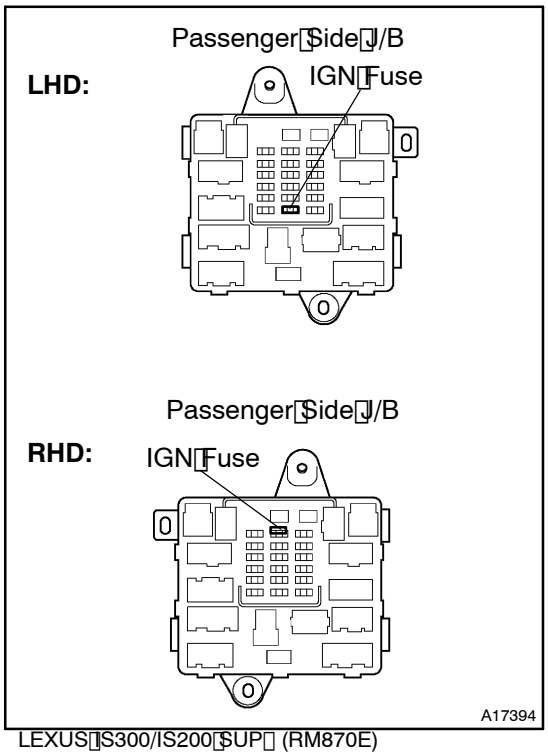


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal IGSW of the engine ECU and body ground.
OK:
Voltage: 9 ~ 14 V

OK → Go to step 6.

NG

4	Check IGN fuse.



PREPARATION:
Remove the IGN fuse from the driver side J/B.
CHECK:
Check continuity of the IGN fuse.
OK:
Continuity

NG → Check for short in all harness and components connected to IGN fuse.

OK

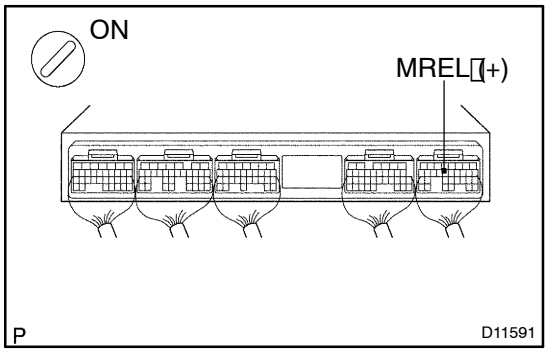
5	Check ignition switch (See page BE–1).

NG → Replace ignition switch.

OK

Check and repair harness and connector between battery and ignition switch, ignition switch and engine ECU.

6	Check voltage between terminal MREL of engine ECU connector and body ground.



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

NG → Check and replace engine ECU (See page IN–34).

OK

7	Check EFI fuse of engine room J/B (See page DI–156).

NG → Check for short in all harness and components connected to EFI fuse.

OK

8	Check EFI main relay (See page FI–50).

NG → Replace EFI main relay.

OK

9	Check for open and short in harness and connector between terminal MREL of engine ECU and body ground (See page IN–34).

NG → Repair and replace harness or connector.

OK

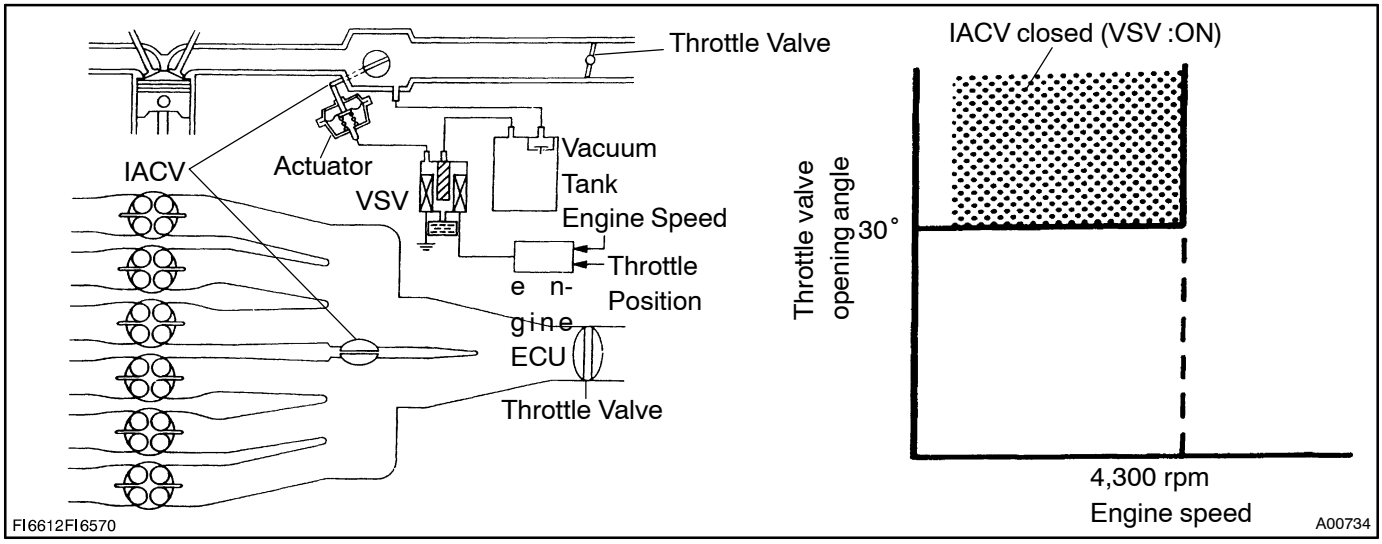
Check and repair harness or connector between EFI fuse and battery.

DI2ER–08

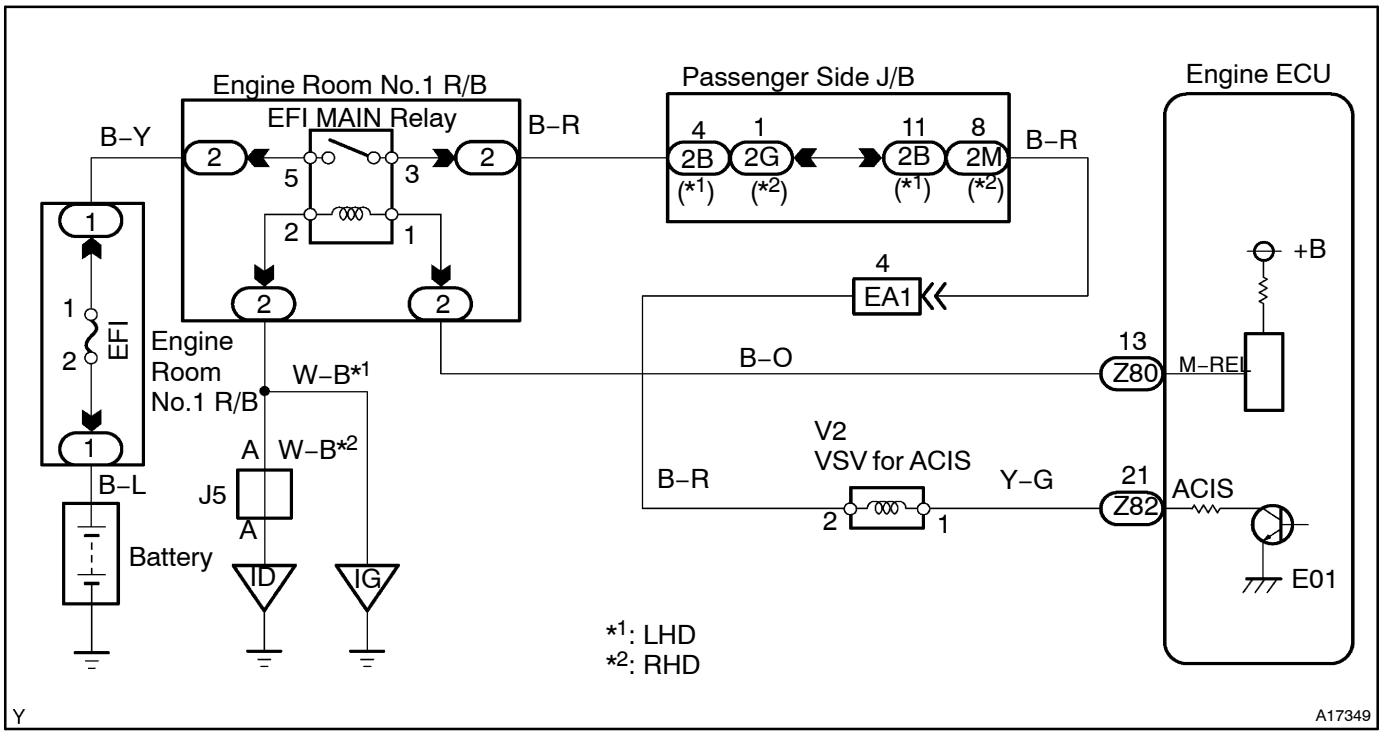
IACV Control VSV Circuit

CIRCUIT DESCRIPTION

This circuit opens and closes the IACV (Intake Air Control Valve) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 4,300 rpm or less and the throttle valve opening angle is 30° or more, the engine ECU turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.



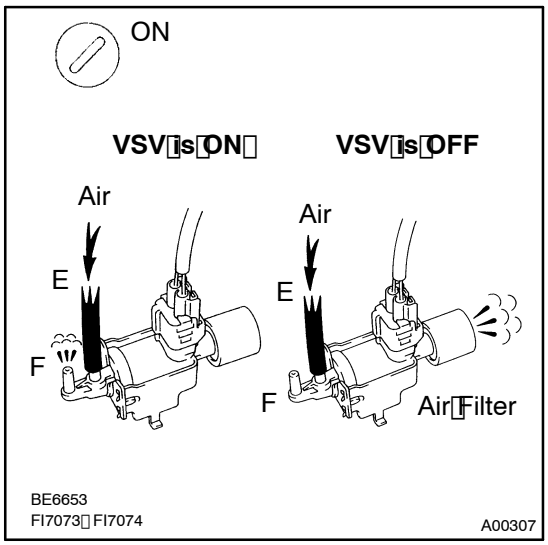
WIRING DIAGRAM



INSPECTION PROCEDURE

When using hand–held tester

1	Connect hand–held tester and check operation of VSV for ACIS.



PREPARATION:

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

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

(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check operation of the VSV when VSV is operated by the hand–held tester.

OK:

VSV is ON:
Air from pipe E is flowing out through pipe F.
VSV is OFF:
Air from pipe E is flowing out through the air filter.

OK	Check for vacuum tank (See page FI–48).

NG

2	Check VSV for ACIS (See page FI–58).

NG	Replace VSV for ACIS.

OK

3	Check for open and short in harness and connector between EFI main relay and engine ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace engine ECU (See page IN–34).

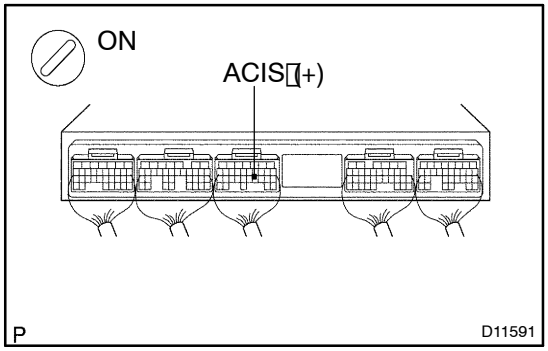
When not using hand–held tester

1	Check VSV for ACIS (See page FI–58).

NG → Replace VSV for ACIS.

OK

2	Check voltage between terminal ACIS of engine ECU connector and body ground.



PREPARATION:

(a) Remove the engine room engine ECU hood and cover.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal ACIS of the engine ECU connector and body ground.

OK:

Voltage: 9 – 14 V

NG → Check for open and short in harness and connector between EFI main relay and engine ECU (See page IN–34).

OK

3	Check for vacuum tank (See page FI–48)

NG → Repair or replace.

OK

Check and replace engine ECU (See page IN–34).

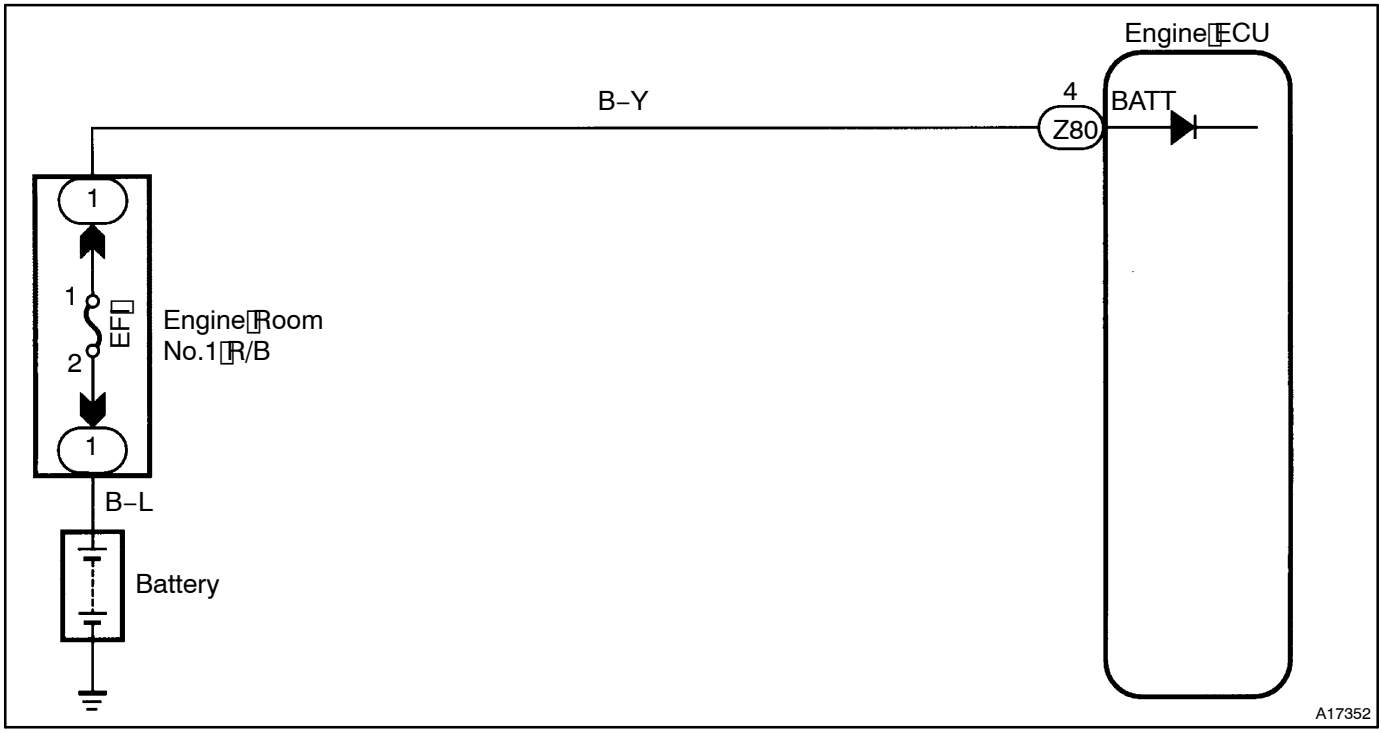
DI2SW–04

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

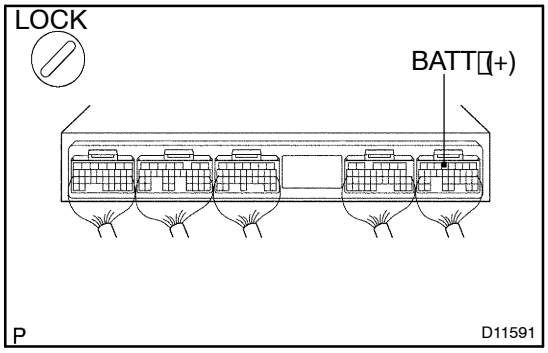
Battery positive voltage is supplied to terminal BATT of the engine ECU even when the ignition switch is OFF for use by the diagnostic trouble code memory, air–fuel ratio adaptive control value memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal BATT of engine ECU connector and body ground.**



PREPARATION:

Remove the engine room engine ECU hood and cover.

CHECK:

Measure voltage between terminal BATT of engine ECU connector and body ground.

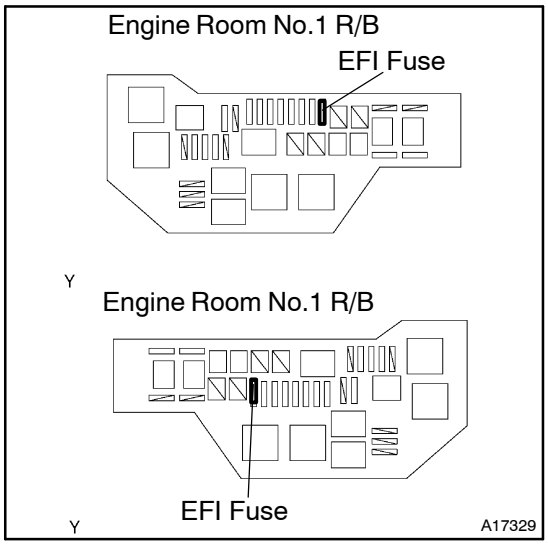
OK:

Voltage: 9 – 14 V

OK	**Check and replace engine ECU (See page IN–34).**

NG

2	**Check EFI fuse of engine rooom No.1 R/B.**



PREPARATION:

Remove the EFI fuse from the engine room No.1 J/B.

CHECK:

Check continuity of EFI fuse.

OK:

Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK

Check and repair harness or connector between battery, EFI fuse and engine ECU.

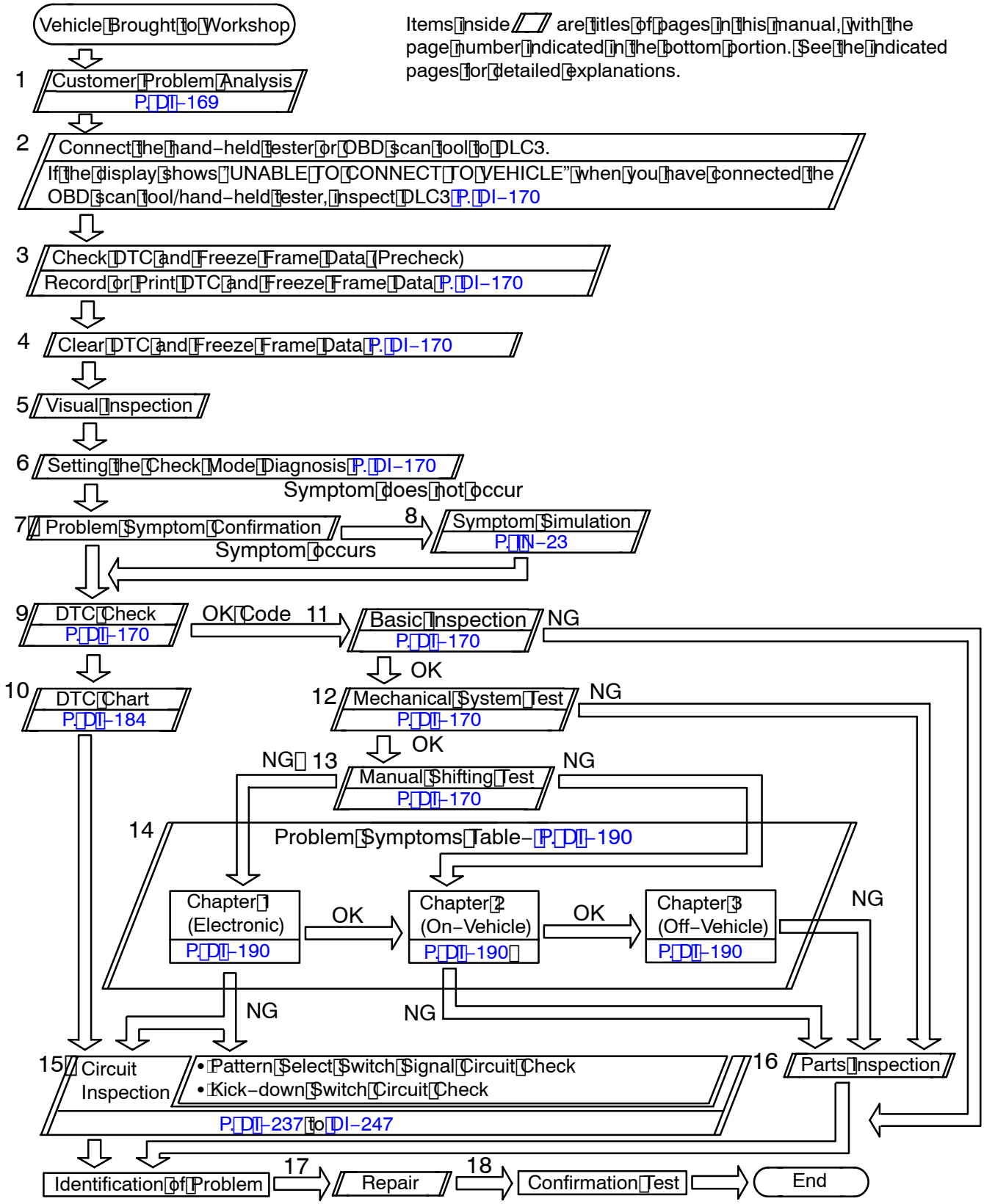
AUTOMATIC TRANSMISSION (A650E)

DI61K–04

HOW TO PROCEED WITH TROUBLESHOOTING

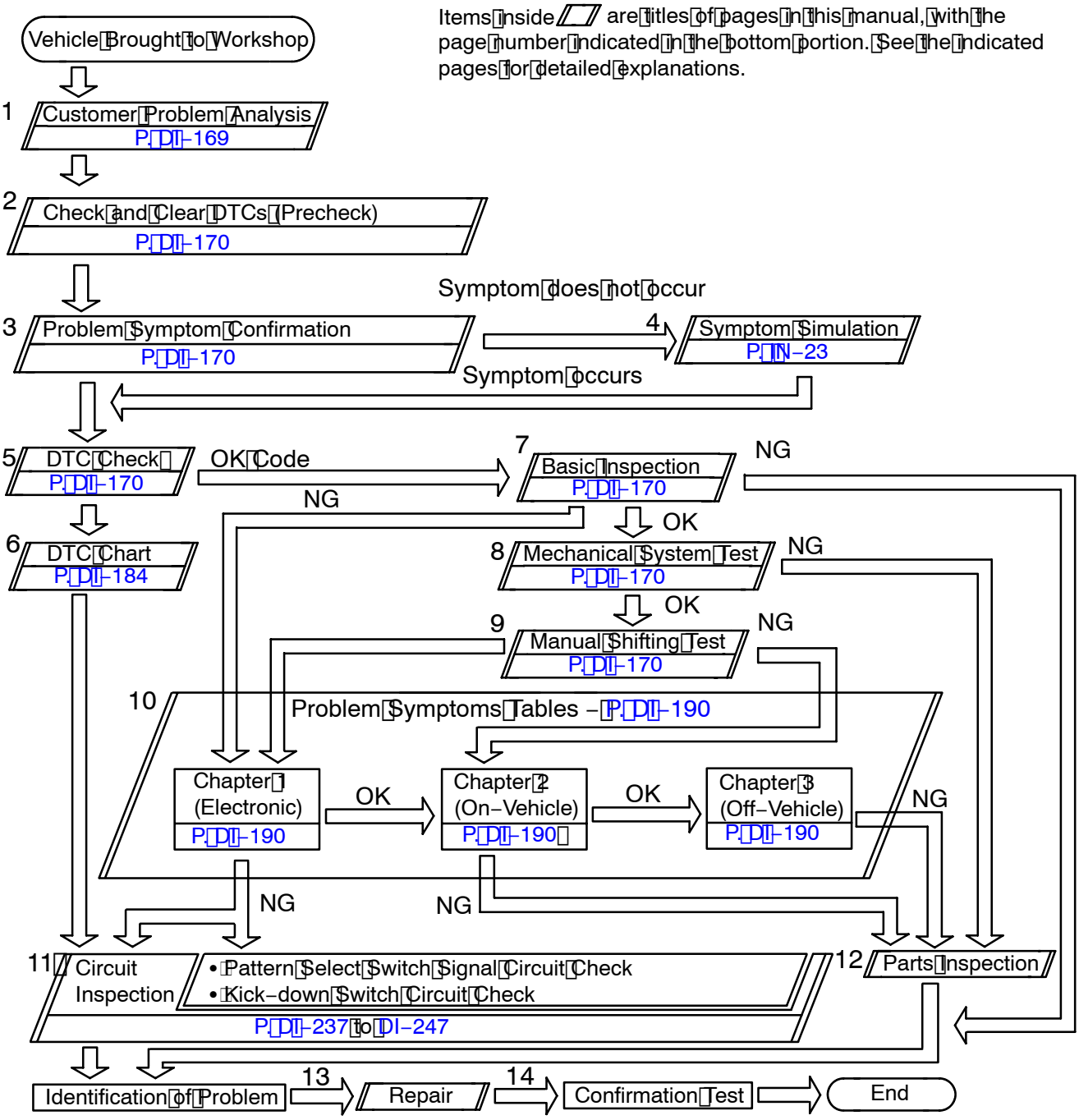
When using hand–held tester, troubleshoot in accordance with the procedure on the following pages.

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.



When not using hand–held tester, troubleshoot in accordance with the procedure on the following pages.

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.



DI61L–03

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet

Inspector's Name :

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

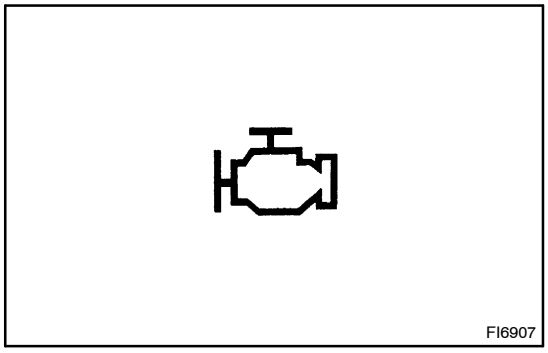
Date Problem Occurred	/ /
Frequency Problem Occurs?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any range ☐ particular range)
	☐ No up–shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down–shift (☐ 5th → 4th ☐ 4th → 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	Check Engine Warning Light	☐ Normal ☐ Remains ON

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

DI9H9–01

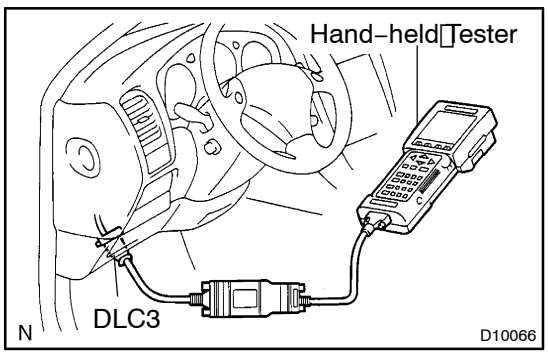

FI6907

PRE–CHECK

1. DIAGNOSIS SYSTEM

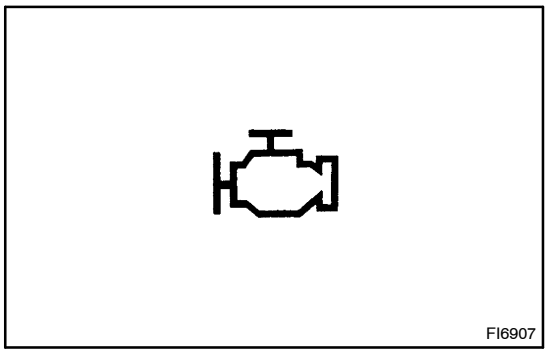
(a) Description for EURO–OBD

- When troubleshooting Euro–OBD vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD scan tool complying with ISO 15031–4 or hand–held tester, 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 on the instrument panel when the computer detects a malfunction in the emission control system/components or in the power–train control components which affect vehicle emissions, or a malfunction in the computer. In addition to the check engine warning light (CHK ENG) lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO15031–6 are recorded in the Engine and ECT ECU memory (See page DI–17). If the malfunction does not reoccur in 3 consecutive trips, the (CHK ENG) goes off automatically but the DTCs remain recorded in the Engine and ECT ECU memory.



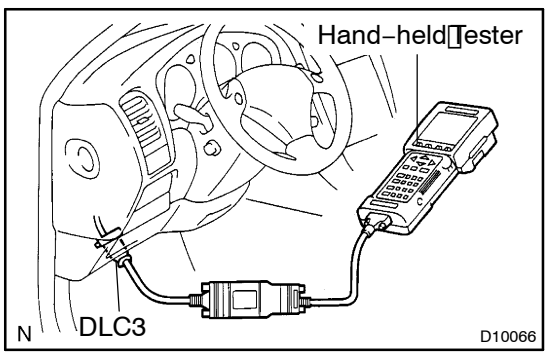
- To check the DTCs, connect the OBD scan tool or hand–held tester to the Data Link Connector 3 (DLC3) on the vehicle. The OBD scan tool or hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see the OBD scan tool's 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–17).

- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic*1 to prevent erroneous detection, and ensure thorough malfunction detection. By switching the Engine and ECT ECU to check mode when troubleshooting, the technician can cause the CHK ENG to light up for a malfunction that is only detected once or momentarily. (Hand–held tester only) (See step 2).
- *2 Trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the Engine and ECT ECU memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to light up (2nd trip).
  (However, the ignition switch must be turned OFF between the 1st trip and the 2nd trip.)


FI6907

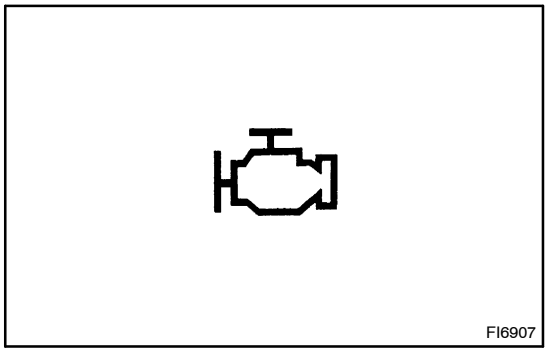
(b) Description for M–OBD

- When troubleshooting Multiplex (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the hand–held tester to the vehicle, and read off various data output from the vehicle's Engine and ECT ECU.
  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. In addition to the CHK ENG lighting up when a malfunction is detected, the applicable DTCs are recorded in the Engine and ECT ECU memory (See page DI–17).
  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 a hand–held tester to DLC3 on the vehicle or read the number of blinks of the CHK ENG when Tc and CG terminals on the DLC3 are connected. The hand–held tester also enables you to erase the DTCs and activate the several actuators and check freeze frame data and various forms of engine data (For instruction book).

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check (test) mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2–trip detection logic (*) to prevent erroneous detection and ensure thorough malfunction detection. By switching the Engine and ECT ECU to check (test) mode using hand–held tester when troubleshooting, the technician can cause the CHK ENG to light up for a malfunction that is only detected once or momentarily.
- *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.


FI6907

2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the CHK ENG.

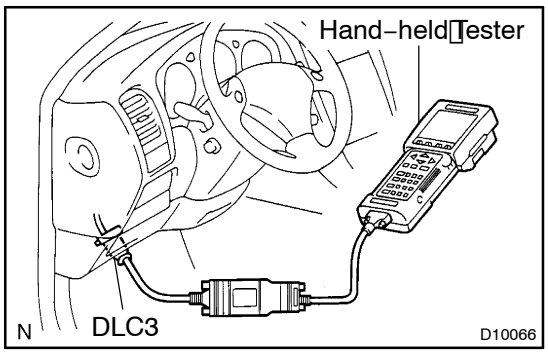
(1) The CHK ENG comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the CHK ENG does not light up, troubleshoot the combination meter (See page BE–35).

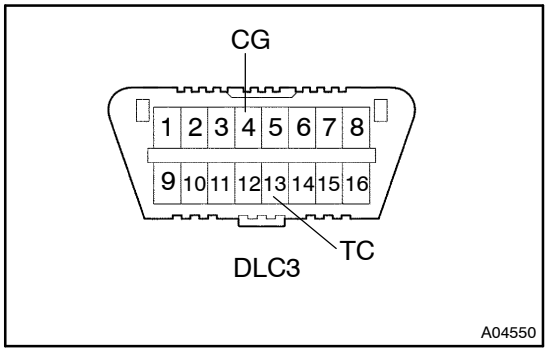
(2) When the engine is started, the CHK ENG should go off. If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC (Using hand–held tester).

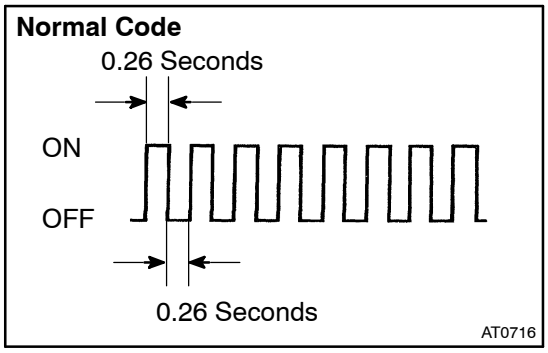
NOTICE:
When the diagnostic system is switched from normal mode to check (test) mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(1) Prepare hand–held tester.
(2) Connect the hand–held tester to DLC3 at the lower part of the instrument panel.
(3) Turn the ignition switch ON and turn the hand–held tester switch ON.
(4) Use the hand–held tester to check the DTCs and instructions, see the hand–held tester instruction book.
(5) See page DI–170 to confirm the details of the DTCs.

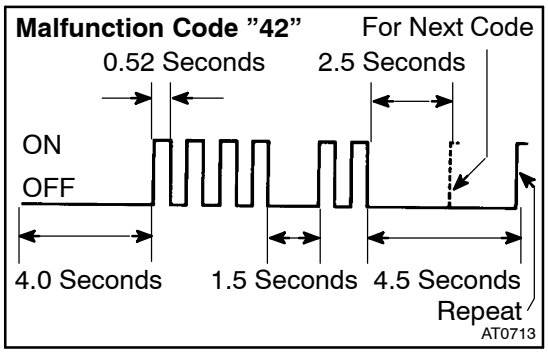


(c) M–OBD only:
Check the DTC (Not using hand–held tester).
(1) Turn the ignition switch ON, but do not start the engine.
(2) Using SST, connect terminals 13 (Tc) and 4 (CG) of DLC3.
SST 09843–18040



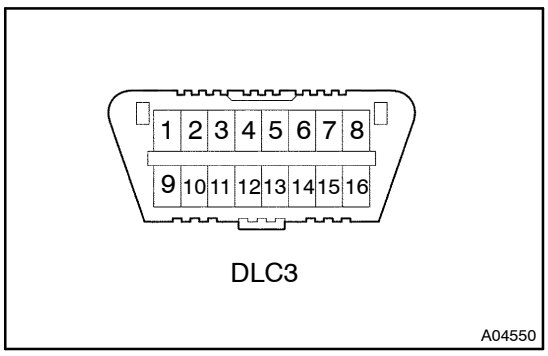
(3) Read the DTC indicated by the number of times the CHK ENG blinks.

HINT:
If the system is operating normally, the light will blink 2 times per second.



(4) The malfunction code is indicated, as shown in the chart on the left (DTC ”42” is shown as an example).

HINT:
When 2 or more malfunction codes are stored in memory, the lower–numbered code is displayed first.



(d) Inspect the DLC3.
(1) The vehicle’s Engine and ECT ECU uses ISO 9141–2 (Euro–OBD)/ISO 14230 (M–OBD) for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2/ISO 14230 format.

Terminal No.	Connection	Voltage or Resistance	Condition
7	Bus ⊕ Line	Pulse generation	During transmission
4	Chassis Ground	↔ Body Ground / 1 Ω or less	Always
16	Battery Positive	↔ Body Ground / 9 – 14 V	Always

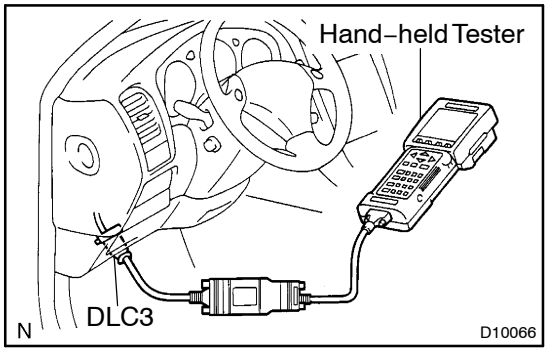
HINT:
If your display shows ”UNABLE TO CONNECT TO VEHICLE” when you have connected the cable of the OBD scan tool or hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

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

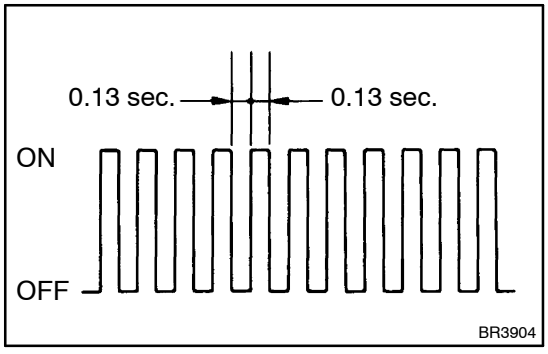
3. INSPECT DIAGNOSIS (CHECK MODE)

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

(a) Check the DTC.
  (1) Check the initial conditions.
    - Battery positive voltage 11 V or more
    - Throttle valve fully closed
    - Transmission in P range
    - Air conditioning switched off
  (2) Turn the ignition switch OFF.
  (3) Prepare a hand–held tester.



  (4) Connect the hand–held tester to DLC3 at the lower part 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, all DTCs etc. are erased.

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

(b) When using hand–held tester:
Clear the DTC.
The following actions will erase the DTC and freeze frame data. Operate a hand–held tester to erase the codes.

(c) When not using hand–held tester:
Clear the DTC.
Disconnecting the battery terminals or EFI fuse and ETCS fuse for 60 seconds or more.

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 transmission 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 (NORM and PWR pattern):
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, 3 → 4 and 4 → 5 up–shift take place, at that the shift point conform to the automatic shift schedule (See page SS–22).

HINT:

- 5th Gear Up–shift Prohibition Control (Coolant temp. is 60 °C (140 °F) or less.)
- 5th Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 °C (140 °F) or less)

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5 up–shifts.

(3) Check for abnormal noises and vibration.
Run at the D range lock–up or 5th gear and check for abnormal noises and vibration.

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

(4) Check kick–down operation.
While running in the D range, 2nd, 3rd and 5th gears, check to see that the possible kick–down vehicle speed limits for 2 → 1, 3 → 2, 4 → 3 and 5 → 4 kick–downs conform to those indicated in the automatic shift schedule (See page SS–22).

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

(6) Check the lock–up mechanism.

- Drive in D range, 5th gear, at a steady speed (lock–up ON) of about 70 km/h (43 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

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

(b) 4 range test:
Shift into the 4 range and fully depress the accelerator pedal and check the following points.

(1) Check up–shift operation.
Check to see that the 1 → 4 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–22).

HINT:
There is no 5th up–shift in the 4 range.

(2) Check engine braking.
While running in the 4 range and 4th 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) 3 range test:
Shift into the 3 range and fully depress the accelerator pedal and check the following points.

(1) Check up–shift operation.
Check to see that the 1 → 3 up–shift takes place and that the shift point conforms to the automatic

(2) Check engine braking.
While running in the 3 range and 3rd 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.

(d) 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

(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.

(e) 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.

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

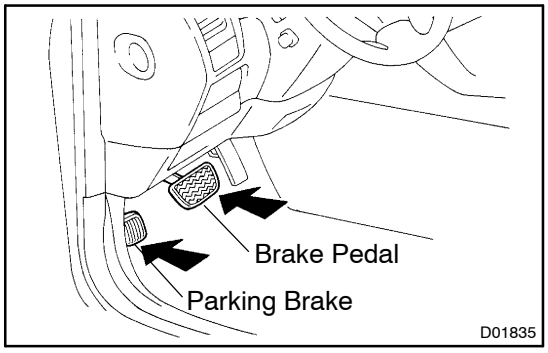
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(g) 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. ACTIVE TEST

You are able to set the A/T gear position as you like by operating each solenoid value forcibly using hand–held tester.
However, the condition that you can set the gear position differs in the setting gear position, so conduct the ACTIVE TEST following the table below.

No.	Indication Gear Condition	Starting Condition	Canceling Condition
1	1st, 2nd	Vehicle speed: 0 km/h (0 mph)	Vehicle speed: 0 km/h (0 mph)
2	3rd	Vehicle speed: 0 km/h (0 mph) or vehicle running at 4th or 5th gear	Vehicle speed: less than 50 km/h (31 mph)
3	4th	• Vehicle running at 3rd or 5th gear • Vehicle speed: 50 km/h (31 mph)	Vehicle speed: less than 50 km/h (31 mph)
4	5th	• Vehicle speed: more than 60 km/h (37 mph) • Vehicle running at 4th gear • Throttle value opening angle: less than 50 %	• Vehicle speed: less than 60 km/h (37 mph) • Throttle value opening angle: more than 50 %



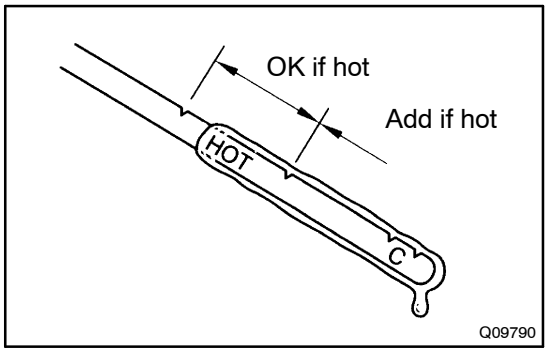
7. BASIC INSPECTION

(a) Check the fluid level.

HINT:

Drive the vehicle so that the engine and transmission 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.

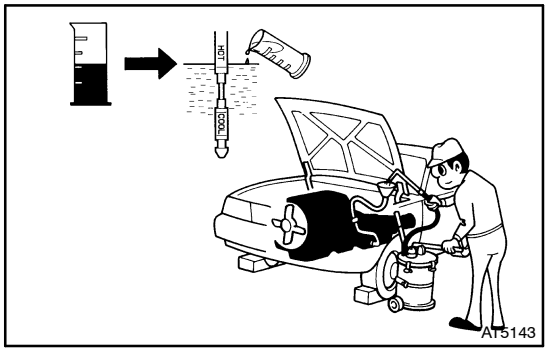
Fluid type: ATF TYPE T–IV

NOTICE:

Do not overfill.

(b) Check the fluid condition.

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

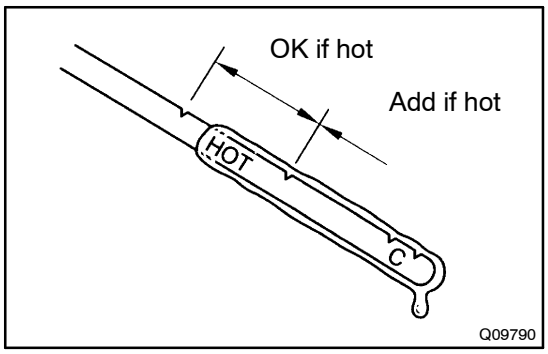


(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.
(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF TYPE T–IV

Capacity: 2.0 liters (2.1 US qts, 1.8 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.

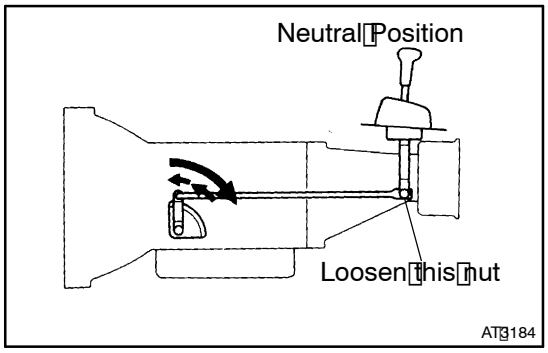
NOTICE:

Do not overfill.

(d) Check the fluid leaks.

Check for leaks in the transmission.

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.

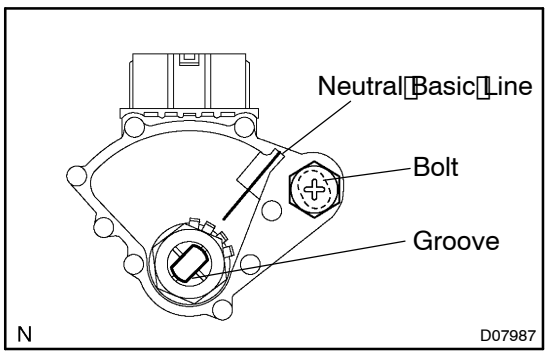
- When shifting the shift lever from the N range to other ranges, check that the lever can be shifted smoothly and accurately to each range and that the position indicator is not aligned with the correct position.

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

- Loosen the nut on the shift lever.
- Push the control shaft fully rearward.
- Return the control shaft lever 2 notches to N range.
- Set the shift lever to N range.
- 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)

- 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.

- Loosen the neutral start switch bolt and set the shift lever to the N range.
- Align the groove and neutral basic line.
- Hold the switch in position and tighten the bolt.

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

- For continuity inspection of the neutral start switch, see page DI–231.

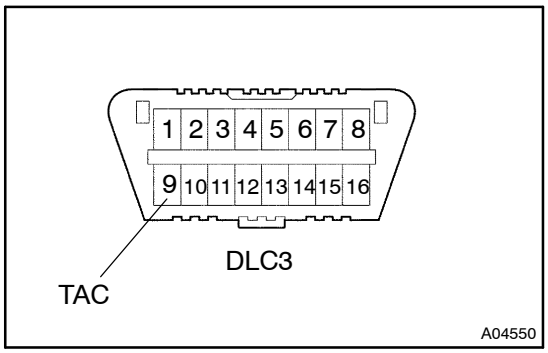
8. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

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



- Chock the 4 wheels.
- Connect a hand–held tester to DLC3 or tachometer to terminal TAC of DLC3 with SST.

SST 09843–18030

- Fully apply the parking brake.
- Keep your left foot pressing firmly on the brake pedal.
- Start the engine.
- Shift into the D range. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,700 ± 150 rpm

Evaluation:

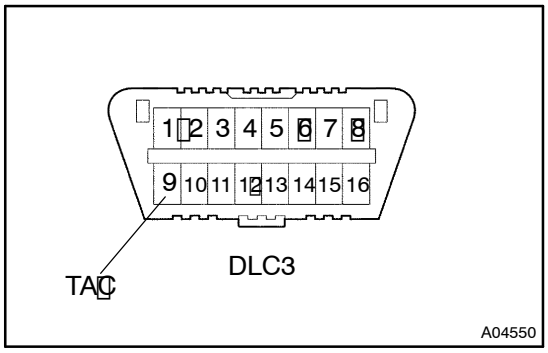
Problem	Possible cause
(a) Stall speed low in D ranges	• Engine output may be insufficient • Stator one–way clutch is operating properly HINT: If more than 600 rpm below the specified value, the torque converter could be faulty.
(b) Stall speed high in D range	• Line pressure too low • Forward clutch slipping • No. 2 one–way clutch not operating properly • O/D 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.**



- Chock the 4 wheels.
- Connect a hand–held tester to DLC3 or tachometer to terminal TAC of DLC3 with SST.

SST 09843–18030

- Start engine and check idle speed.

Idle speed: 700 ± 50 rpm (In N range and A/C OFF)

- 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

- In the same way, measure the time lag for N → R.

Time lag: N → R less than 1.5 seconds

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

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

9. 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 right side of the transmission case and connect SST.
(See page AT–331 for the location to connect SST)

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

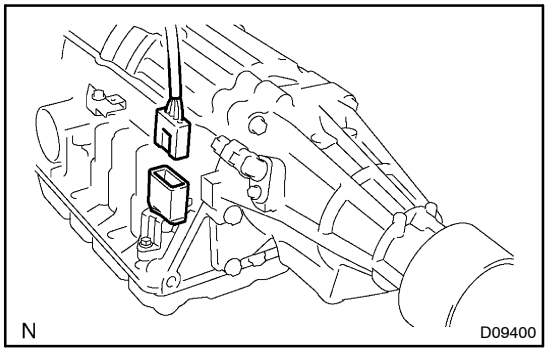
(3) Fully apply the parking brake and chock the 4 wheels.
(4) Connect a hand–held tester to DLC3.
(5) Start the engine and check idling speed.
(6) Keep your left foot pressing firmly on the brake pedal and shift into D range.
(7) Measure the line pressure when the engine is idling.
(8) Depress the accelerator 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	390 – 460 (4.0 – 4.7, 57 – 67)	0
Stall	1,200 – 1,360 (12.2 – 13.8, 174 – 196)	1,640 – 1,960 (16.7 – 20.0, 238 – 282)

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 defect • Oil pump defect • O/D direct clutch defect
If pressure is low in the D range only	• D range circuit fluid leakage • Forward clutch defect
If pressure is low in the R range only	• R range circuit fluid leakage • Direct clutch defect • 1st & reverse brake defect



10. 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 transmission.

(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, 3, 4 and D ranges.

Check that the gear change corresponds to the shift range.

Shift range	Gear position
D	5th
4	5th
3	4th
2	3rd
L	3rd
R	Reverse
P	Pawl Lock

HINT:

If the L, 2, 3, 4 and D range gear positions are difficult to distinguish, do the following read test.

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

(c) Connect the solenoid wire.

(d) Cancel out DTC.

DI1G9–04

DIAGNOSTIC TROUBLE CODE CHART

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

Euro OBD:

DTC No. (See Page)	Detection Item	Trouble Area	*1CHK ENG	*2Memory
P0500 (DI–195)	Vehicle Speed Sensor Malfunction	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Engine and ECT ECU • Automatic transmission assembly	●	○
P0710 (DI–199)	Transmission Fluid Temperature Sensor Circuit Malfunction (ATF Temperature Sensor)	• Open or short in ATF temperature sensor circuit • ATF temperature sensor circuit • Engine and ECT ECU	●	○
P0711 (DI–201)	Transmission Fluid Temperature Sensor Circuit Range/Performance problem	ATF temperature sensor	●	○
P0715 (DI–202)	Input/Turbine Speed Sensor Circuit Malfunction (O/D Direct Clutch Speed Sensor)	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • Engine and ECT ECU • Automatic transmission assembly	●	○
P0750 (DI–205)	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 transmission assembly	●	○
P0753 (DI–208)	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 (DI–205)	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 transmission assembly	●	○
P0758 (DI–208)	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	●	○
P0760 (DI–205)	Shift Solenoid ”C” Malfunction (No. 3 Solenoid Valve)	• No. 3 solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Automatic transmission assembly	●	○
P0763 (DI–208)	Shift Solenoid ”C” Electrical Malfunction (No. 3 Solenoid Valve)	• Open or short in No. 3 solenoid valve circuit • No. 3 solenoid valve • Engine and ECT ECU	●	○
P0768 (DI–213)	Shift Solenoid ”D” Electrical Malfunction (No. 4 Solenoid Valve)	• Open or short in No. 4 solenoid valve circuit • No. 4 solenoid valve • Engine and ECT ECU	●	○
P0770 (DI–216)	Shift Solenoid ”E” Malfunction (SLU Solenoid Valve)	• SLU solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Lock–up clutch • Automatic transmission assembly • Torque converter	●	○
P1520 (DI–218)	Stop Light Switch Signal Malfunction	• Short stop light switch signal circuit • Stop light switch • Engine and ECT ECU	●	○
P1755 (DI–219)	Linear Solenoid for Lock–up Control Circuit Malfunction (SLU Solenoid Valve)	• Open or short in SLU solenoid valve circuit • SLU solenoid valve • Engine and ECT ECU • Automatic transmission assembly	●	○

P1760 (DI–223)	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT Solenoid Valve)	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECT ECU	●	○
P1765 (DI–223)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (SLN Solenoid Valve)	• Open or short in SLN solenoid valve circuit • SLN solenoid valve • Engine and ECT ECU	●	○
P1780 (DI–231)	Neutral Start Switch Malfunction	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU	●	○

*1: "●" mark means check engine waning light (CHK ENG) blinks once every 2 seconds.
*2: "○" mark means Engine and ECT ECU memorizes the malfunction code if the Engine and ECT ECU detects the DTC detection condition.
HINT:
This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

M–OBD (Except European spec.):

DTC No. (See Page)	Detection Item	Trouble Area	*CHK ENG	*2Memory
P0500/42 (DI–195)	Vehicle Speed Sensor Malfunction	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Engine and ECT ECU • Automatic Transmission Assembly	●	○
P0710/38 (DI–199)	Transmission Fluid Temperature Sensor Circuit Malfunction (ATF Temperature Sensor)	• Open or short in ATF temperature sensor circuit • ATF temperature sensor circuit • Engine and ECT ECU	●	○
P0715/67 (DI–202)	Input/Turbine Speed Sensor Circuit Malfunction (O/D Direct Clutch Speed Sensor)	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • Engine and ECT ECU • Automatic Transmission Assembly	●	○
P0753/62 (DI–208)	Shift Solenoid "A" Electrical Malfunction (No. 1 Solenoid Valve)	• Open or short in No. 1 solenoid value circuit • No. 1 solenoid valve • Engine and ECT ECU	●	○
P0758/63 (DI–208)	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	●	○
P0763/76 (DI–208)	Shift Solenoid "C" Electrical Malfunction (No. 3 Solenoid Valve)	• Open or short in No. 3 solenoid valve circuit • No. 3 solenoid valve • Engine and ECT ECU	●	○
P0768/65 (DI–213)	Shift Solenoid "D" Electrical Malfunction (No. 4 Solenoid Valve)	• Open or short in No. 4 solenoid valve circuit • No. 4 solenoid valve • Engine and ECT ECU	●	○
P1755/68 (DI–219)	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLU Solenoid Valve)	• Open or short in SLU solenoid valve circuit • SLU solenoid valve • Engine and ECT ECU	X	○
P1760/77 (DI–223)	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT Solenoid Valve)	• Open or short in SLT solenoid valve circuit • SLT solenoid valve • Engine and ECT ECU	X	○

P1765/46 (DI–227)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (SLN Solenoid Valve)	• Open or short in SLN solenoid valve circuit • SLN solenoid valve • Engine and ECT ECU	X	○
P1780/97 (DI–231)	Neutral Start Switch Malfunction	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU	●	○

*1: "●" mark means check engine warning light (CHK ENG) blinks once every 2 seconds.
"X" mark means CHK ENG never blinks.

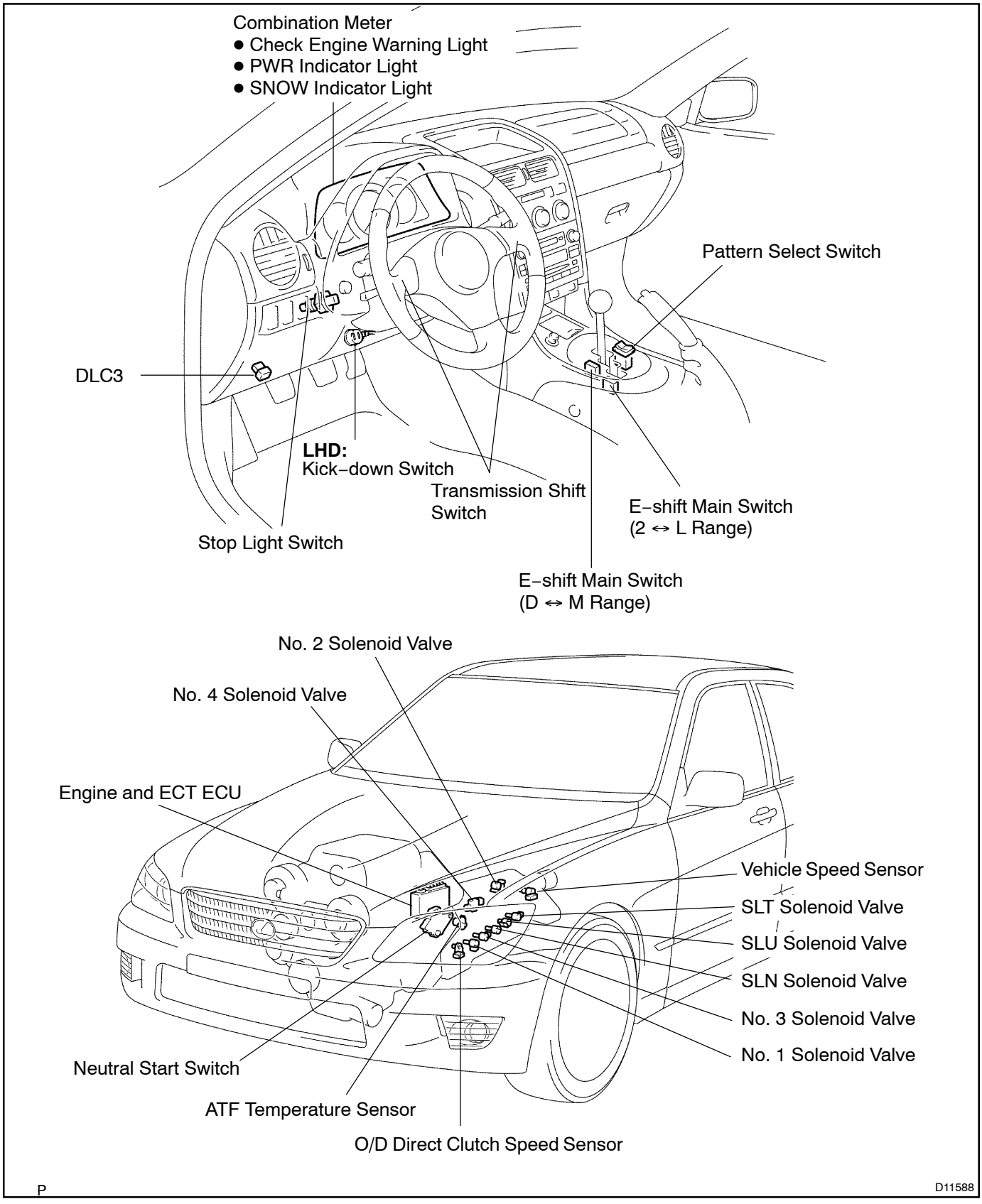
*2: "○" mark means Engine and ECT ECU memorizes the malfunction code if the Engine and ECT ECU detects the DTC detection condition.

HINT:

This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

DI25K–03

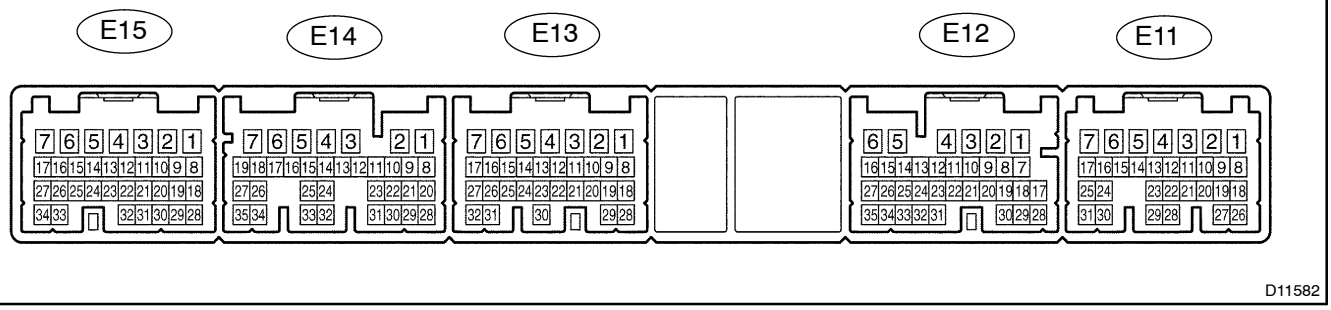
PARTS LOCATION



DI1GB–13

TERMINALS OF ECU

Engine and ECT ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
*1 KD ↔ E1 (E11–9 ↔ E14–7)	GR–L ↔ BR	IG ON and accelerator pedal depressed	9 – 14
		IG ON and accelerator pedal released	Below 1.5
STP ↔ E1 (E12–4 ↔ E14–7)	G–W ↔ BR	IG ON and brake pedal depressed	7.5 – 14
		IG ON and brake pedal released	Below 1.5
SFTD ↔ E1 (E12–5 ↔ E14–7)	*2 GR–R ↔ BR *3 GR–G ↔ BR	IG ON and ”Down” transmission shift switch pressed	Below 3
		IG ON and ”Down” transmission shift switch released	7 – 12
SFTU ↔ E1 (E12–6 ↔ E14–7)	*2 GR–G ↔ BR *3 GR–R ↔ BR	IG ON and ”Up” transmission shift switch pressed	Below 3
		IG ON and ”Up” transmission shift switch released	7 – 12
2 ↔ E1 (E12–12 ↔ E14–7)	Y–G ↔ BR	IG ON and shift lever 2 or L range	7.5 – 14
		IG ON and shift lever other than 2 and L range	Below 1.5
D ↔ E1 (E12–13 ↔ E14–7)	GR–B↔ BR	IG ON and shift lever D or M range	7.5 – 14
		IG ON and shift lever other than D and M range	Below 1.5
4 ↔ E1 (E12–14 ↔ E14–7)	LG–B ↔ BR	IG ON and shift lever M range	7.5 – 14
		IG ON and shift lever other than M range	Below 1.5
L ↔ E1 (E12–15 ↔ E14–7)	G–Y ↔ BR	IG ON and shift lever L range	7.5 – 14
		IG ON and shift lever other than L range	Below 1.5
N ↔ E1 (E14–3 ↔ E14–7)	G–R ↔ BR	IG ON and shift lever N range	7.5 – 14
		IG ON and shift lever other than N range	Below 1.5
3 ↔ E1 (E14–4 ↔ E14–7)	G–W ↔ BR	IG ON and shift lever 3 range	7.5 – 14
		IG ON and shift lever other than 3 range	Below 1.5
R ↔ E1 (E14–5 ↔ E14–7)	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
P ↔ E1 (E14–6 ↔ E14–7)	G ↔ BR	IG ON and shift lever P range	7.5 – 14
		IG ON and shift lever other than P range	Below 1.5
SLU^+ ↔ SLU^- (E14–11 ↔ E14–10)	G–W ↔ *2 LG–B G–W ↔ *3 L–R	IG ON	Below 3
		Engine is idling	Pulse signal is output below 1.5 ↔ 9 – 14
SLN^+ ↔ SLN^- (E14–13 ↔ E14–12)	Y–R ↔ R–W	IG ON	Below 3
		Engine is idling	Pulse signal is output below 1.5 ↔ 9 – 14
S4 ↔ E1 (E14–16 ↔ E14–7)	B–R ↔ BR	IG ON	Below 1.5
		1st, 2nd, 3rd or 4th gear	Below 1.5
		5th gear	9 – 14

S3 ↔ E1 (E14–17 ↔ E14–7)	W–L ↔ BR	IG ON	Below 1.5
		1st, 2nd, 3rd or 5th gear	Below 1.5
		4th gear	9 – 14
S2 ↔ E1 (E14–18 ↔ E14–7)	G–Y ↔ BR	IG ON	Below 1.5
		1st, 4th or 5th gear	Below 1.5
		2nd or 3rd gear	9 – 14
S1 ↔ E1 (E14–19 ↔ E14–7)	Y ↔ BR	IG ON	Below 1.5
		3rd, 4th or 5th gear	Below 1.5
		1st or 2nd gear	9 – 14
$NC0^+$ ↔ $NC0^-$ (E14–21 ↔ E14–20)	R ↔ G	Engine is idling	Pulse signal is output below 1.5 ↔ 4 – 6
$SP2^+$ ↔ $SP2^-$ (E14–23 ↔ E14–22)	L–Y ↔ R–L	Engine is idling	Pulse signal is output below 1.5 ↔ 4 – 6
OIL ↔ E2 (E14–27 ↔ E12–34)	GR ↔ BR	IG ON and ATF temperature 110 °C (176 °F)	Below 1
SLT^+ ↔ SLT^- (E14–35 ↔ E14–34)	B–Y ↔ R–B	IG ON	Below 3
		Engine is idling	Pulse signal is output below 1.5 ↔ 9 – 14

*1: LHD Only
*2: LHD
*3: RHD

DI1GC–15

PROBLEM SYMPTOMS TABLE

HINT:

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

The Matrix Chart is divided into 3 chapters.

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

1. CHAPTER 1: ELECTRONIC CIRCUIT MATRIX CHART

Symptom	Suspect Area	See page
No up–shift (A particular gear, from 1st to 4th gear, is not up–shifted)	Engine and ECT ECU	IN–34
No up–shift (4th → 5th)	1. E–shift main switch circuit 2. Engine and ECT ECU	DI–240 IN–34
No down–shift (5th → 4th)	1. E–shift main switch circuit 2. Engine and ECT ECU	DI–240 IN–34
No down–shift (A particular gear, from 1st to 4th gear, is not up–shifted)	Engine and ECT ECU	IN–34
No lock–up	1. Stop light switch signal circuit 2. Engine and ECT ECU	DI–218 IN–34
No lock–up off	Engine and ECT ECU	IN–34
Shift point too high or too low	1. Pattern select switch circuit 2. Engine and ECT ECU	DI–237 IN–34
Up–shift to 5th from 4th while shift lever is M position	1. E–shift main switch circuit 2. Engine and ECT ECU	DI–240 IN–34
Up–shift to 5th from 4th while engine is cold	Engine and ECT ECU	IN–34
No kick–down	1. Kick–down switch circuit 2. Engine and ECT ECU	DI–247 IN–34
No pattern select	1. Pattern select switch circuit 2. Engine and ECT ECU	DI–237 IN–34
Engine stalls when starting off or stopping	1. Stop light switch signal circuit 2. Engine and ECT ECU	DI–218 IN–34
No 2nd start	1. Pattern select switch circuit 2. Engine and ECT ECU	DI–237 IN–34
No E–shift system	1. E–shift main switch circuit 2. Transmission shift switch circuit 3. Engine and ECT ECU	DI–240 DI–243 IN–34

2. CHAPTER 2: ON–VEHICLE REPAIR
(★: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward range and reverse range	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off–vehicle repair matrix chart	DI–170 ★ ★ –
Vehicle does not move in R range	1. Reverse control valve 2. Off–vehicle repair matrix chart	★ –
Vehicle does not move in particular range or ranges (Except 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 → 4th)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	★ –
No up–shift (4th → 5th)	1. 4–5 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (5th → 4th)	1. 4–5 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (4th → 3rd)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (3rd → 2nd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	★ –
No down–shift (2nd → 1st)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	★ –
No lock–up or No lock–up off	1. Lock–up control valve 2. Lock–up relay valve 3. Off–vehicle repair matrix chart	★ ★ –
Harsh engagement (N → D)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_1 accumulator 4. Orifice control valve 5. Off–vehicle repair matrix chart	★ ★ ★ ★ –
Harsh engagement (Lock–up)	1. Lock–up control valve 2. Lock–up relay valve 3. Solenoid relay valve 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (N → R)	1. Accumulator control valve 2. C_2 accumulator 3. Solenoid modulator valve 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (2 → L)	Coast brake control valve	★
Harsh engagement (2nd → 3rd → 4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve	★ ★
Harsh engagement (1st → 2nd)	1. Solenoid modulator valve 2. B_3 control valve 3. B_2 release control valve 4. Solenoid relay valve 5. Off–vehicle repair matrix chart	★ ★ ★ ★ –

Harsh engagement (2nd → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_{2R} accumulator 4. B_{3R} control valve 5. B_{2R} release control valve 6. Solenoid relay valve 7. Off–vehicle repair matrix chart	★ ★ ★ ★ ★ ★ –
Harsh engagement (3rd → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_{2R} accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_{0R} accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –
Harsh engagement (5th → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_{0R} accumulator 4. Off–vehicle repair matrix chart	★ ★ ★ –
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Oil strainer 3. Pressure relief valve 4. Off–vehicle repair matrix chart	DI–170 ★ ★ –
Slip or shudder (Particular range)	1. Transmission control rod 2. Off–vehicle repair matrix chart	DI–170 –
No engine braking (1st: L range)	1. Coast brake control valve 2. Off–vehicle repair matrix chart	★ –
No engine braking (2nd: 2 range)	1. Coast brake control valve 2. Off–vehicle repair matrix chart	★ –
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	★ ★ ★

3. CHAPTER 3: OFF–VEHICLE REPAIR (★: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward range and reverse range	1. O/D one–way clutch (F_0) 2. O/D direct clutch (C_0) 3. O/D planetary gear unit 4. Torque converter	★ ★ ★ AT–39
Vehicle does not move in R range	1. Center and rear planetary gear unit 2. Direct clutch (C_2) 3. 1st & reverse brake (B_4) 4. O/D brake (B_0)	★ ★ ★ ★
No up–shift (1st → 2nd)	2nd brake (B_3)	★
No up–shift (2nd → 3rd)	1. 3rd brake (B_2) 2. One–way clutch No. 1 (F_1)	★ ★
No up–shift (3rd → 4th)	Direct clutch	★
No up–shift (4th → 5th)	O/D brake (B_0)	★
No lock–up or No lock–up off	Torque converter	AT–39
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. One–way clutch No. 2 (F_2)	★ ★ ★
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. O/D brake (B_0) 3. 1st & reverse brake (B_4)	★ ★ ★
Harsh engagement (1st → 2nd)	2nd brake (B_3)	★
Harsh engagement (2nd → 3rd)	1. 3rd brake (B_2) 2. 2nd brake (B_3) 3. One–way clutch No. 1 (F_1)	★ ★ ★
Harsh engagement (3rd → 4th)	Direct clutch (C_2)	★
Harsh engagement (4th → 5th)	1. O/D brake (B_0) 2. O/D direct clutch (C_0)	★ ★
Harsh engagement (Lock–up)	Torque converter	AT–39
Slip or shudder (Forward and reverse: After warm–up)	1. Torque converter 2. O/D one–way clutch (F_0) 3. O/D direct clutch (C_0)	AT–39 ★ ★
Slip or shudder (Particular range: Just after engine starts)	Torque converter	AT–39
Slip or shudder (R range)	1. Direct clutch (C_2) 2. O/D brake (B_0) 3. 1st & reverse brake (B_4)	★ ★ ★
Slip or shudder (1st)	1. Forward clutch (C_1) 2. No. 2 one–way clutch (F_2)	★ ★
Slip or shudder (2nd)	2nd brake (B_3)	★
Slip or shudder (3rd)	1. 3rd coast brake (B_1) 2. 3rd brake (B_2) 3. One–way clutch No. 1 (F_1)	★ ★ ★
Slip or shudder (4th)	Direct clutch	★
Slip or shudder (5th)	O/D brake (B_0)	★
No engine braking (1st – 4th: D range)	O/C direct clutch (C_0)	★
No engine braking (1st: L range)	1st & reverse brake (B_4)	★
No engine braking (2nd: 2 range)	2nd brake (B_3)	★
No engine braking (3rd: 3 range)	3rd coast brake (B_1)	★

Poor acceleration (All ranges)	Torque converter	AT–39
Poor acceleration (5th)	1. O/D brake (B_0) 2. O/D planetary gear unit	★ ★
Engine stalls when starting off or stopping	Torque converter	AT–39

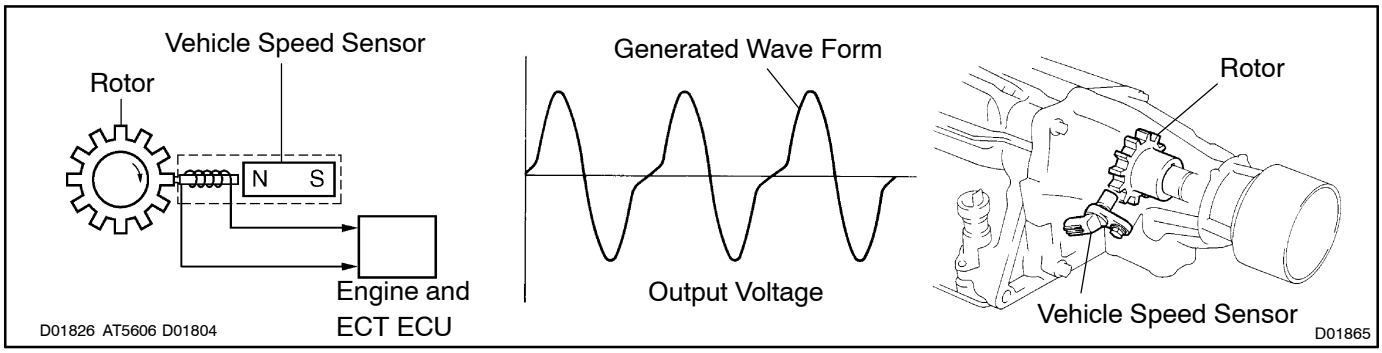
DI2L8–07

CIRCUIT INSPECTION

DTC	P0500/42	Vehicle Speed Sensor Malfunction

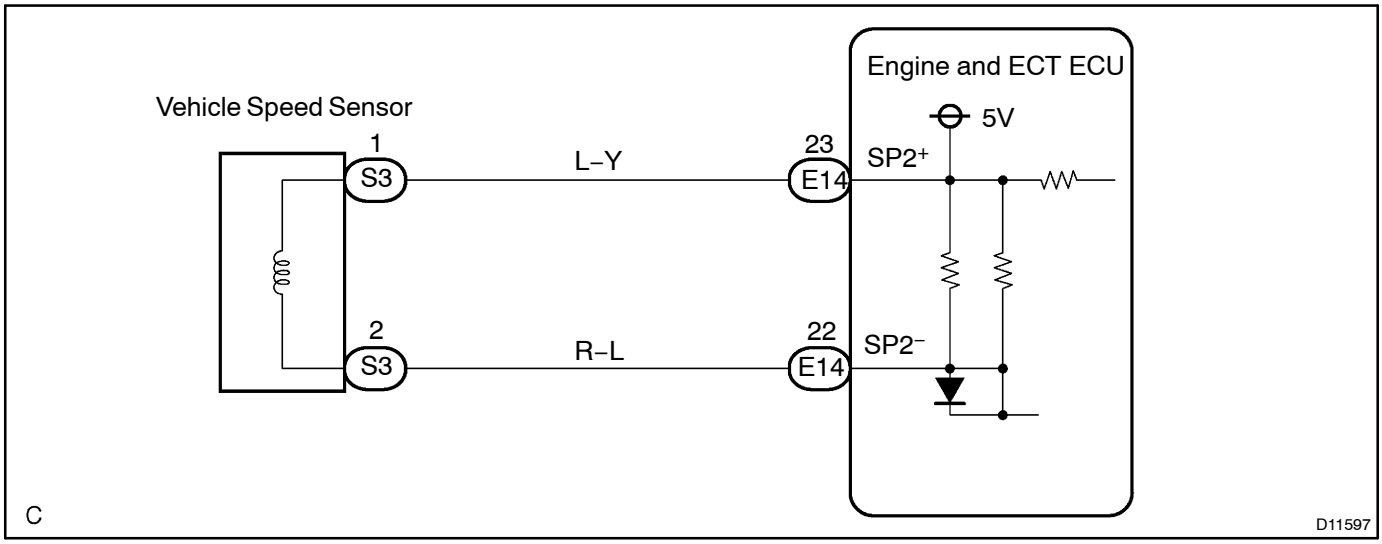
CIRCUIT DESCRIPTION

The vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the Engine and ECT ECU. The Engine & ECT ECU determines the vehicle speed based on these signals. An AC voltage is generated in the vehicle speed sensor coil as the rotor mounted on the output shaft rotates, and this voltage is sent to the Engine and ECT ECU.



DTC No.	DTC Detecting Condition	Trouble Area
P0500/42	No vehicle speed sensor signal to Engine and ECT ECU under conditions (a) and (b): (a) Neutral start switch is OFF (b) Vehicle is being driven	• Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Engine and ECT ECU • Automatic transmission assembly
	Clutch or brake slips or gear broken	

WIRING DIAGRAM



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	**Connect hand–held tester and read value of vehicle speed value.**

PREPARATION:

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

(b) Start the engine and the hand–held tester main switch ON.

CHECK:

Drive the vehicle and read vehicle speed value.

OK:

Vehicle speed matches tester speed value.

OK → **Check and replace Engine and ECT ECU (See page IN–34).**

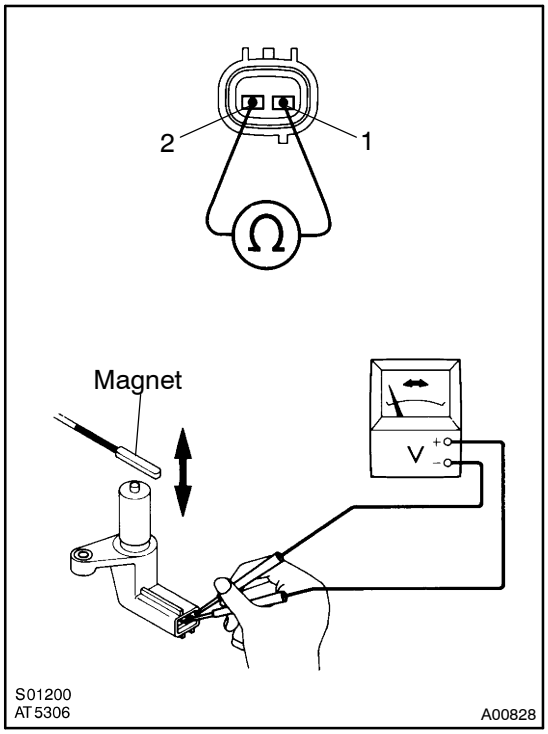
NG

2	**Check speedometer circuit (See page BE–2).**

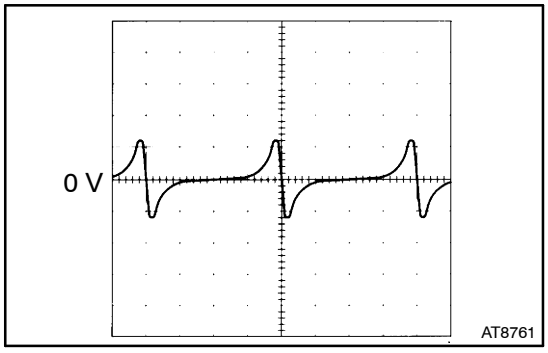
NG → **Repair or replace speedometer circuit.**

OK

3	Check vehicle speed sensor.



PREPARATION:
Remove the vehicle speed sensor from the transmission (See page AT–7).
CHECK:
Measure resistance between terminals 1 and 2 of the speed sensor.
OK:
Resistance: 560 – 680 Ω at 20°C (68°F)
Reference:
Check vehicle speed sensor's function
CHECK:
Check voltage between terminals 1 and 2 of the vehicle speed sensor when a magnet is put close to front end of the vehicle speed sensor then taken away quickly.
OK:
Voltage is generated intermittently
HINT:
The generated voltage is extremely low.

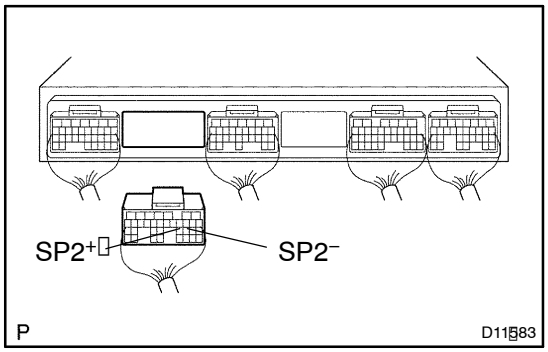


Reference:
INSPECTION USING OSCILLOSCOPE
Refer to the chart for wave form between terminals SP2+ and SP2–. When the vehicle speed is approx. 60 km/h (37 mph).

NG	Replace the vehicle speed sensor (See page AT–7).

OK

4	**Measure resistance between terminals SP2+ and SP2– of Engine and ECT connector.**



PREPARATION:

(a) Remove the Engine and ECT ECU hood.

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

CHECK:

Measure resistance between terminals SP2+ and SP2– of the Engine and ECT ECU connector.

OK:

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

OK	**Check and replace the Engine and ECT ECU (See page IN–34).**

NG

5	**Check and repair harness and connector between Engine and ECT ECU and vehicle speed sensor (See page IN–34)**

NG	**Replace or repair the wire harness or connector.**

OK

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

DI9HA–01

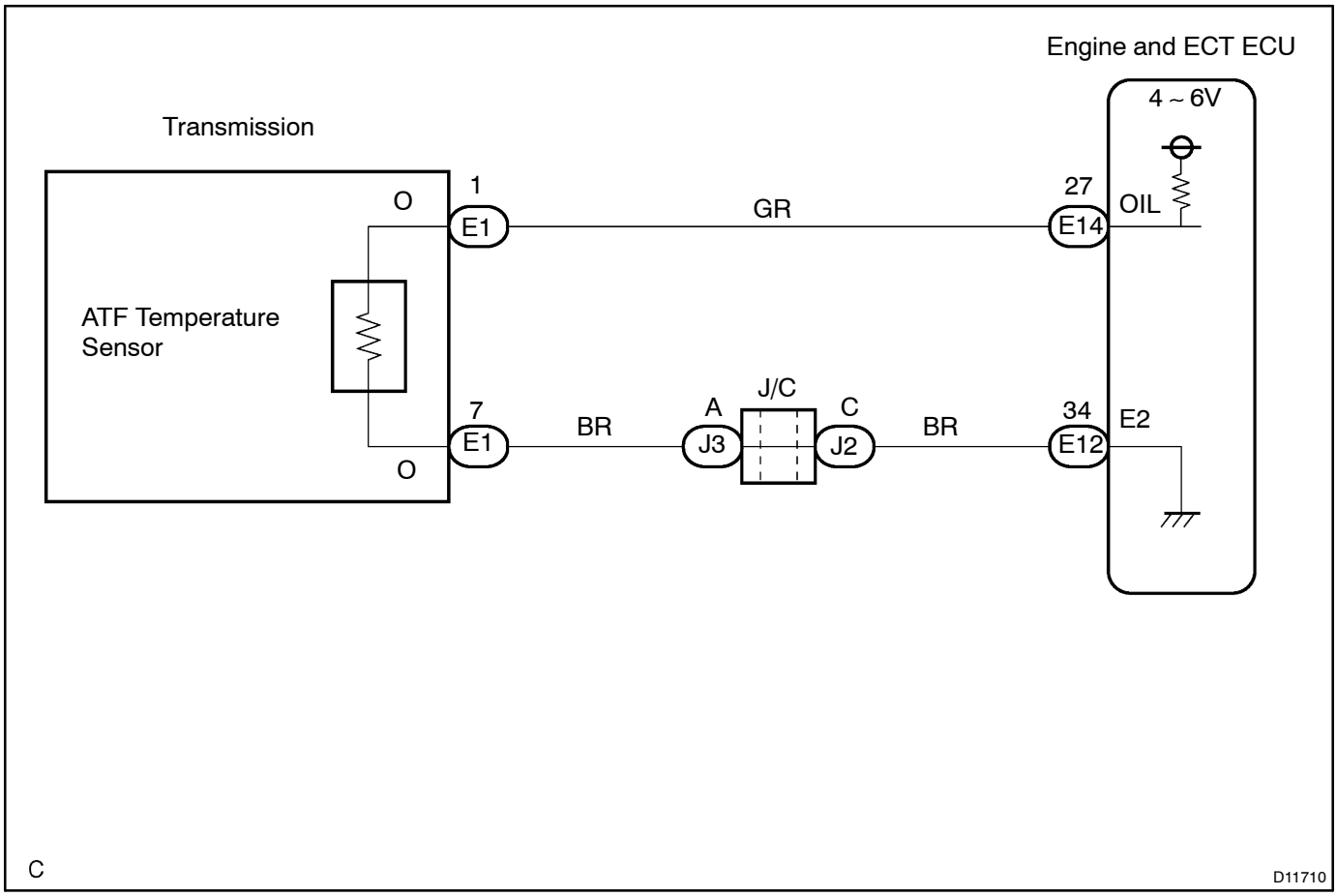
DTC	P0710/38	Transmission Fluid Temperature Sensor Malfunction (ATF Temperature Sensor)

CIRCUIT DESCRIPTION

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

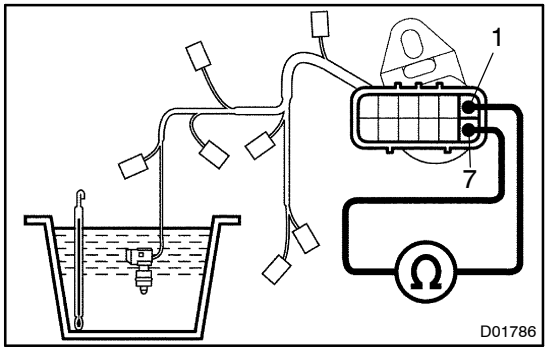
DTC No.	DTC Detecting Condition	Trouble Area
P0710/38	Either (a) or (b) is detected for 0.5 sec. or more. (2–trip detection logic) (a) Temperature sensor resistance is less than 79 Ω (b) After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 kΩ	• Open or short in ATF temperature sensor • ATF temperature 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) Disconnect the ATF temperature sensor.

CHECK:

Measure resistance between terminals 1 and 7 of transmission wire connector at 25°C (77°F) and 110°C (230°F).

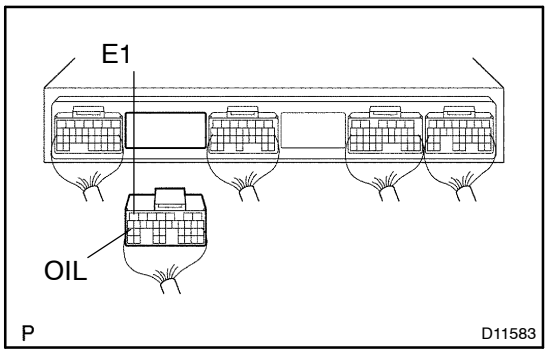
OK:

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

NG	Replace the ATF temperature sensor (transmission wire) (See page AT–9).

OK

2	Measure resistance between terminals OIL and E1 of Engine and ECT ECU connector.



PREPARATION:

(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector of the Engine and ECT ECU.

CHECK:

Measure resistance between terminals OIL and E1 of Engine and ECT ECU connector.

OK:

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

NG	Repair or replace the harness or connector. (See page IN–34).

OK

Check and replace the Engine and ECT ECU (See page IN–34).

DTC	P0711	Transmission Fluid Temperature Sensor Circuit Range / Performance

CIRCUIT DESCRIPTION

Refer to DTC P0710 on See page DI–199.

DTC No.	DTC Detecting Condition	Trouble Area
P0711	Both (a) and (b) detected. (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 6.2 miles (10 km), the ATF temp. is less than 10°C.	ATF temperature sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester or OBD scan tool. 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.

1	Are there any other codes (besides DTC P0711) being output?

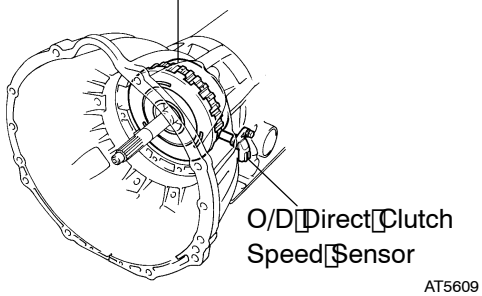
YES → Go to relevant DTC chart (See page DI–184).

NO →

Replace the ATF temperature sensor (transmission wire) (See page AT–9).

DTC	P0715/67	Input/Turbine Speed Sensor Circuit Malfunction (O/D Direct Clutch Speed Sensor)

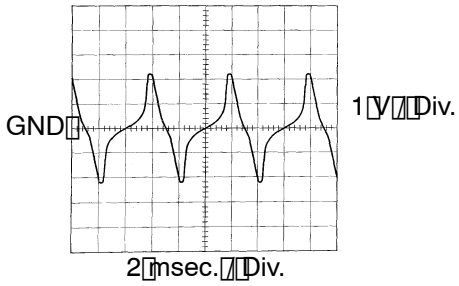
CIRCUIT DESCRIPTION



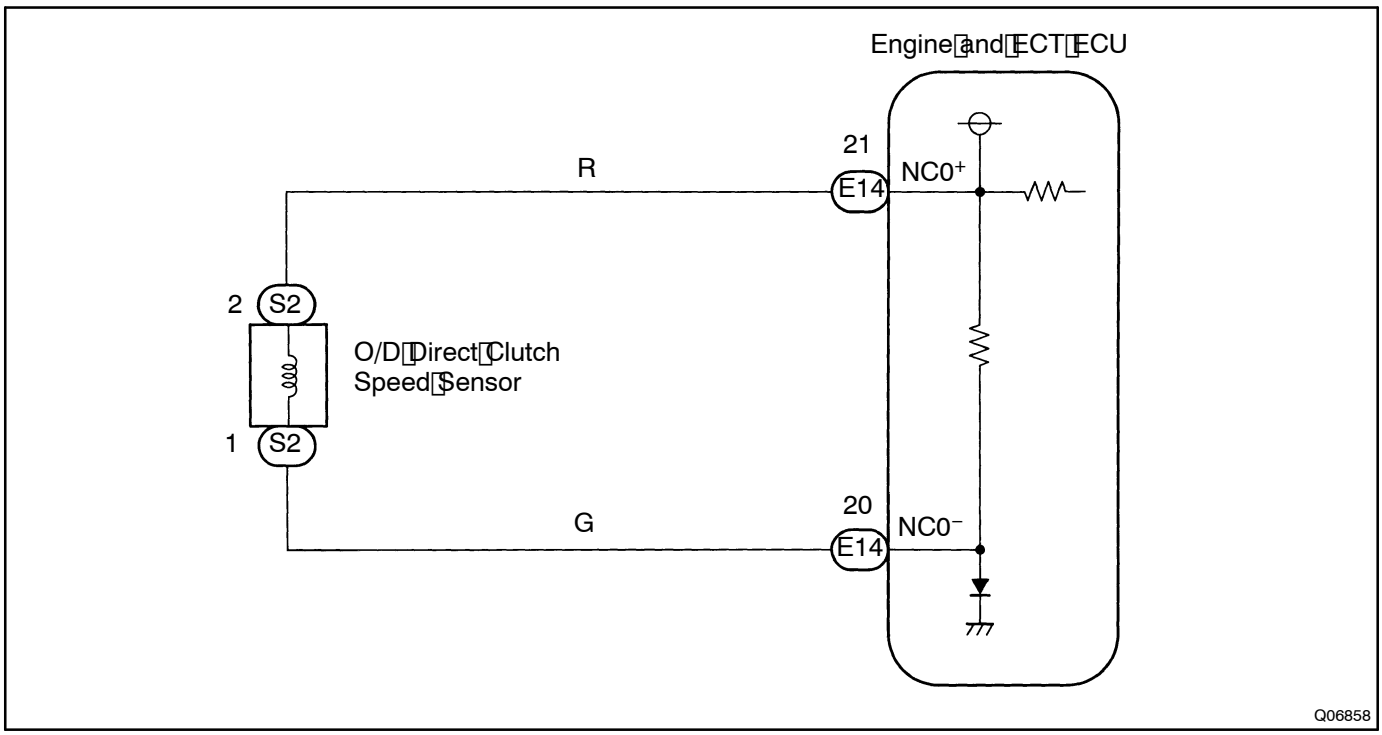
This sensor detects the rotation speed of the O/D input shaft from the rotation of the O/D direct clutch drum.
Its construction is the same as that of the vehicle speed sensor (See page DI–195).
By comparing the O/D direct clutch speed signal and vehicle speed sensor signal, the Engine and ECT ECU detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus doing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0715/67	All conditions below are detected for 5 secs. or more (2–trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd, 3rd or 4th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Neutral start switch: OFF (f) No.1, No.2, No.3, No.4, SLU solenoid valves and vehicle speed sensor are in normal operation	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • Engine and ECT ECU • Automatic transmission assembly

Refer to the chart for the wave form between terminals NC0+ and NC0– during engine idling.



WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Using hand–held tester, check O/D direct clutch speed signal.**

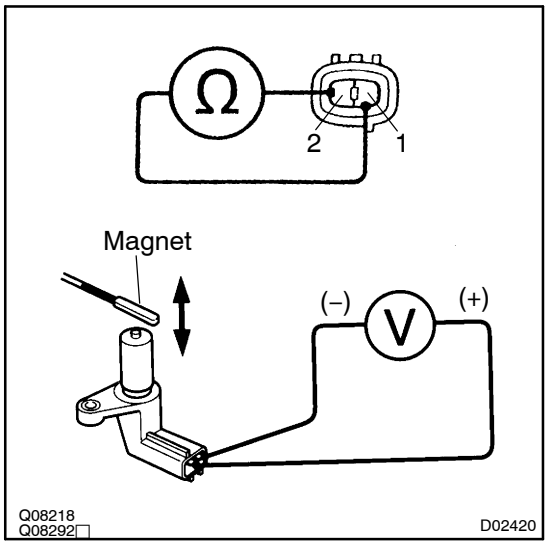
PREPARATION:
Remove the DLC3 cover.
Connect a hand–held tester to the DLC3.
Start the engine (Shift range: P).
Turn the hand–held tester main switch ON.
CHECK:
Read O/D direct clutch speed at engine idling.
OK:

700 ± 50 rpm at engine idling

OK → **Check and replace Engine and ECT ECU (See page IN–34).**

NG

2	Check O/D direct clutch speed sensor.



PREPARATION:

Remove the O/D direct clutch speed sensor from the transmission (See page AT–8).

CHECK:

(a) Measure resistance between terminals 1 and 2 of O/D direct clutch 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 kept away quickly.

OK:

(a): Voltage is generated intermittently

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

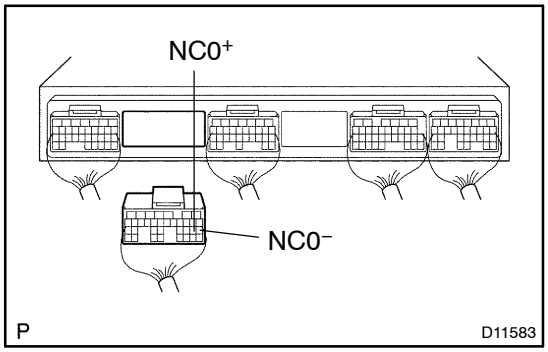
HINT:

The generated voltage is extremely low.

NG	Replace the O/D direct clutch speed sensor (See page AT–8).

OK

3	Measure resistance between terminals NC0+ and NC0– of Engine and ECT connector.



PREPARATION:

(a) Remove the Engine and ECT ECU hood.

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

CHECK:

Measure resistance between terminals NC0+ and NC0– of the Engine and ECT ECU connector.

OK:

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

OK	Check and replace the Engine and ECT ECU (See page IN–34).

NG

Repair or replace the harness or connector (See page IN–34).

DI87R–02

DTC	P0750	Shift Solenoid ”A” Malfunction (No. 1 Solenoid Valve)

DTC	P0755	Shift Solenoid ”B” Malfunction (No. 2 Solenoid Valve)

DTC	P0760	Shift Solenoid ”C” Malfunction (No. 3 Solenoid Valve)

SYSTEM DESCRIPTION

The Engine and ECT ECU uses signals from the vehicle speed sensor and input/turbine speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear). The Engine and ECT ECU then compares the actual gear with the shift schedule in the Engine and ECT ECU memory to detect mechanical trouble of the solenoid valves, valve body and automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755 P0760	During normal driving, the gear required by the Engine & ECT ECU does not match the actual gear (2–trip detection logic)	• No. 1/No. 2/No. 3 solenoid valve is stuck open or closed • Valve body is blocked up or stuck • Automatic transmission assembly

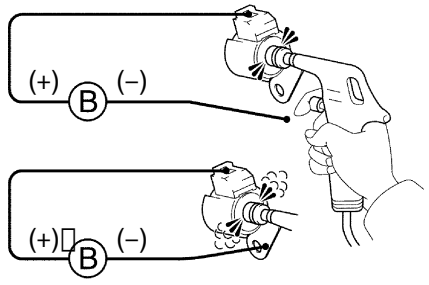
HINT:

Check the No. 1 solenoid valve when DTC P0750 is output, check No. 2 solenoid valve when DTC P0755 is output and check the No. 3 solenoid valve when DTC P0760 is output.

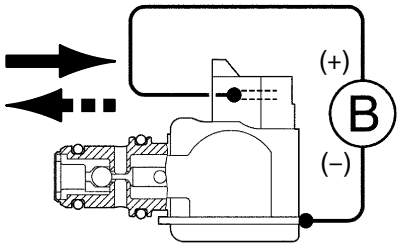
INSPECTION PROCEDURE

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

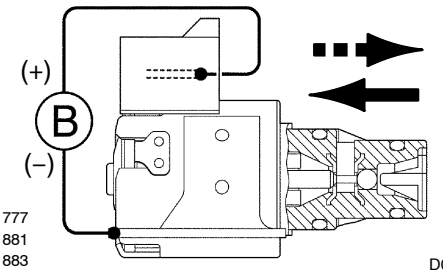
Shift Solenoid Valve No. 2



Shift Solenoid Valve No. 1



Shift Solenoid Valve No. 3



D01777
D01881
D01883
D02230

PREPARATION:

(a) Remove the oil pan.

(b) Remove the No. 1, No. 2 or No. 3 solenoid valve (See page AT–14).

CHECK:

No. 2 solenoid valve:

(a) Applying 490 kPa (5 kgf/cm², 71 psi) of compressed air, check that the solenoid valves do not leak air.

(b) When battery positive voltage is supplied to the shift solenoid valves, check that the solenoid valves are open.

No. 1 and No. 3 solenoid valve:

Connect the positive (+) lead with 3 – 10 W bulb to terminal 2 and the negative (–) lead to terminal 1, then check the movement of the valve.

OK:

When B^+ is applied.	Valve moves in ◀ direction in illustration on the left.
When B^+ is cut off.	Valve moves in ■■■▶ direction in illustration on the left.

NG → Replace the No. 1, No. 2 or No. 3 solenoid valve (See page AT–14).

OK

2	Check valve body (See page DI–190).

NG → Replace the valve body (See page AT–144).

OK

Replace the transmission (See page AT–33).

DI9HC–01

DTC	P0753/62	Shift Solenoid A Electrical Malfunction (No. 1 Solenoid Valve)

DTC	P0758/63	Shift Solenoid B Electrical Malfunction (No. 2 Solenoid Valve)

DTC	P0763/76	Shift Solenoid C Electrical Malfunction (No. 3 Solenoid Valve)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ON and OFF of the No. 1, No. 2 and No. 3 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).

HINT:

Check the No. 1 solenoid valve when DTC P0753/62 is output, check the No. 2 solenoid valve when DTC P0758/63 is output and check the No. 3 solenoid valve when DTC P0763/76 is output.

DTC No.	DTC Detecting Condition	Trouble Area
P0753/62 P0758/63 P0763/76	The Engine and ECT ECU checks for an open or short circuit in the No. 1, No. 2 or No. 3 solenoid valve circuit when it changes. The Engine and ECT ECU records DTC P0753/62, P0758/63 or P0763/76 if condition (a) or (b) is detected once, but it does not light up CHK ENG. After Engine and ECT ECU detects condition (a) or (b) continuously 8 times or more in 1 trip, it causes the CHK ENG lights 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 CHK ENG 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/No. 3 solenoid valve circuit • No. 1/No. 2/No. 3 solenoid valve • Engine and ECT ECU

Fail Safe Function:

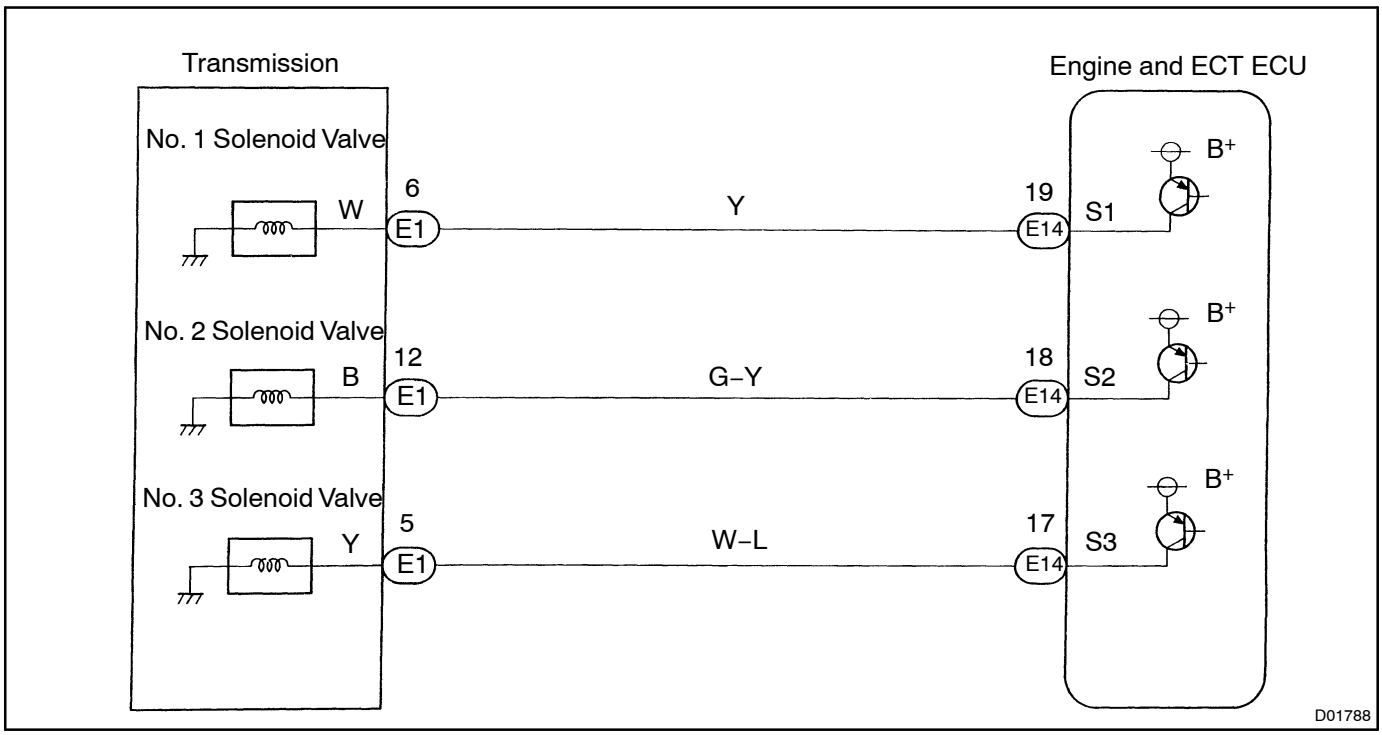
If either of the shift solenoid valve circuits develops an open or short, the Engine and ECT ECU turns the other solenoid valve ON and OFF to shift to the gear positions shown in the table below. The Engine and ECT ECU also turns the SLU solenoid valve OFF at the same time. If both solenoids are malfunctioning,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

Manual shifting as shown in the 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).

Range	Normal				No. 1 Solenoid Valve Malfunction				No. 2 Solenoid Valve Malfunction				No. 3 Solenoid Valve Malfunction			
	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
	No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	
D	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
	OFF	OFF	OFF	5	X	OFF	OFF	5	OFF	X	OFF	5	OFF	OFF	X	5
4	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
3	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	4→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	4
2	ON	OFF	ON	1	X	OFF→ON	ON	3	ON	X	ON	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	3	OFF	ON	X	3
L	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	3	ON	X	OFF	1	ON	OFF	X	1

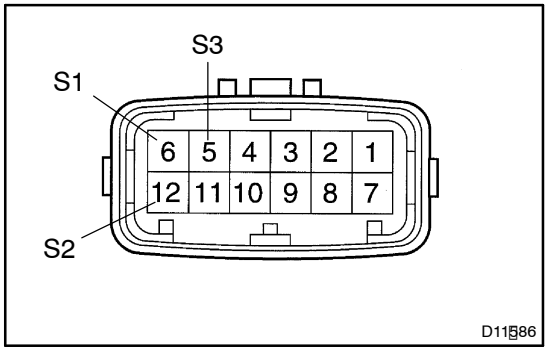
Range	No. 1 and No. 2 Solenoid Valve Malfunction				No. 1 and No. 3 Solenoid Valve Malfunction				No. 2 and No. 3 Solenoid Valve Malfunction				No. 1, No. 2 and No. 3 Solenoid Valve Malfunction			
	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
	No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	
D	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
	X	X	OFF	5	X	OFF	X	5	OFF	X	X	5	X	X	X	5
4	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
3	X	X	OFF→ON	4	X	OFF→ON	X	4→3	ON	X	X	1	X	X	X	4
	X	X	ON	4	X	ON	X	3	OFF	X	X	4	X	X	X	4
	X	X	ON	4	X	OFF	X	4	OFF	X	X	4	X	X	X	4
2	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3
	X	X	ON	3	X	ON	X	3	OFF	X	X	3	X	X	X	3
L	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

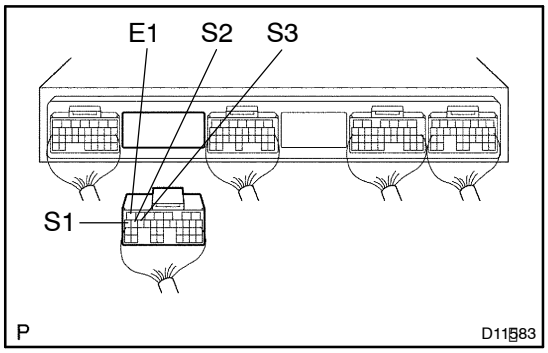


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S1, S2 or S3 of transmission wire and body ground.
OK:
Resistance: 11 – 15 Ω at 20°C (68°F)

NG → Go to step 3.

OK

2	Measure resistance between terminal S1, S2 or S3 of Engine and ECT ECU and body ground.



PREPARATION:
(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector from Engine and ECT ECU.
CHECK:
Measure resistance between terminal S1, S2 or S3 and E1 of Engine and ECT ECU.
OK:
Resistance: 11 – 15 Ω at 20°C (68°F)

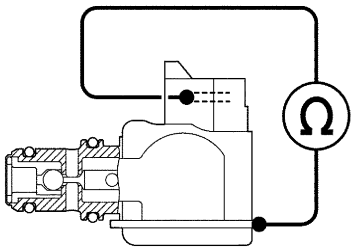
OK → Check and replace the Engine and ECT ECU (See page IN–34).

NG

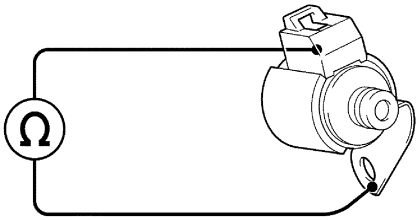
Repair or replace the harness or connector (See page IN–34).

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

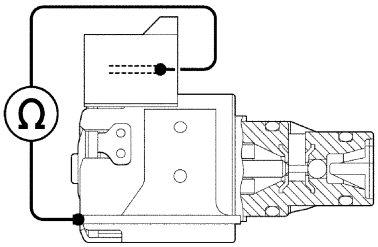
Shift Solenoid Valve No. 1



Shift Solenoid Valve No. 2



Shift Solenoid Valve No. 3



D01882
D01890
D01884

D02236

PREPARATION:

Remove the No. 1, No. 2 or No. 3 solenoid valve (See page AT–144).

CHECK:

(a) Measure resistance between solenoid connector and body ground.

(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

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

(b) The solenoid makes an operating noise.

NG → **Replace the solenoid valve (See page AT–144).**

OK

Repair or replace the transmission wire (See page AT–9).

DI2LC–05

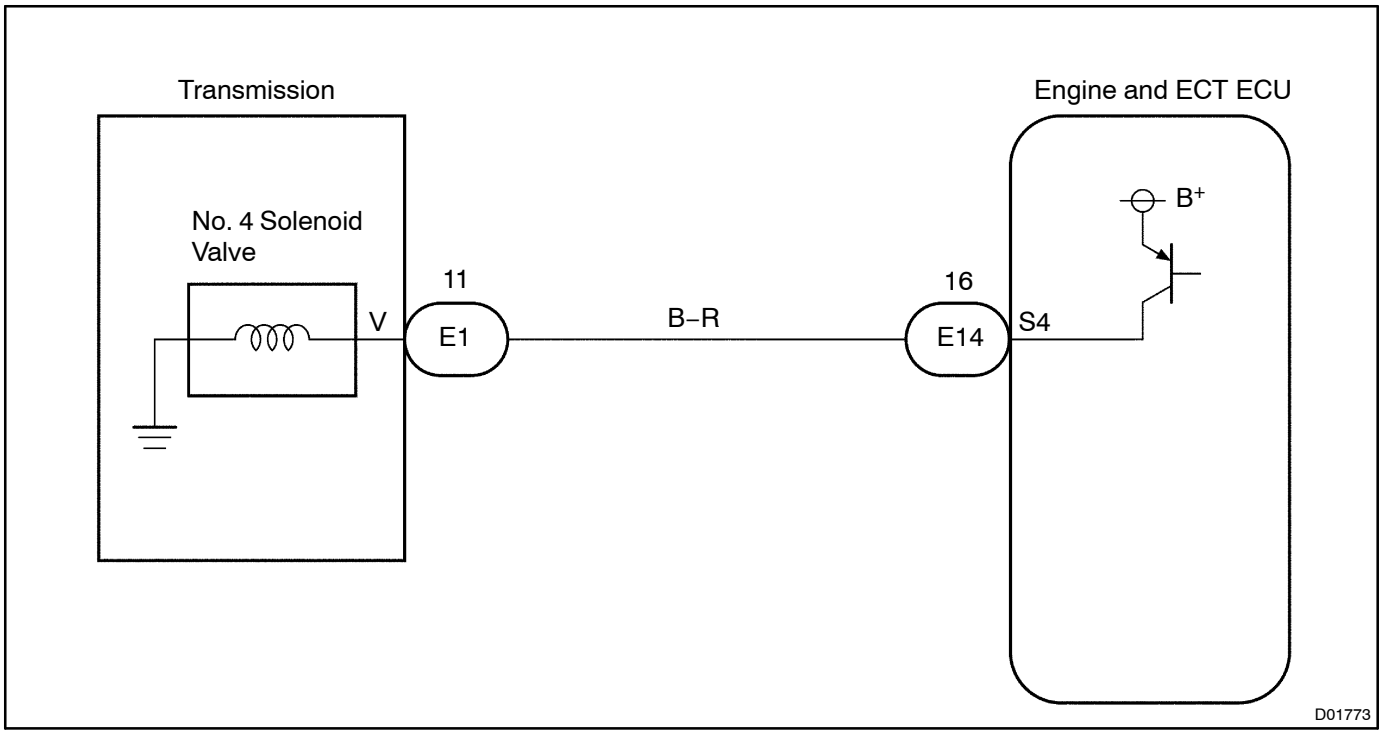
DTC	P0768/65	Shift Solenoid D Electrical Malfunction (No. 4 Solenoid Valve)

CIRCUIT DESCRIPTION

No. 4 solenoid valve is controlled by Engine and ECT ECU and it switches ON and OFF of the O/D direct switch.

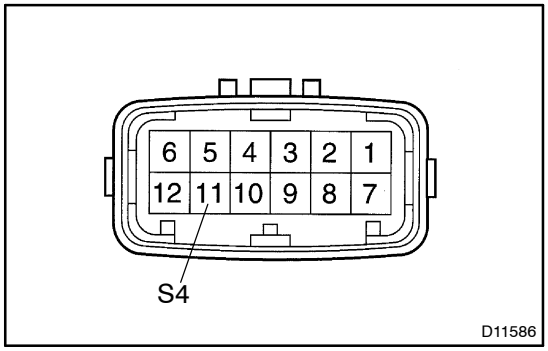
DTC No.	DTC Detecting Condition	Trouble Area
P0768/65	The Engine and ECT ECU checks for an open or short circuit in the No. 4 solenoid valve circuit when it changes. The Engine and ECT ECU records DTC P0768/65 if condition (a) or (b) is detected once, but it does not light up CHK ENG. After Engine and ECT ECU detects condition (a) or (b) continuously 8 times or more in 1 trip, it causes the CHK ENG lights 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 CHK ENG 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. 4 solenoid valve circuit • No. 4 solenoid valve • Engine and ECT ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

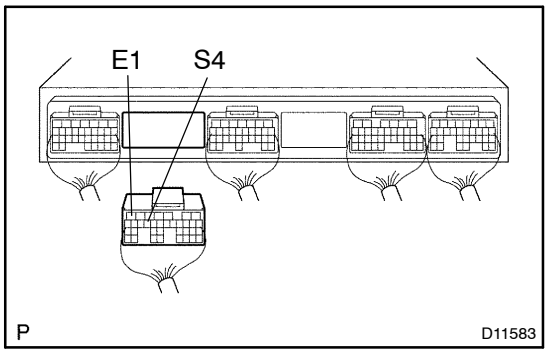


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S4 of transmission wire and body ground.
OK:
Resistance: 11 – 15 Ω at 20°C (68°F)

OK	Go to step 3.

NG

2	Measure resistance between terminals S4 of Engine and ECT ECU and body ground.



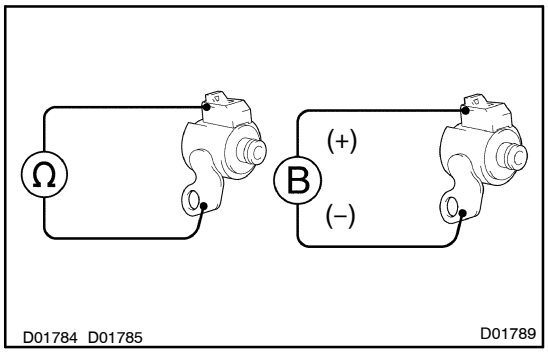
PREPARATION:
(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector from Engine and ECT ECU.
CHECK:
Measure resistance between terminals S4 and E1 of Engine and ECT ECU.
OK:
Resistance: 11 – 15 Ω at 20°C (68°F)

OK	Check and replace the Engine and ECT ECU (See page IN–34).

NG

Repair or replace the harness or connector (See page IN–34).

3	Check No. 4 solenoid valve.



PREPARATION:

Remove the No. 4 solenoid valve (See page AT–14).

CHECK:

(a) Measure resistance between terminal and solenoid body.

(b) Connect positive (+) lead to terminal of solenoid connector and negative (–) lead to solenoid body.

OK:

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

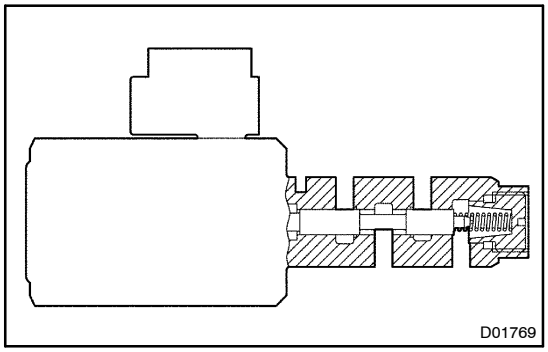
(b) The solenoid makes an operating noise.

NG → **Replace the No. 4 solenoid valve. (See page AT–14).**

OK

Repair or replace the transmission wire (See page AT–9).

DTC	P0770	Shift Solenoid "E" Malfunction (SLU Shift Solenoid Valve)



SYSTEM DESCRIPTION

The Engine and ECT ECU uses the signals from the Throttle Position Sensor and Air–flow Meter 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 SLU solenoid valve, valve body, torque converter and automatic transmission assembly (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)	• SLU solenoid valve is stuck open or closed • Valve body blocked up or stuck • Lock–up clutch • Automatic transmission assembly • Torque converter

INSPECTION PROCEDURE

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

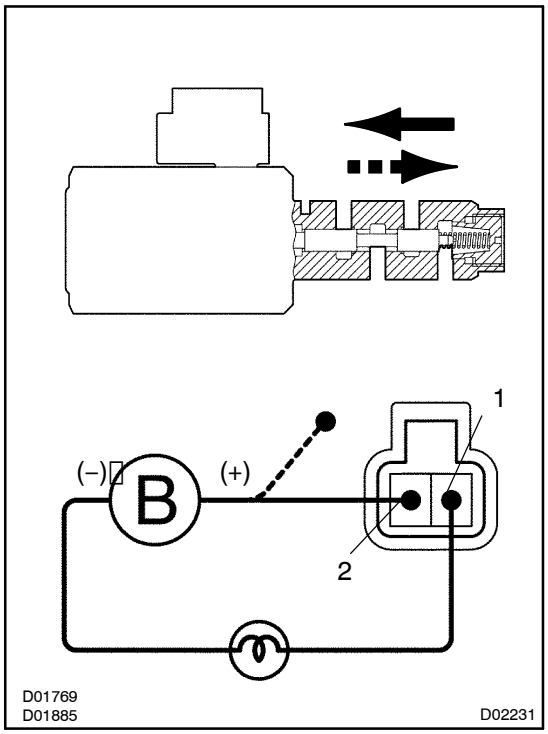
1	Active test.

PREPARATION:
(a) Remove the DLC3 cover.
(b) Connect a hand–held tester.
(c) Turn the ignition switch ON and hand–held tester main switch ON.
CHECK:
Using active test, check the lock–shift operation.
OK:
Lock–up ON

NG → **Replace the torque converter (See page AT–33).**

OK

2	Check SLU solenoid valve operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the SLU solenoid valve.

CHECK:

Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1.

OK:

When B^+ is applied.	Valve moves in → direction in illustration on the left.
When B^+ is cut off.	Valve moves in ← direction in illustration on the left.

NG → **Replace the SLU solenoid valve (See page AT–14).**

OK

3	Check valve body (See page DI–190).

NG → **Replace the valve body (See page AT–14).**

OK

Replace the torque converter (See page AT–33).

DI25S–05

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 depressed, this switch sends a signal 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	The stop light switch does not turn off even once the vehicle is driven. (2–trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • Engine and ECT ECU

WIRING DIAGRAM

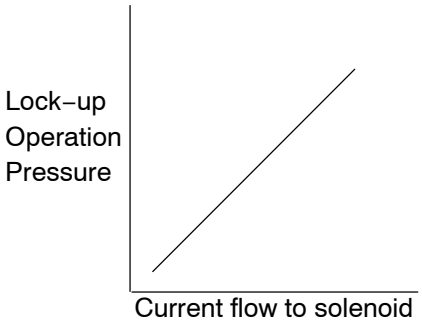
See page DI–218.

INSPECTION PROCEDURE

See page DI–218.

DI9HE–01

DTC	P1755/68	Linear Solenoid for Lock–up Control Circuit Malfunction (SLU Solenoid Valve)

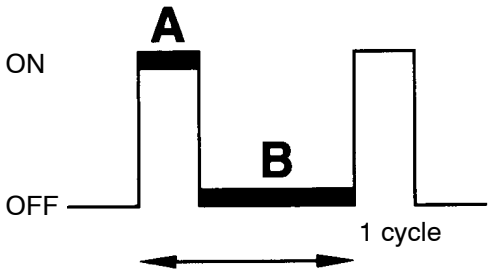


CIRCUIT DESCRIPTION

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

(*) Duty Ratio

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



BE4056

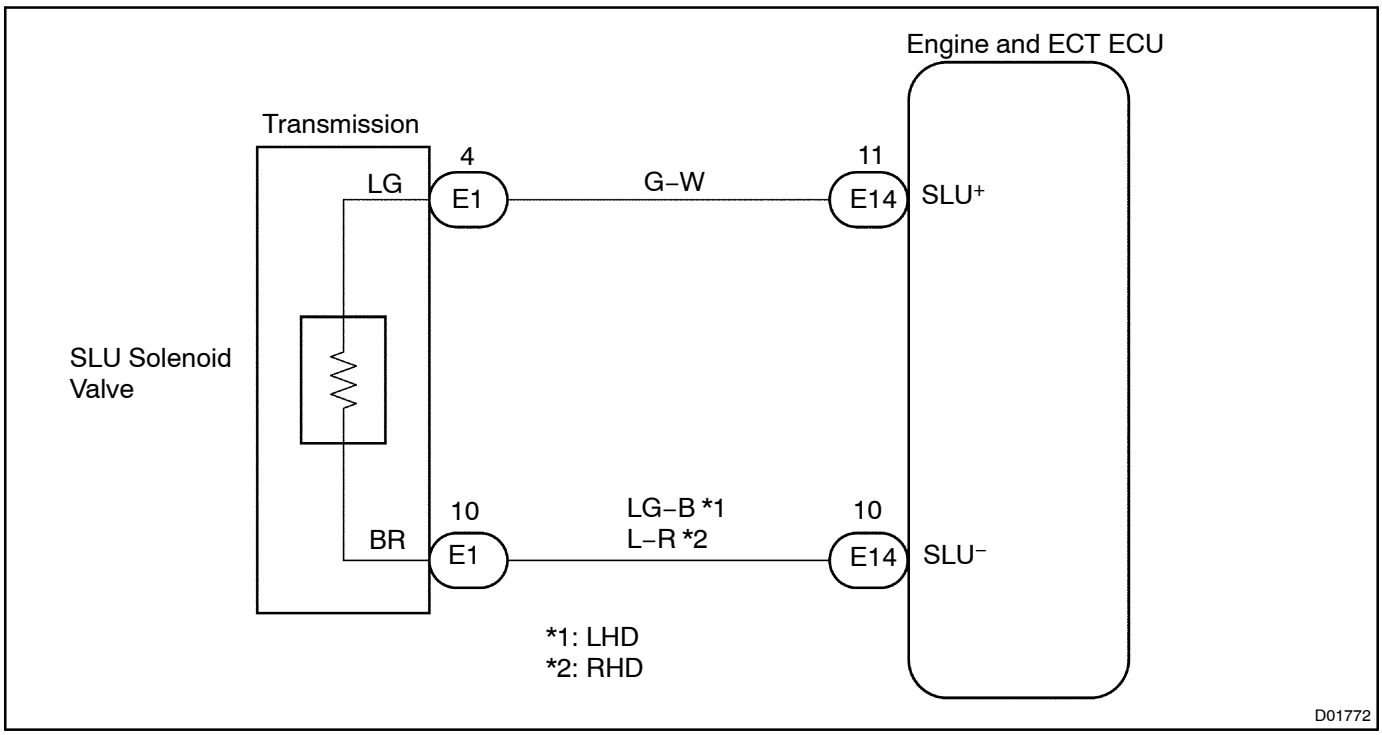
(*)

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

D00160

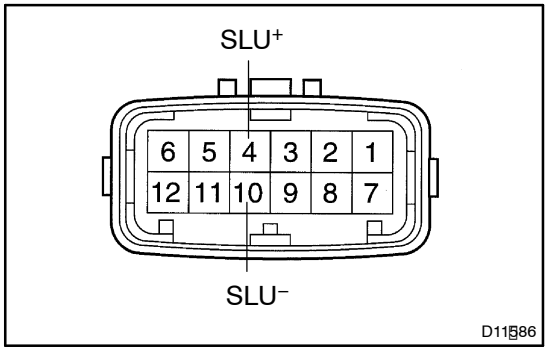
DTC No.	DTC detection condition	Trouble Area
P1755/68	The following condition is detected. (2–trip detection logic) Signal output from SLU is ON for 3.3 msecs. or more and duty ratio is at least 95 % for 1 second.	• Open or short in SLU solenoid valve circuit • SLU solenoid valve • Engine and ECT ECU • Automatic transmission assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

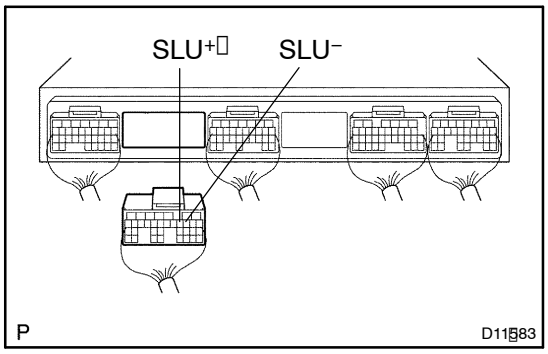


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLU+ and SLU– of transmission wire.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG	Go to step 3.

OK

2	Measure resistance between terminal SLU+ and SLU– of Engine and ECT ECU connector.



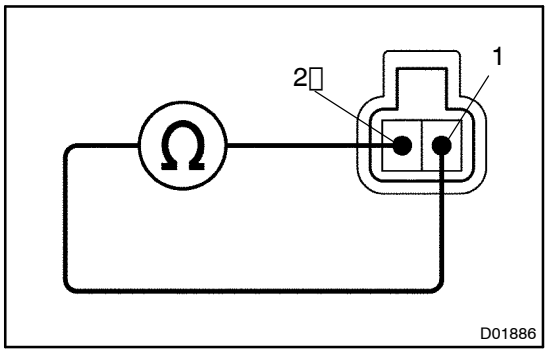
PREPARATION:
(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector of the Engine and ECT ECU.
CHECK:
Measure resistance between terminals SLU+ and SLU– of Engine and ECT ECU connector.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG	Repair or replace the harness or connector (See page IN–34).

OK

Check and replace the Engine and ECT ECU (See page IN–34).

3	Check SLU solenoid valve.



PREPARATION:

(a) Remove the oil pan.

(b) Disconnect the solenoid valve connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

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

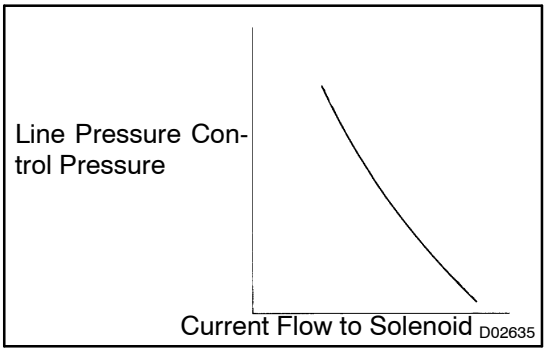
NG → **Replace the SLU solenoid valve (See page AT–144).**

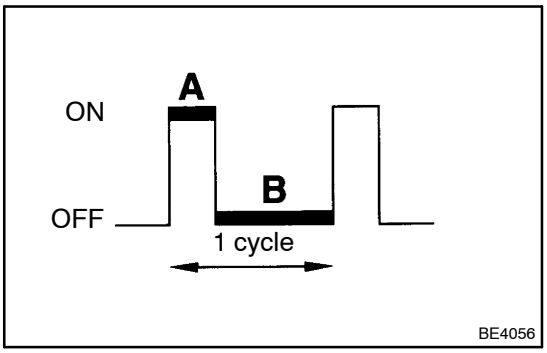
OK

Repair or replace the transmission wire (See page AT–9).

DI9HF–01

DTC	P1760/77	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT Solenoid Valve)



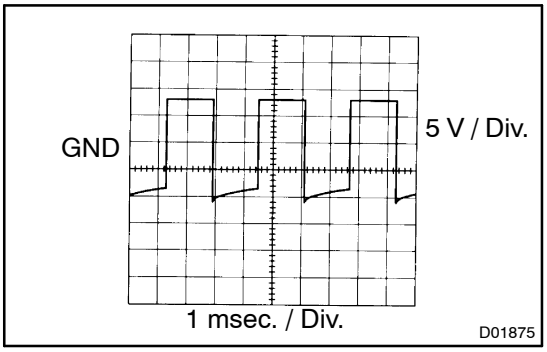


CIRCUIT DESCRIPTION

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

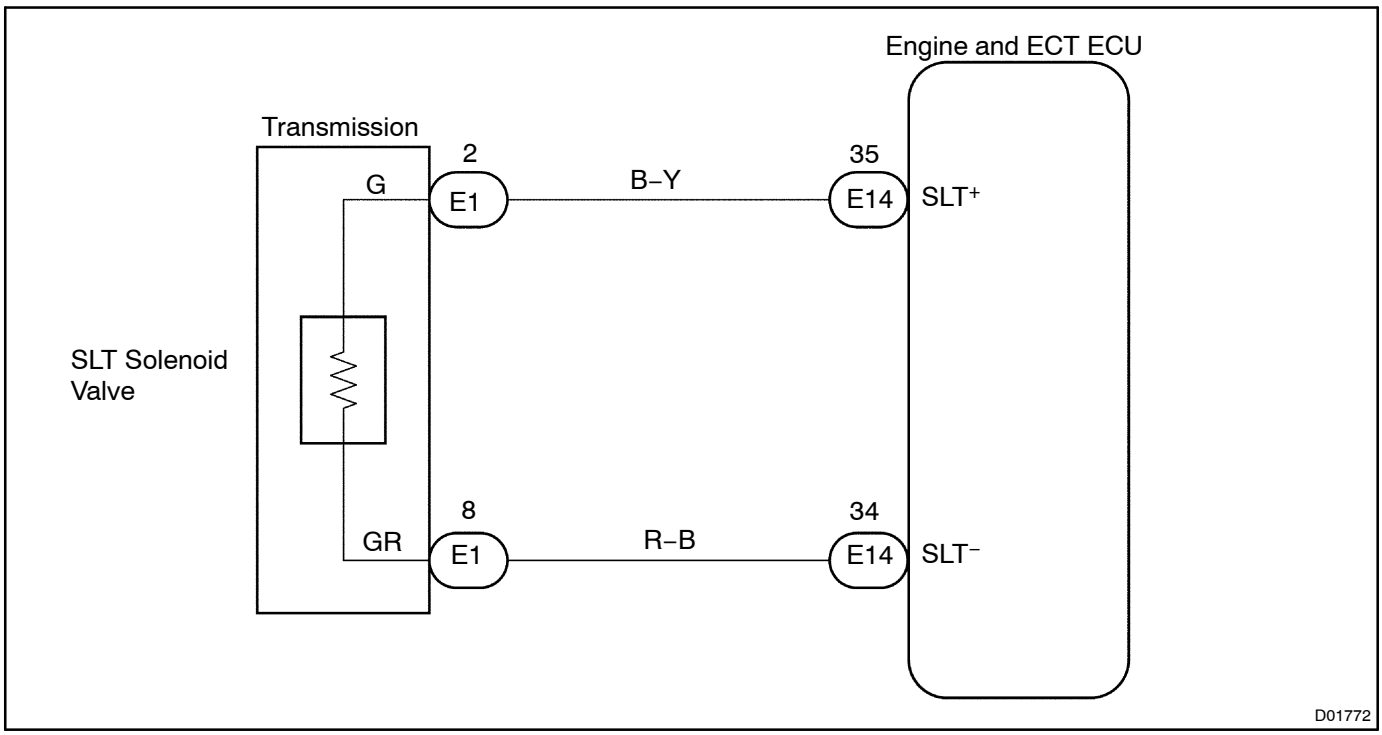
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760/77	(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



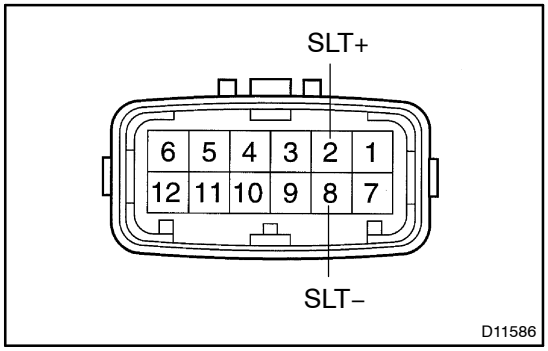
Reference:
Refer to the chart for the wave form between terminals SLT+ and SLT⁻during engine idling.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

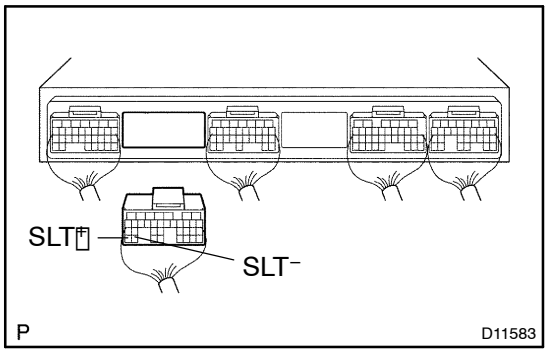


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLT+ and SLT– of transmission wire.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminals SLT+ and SLT– of Engine and ECT ECU connector.



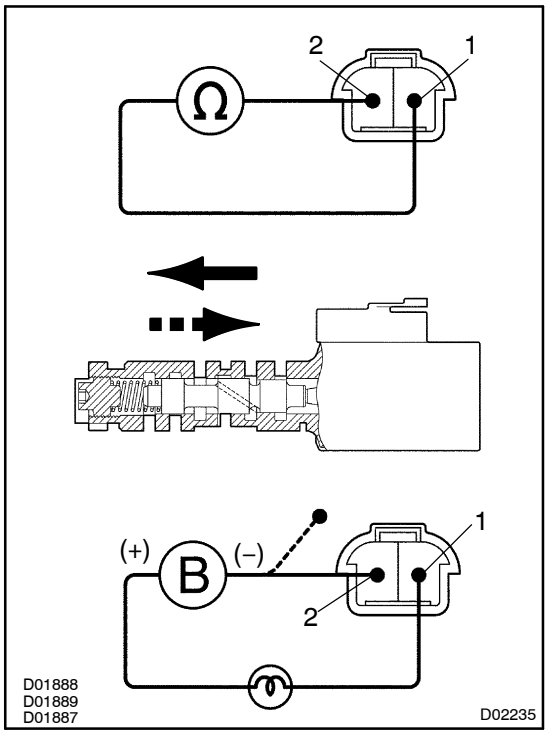
PREPARATION:
(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector of the Engine and ECT ECU.
CHECK:
Measure resistance between terminals SLT+ and SLT– of Engine and ECT ECU connector.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG → **Repair or replace the harness or connector (See page IN–34).**

OK

Check and replace the Engine and ECT ECU (See page IN–34).

3	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 positive voltage is applied.	Valve moves in ← direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in ■ ■ → direction in the illustration on the left.

NG → **Replace the SLT solenoid valve (See page AT–144).**

OK

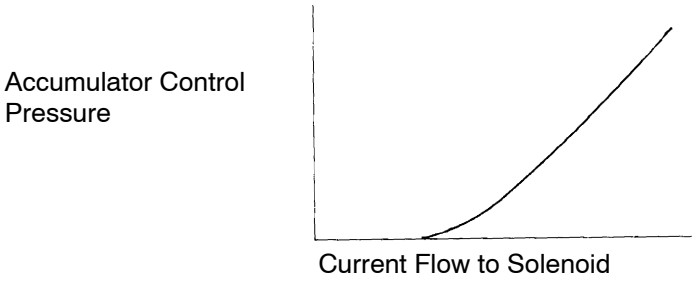
Repair or replace the transmission wire (See page AT–9).

DI9HG–01

DTC	P1765/46	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (SLN Solenoid)

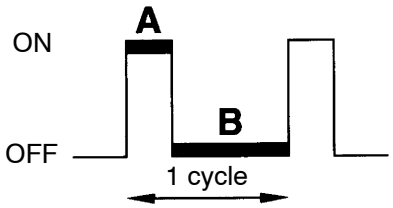
CIRCUIT DESCRIPTION

The SLN solenoid valve controls the hydraulic pressure acting on the accumulator control valve when gears are shifted and performs smooth gear shifting. The Engine and ECT ECU determines optimum operating pressure according to the signals from the throttle position sensor, vehicle speed sensor and O/D direct clutch speed sensor and controls the volume of current flow to the solenoid valve. The amount of current to the solenoid is controlled by the (*) duty ratio of Engine and ECT ECU output signals, causing a momentary charge to the hydraulic pressure acting on the clutches during gear shifting.
When the duty ratio is high, the hydraulic pressure acting on the clutches is low.



D02636

(*) 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

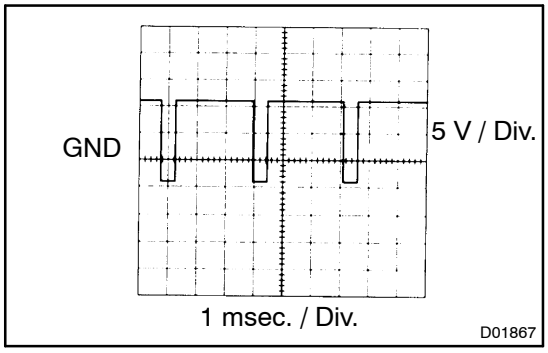


$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

BE4056

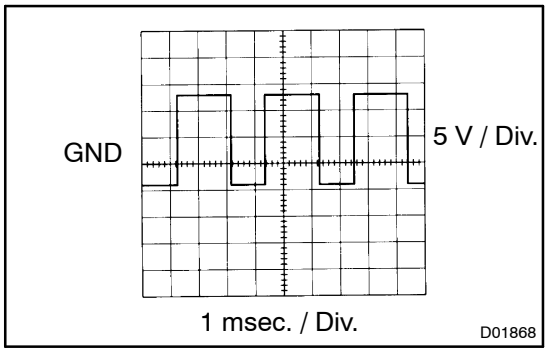
D02292

DTC No	DTC Detecting Condition	Trouble Area
P1765/46	All conditions below are detected for 1 second or more. (2–trip detection logic) (a) Engine and ECT ECU outputs duty signal to SLN solenoid valve at 90 % or higher duty ratio (b) Current to shift solenoid valve SLN: 230 ~ 430 mA or less	• Open or short in SLN solenoid valve circuit • SLN solenoid valve • Engine and ECT ECU



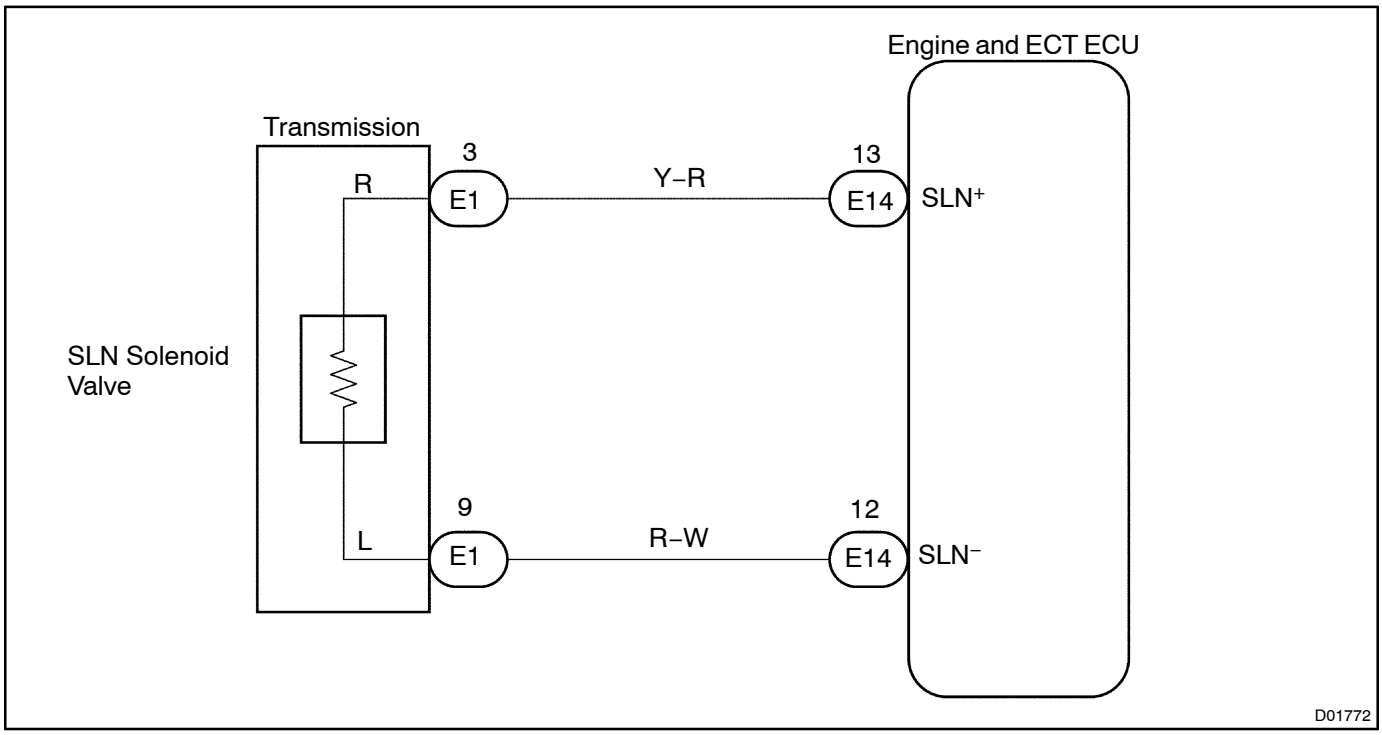
Reference:

- Refer to the chart for the wave form between terminals SLN– and E1 when engine is idling.



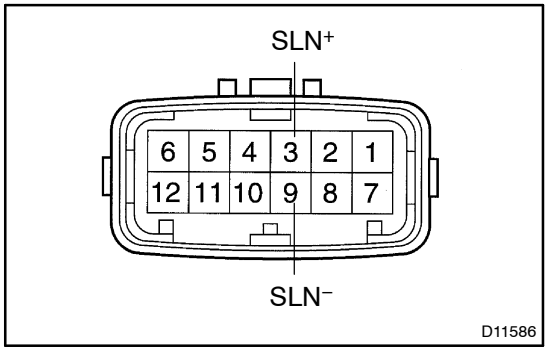
- Refer to the chart for the wave form between terminals SLN– and E1 during shift change.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

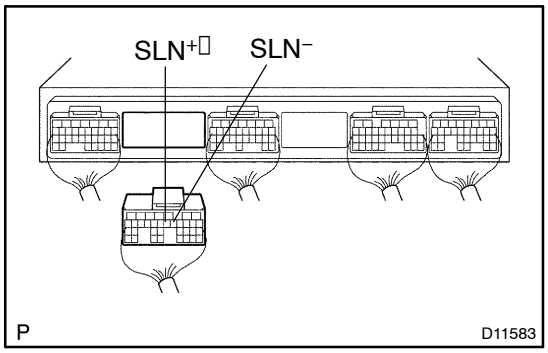


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLN+ and SLN– of transmission wire.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminals SLN+ and SLN– of Engine and ECT ECU connector.



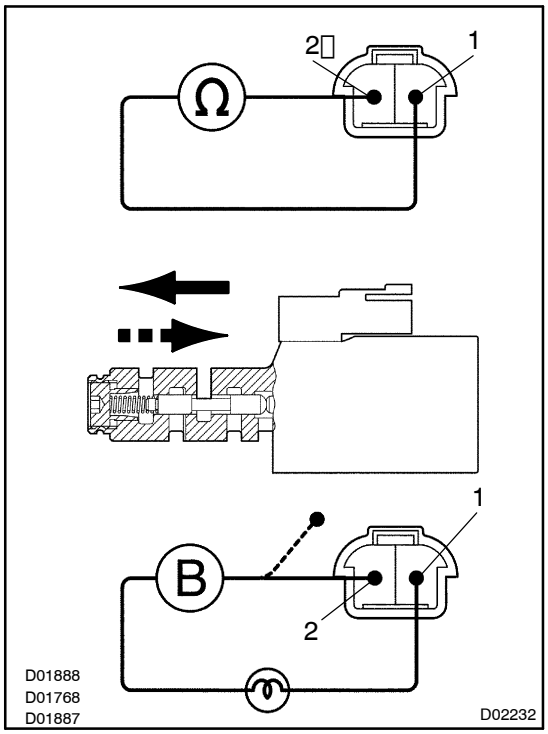
PREPARATION:
(a) Remove the Engine and ECT ECU hood.
(b) Disconnect the connector of the Engine and ECT ECU.
CHECK:
Measure resistance between terminals SLN+ and SLN– of Engine and ECT ECU connector.
OK:
Resistance: 5.0 – 5.6 Ω at 20°C (68°F)

NG → **Repair or replace the harness or connector (See page IN–34).**

OK

Check and replace the Engine and ECT ECU (See page IN–34).

3	Check SLN 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 positive voltage is applied.	Valve moves in ◀ direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in ■■▶ direction in the illustration on the left.

NG → **Replace the SLN solenoid valve (See page AT–144).**

OK

Repair or replace the transmission wire (See page AT–9).

DI9HH–01

DTC	P1780/97	Neutral Start Switch Circuit

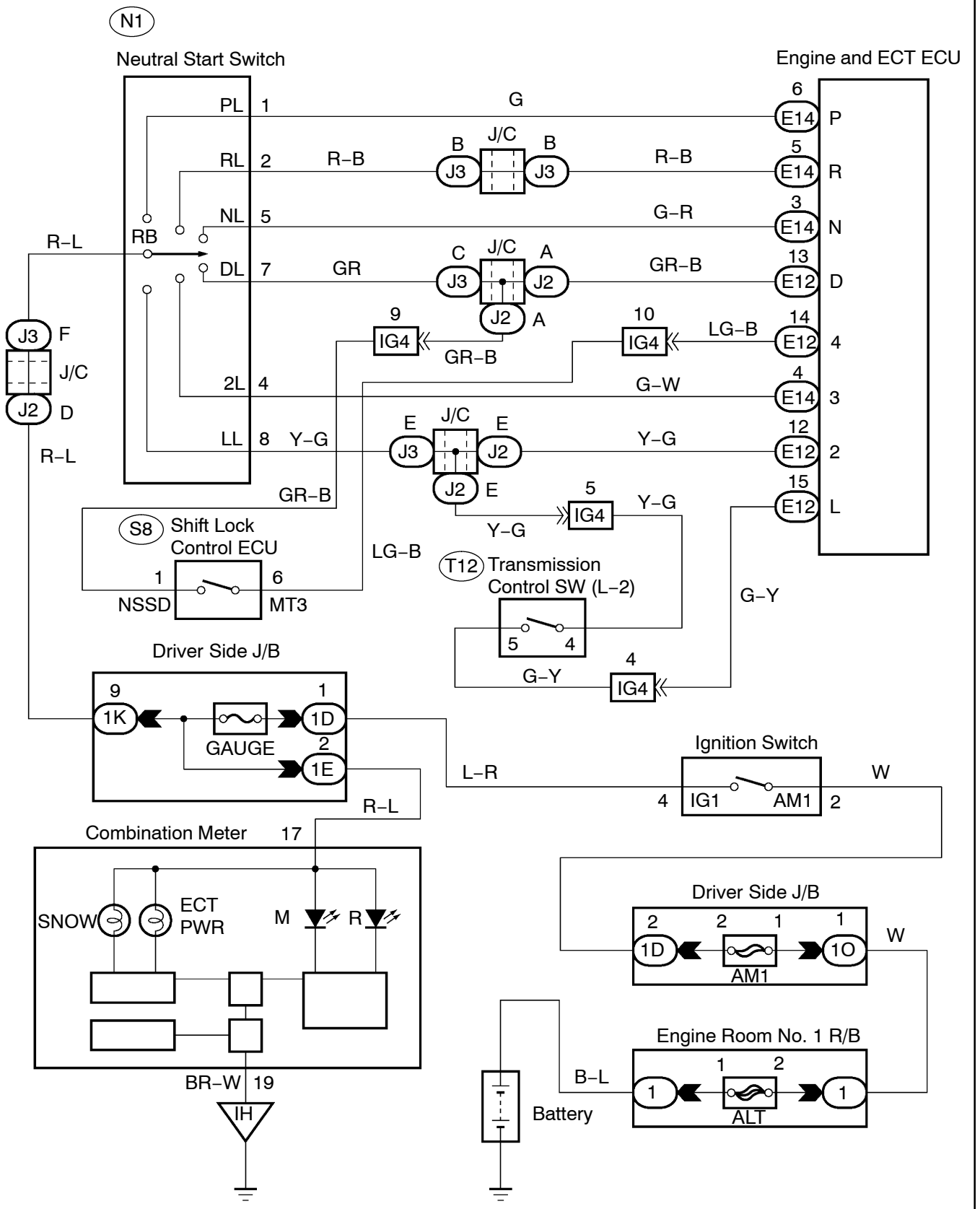
CIRCUIT DESCRIPTION

The neutral start switch detects the shift lever range and sends signals to the Engine and ECT ECU.
The Engine and ECT ECU receives signals (P, R, N, D, 4, 3, 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 D range.

DTC No.	DTC Detection Condition	Trouble Area
P1780/97	2 or more switches are ON simultaneously for P, R, N, D, 4, 3, 2 and L ranges. (2–trip detection logic)	• Short in neutral start switch circuit • Neutral start switch • Engine and ECT ECU
	When driving under conditions (a) and (b) for 30 seconds or more, the neutral start switch is ON (N position). (2–trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 – 2,500 rpm	

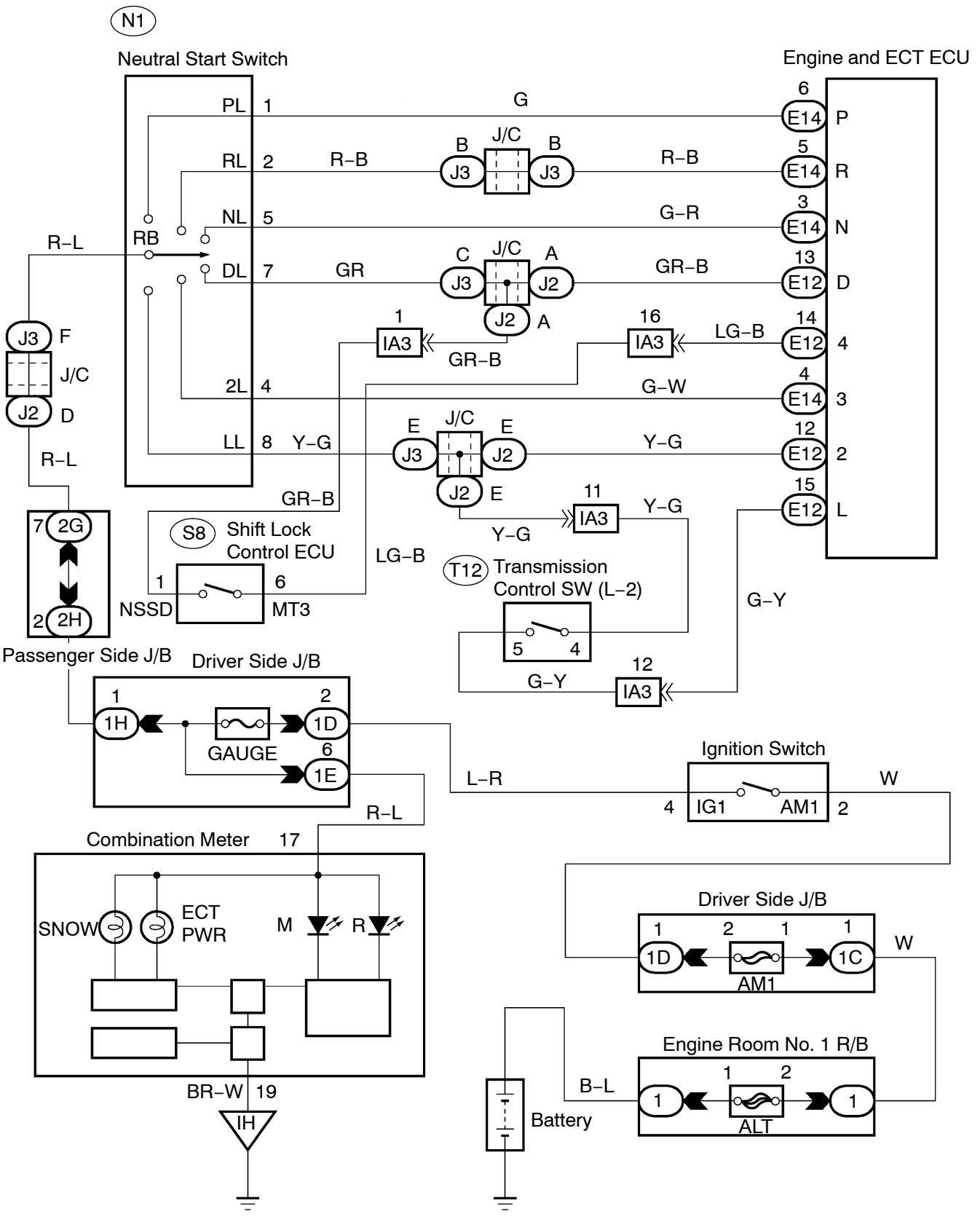
WIRING DIAGRAM

LHD:



D11596

RHD:


N1
Neutral Start Switch
Engine and ECT ECU
PL 1
RL 2
NL 5
DL 7
2L 4
LL 8
RB
R–L
G
R–B
G–R
GR
GR–B
G–W
Y–G
LG–B
J/C
J3
J2
E14
E12
P
R
N
D
4
3
2
L
IA3
S8
Shift Lock Control ECU
NSSD
MT3
T12
Transmission Control SW (L–2)
G–Y
Passenger Side J/B
Driver Side J/B
1H
1D
1E
2G
2H
GAUGE
Ignition Switch
IG1
AM1
W
L–R
Combination Meter
17
SNOW
ECT PWR
M
R
BR–W
19
IH
Battery
B–L
Engine Room No. 1 R/B
ALT
AM1
1C

C

D11711

INSPECTION PROCEDURE

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

1	**Read PNP, REVERSE, DRIVE, 4TH, 3RD, 2ND and LOW signals.**

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, M, 3, 2 and L ranges, and read the PNP, REVERSE, DRIVE, 4TH, 3RD, 2ND and LOW signals on the hand–held tester.

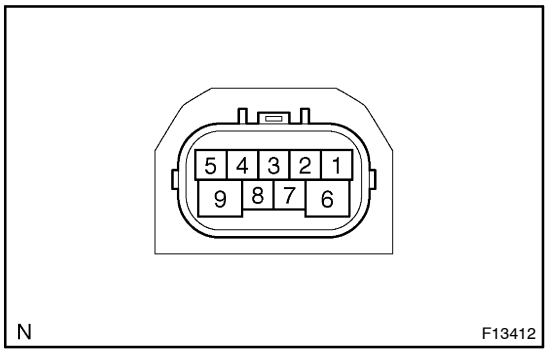
OK:

Shift range	Signal
P, N	PNP: OFF → ON
R	REVERSE: OFF → ON
D	DRIVE: OFF → ON
M	4TH: OFF → ON
3	3RD: OFF → ON
2	2ND: OFF → ON
L	LOW: OFF → ON

NG → **Check the combination meter (See page BE–2).**

OK

2	Check neutral start switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the neutral start switch connector.

CHECK:

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

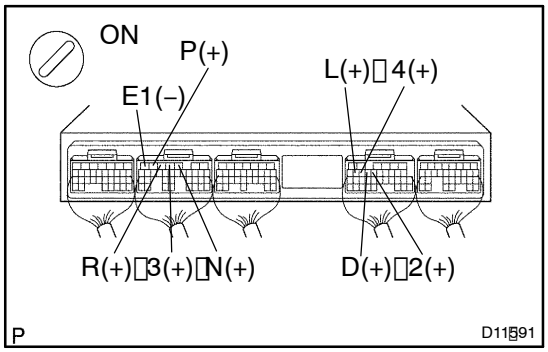
OK:

Shift range	Terminal No. to continuity	Terminal No. to continuity
P	1 – 3	6 – 9
R	2 – 3	–
N	3 – 5	6 – 9
D, M	3 – 7	–
3	3 – 4	–
2, L	3 – 8	–

NG → **Replace the neutral start switch (See page AT–13).**

OK →

3	**Measure voltage between each terminals of P, R, N, D, 4, 3, 2, L and E1 of Engine and ECT ECU.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between each terminals P, R, N, D, 4, 3, 2 and L, E1 of Engine and ECT ECU when the shift lever is shifted to the following ranges.

OK:

Tester connection	Condition	Specified condition
P – Body ground	Shift lever range: P	Battery voltage
R – Body ground	Shift lever range: R	Battery voltage*
N – Body ground	Shift lever range: N	Battery voltage
D – Body ground	Shift lever range: D E-shift main SW (for D and 4) : OFF	Battery voltage
4 – Body ground	Shift lever range: M E-shift main SW (for D and 4) : ON	Battery voltage
3 – Body ground	Shift lever range: 3	Battery voltage
2 – Body ground	Shift lever range: 2 E-shift main SW (for 2 and L) : OFF	Battery voltage
L – Body ground	Shift lever range: L E-shift main SW (for 2 and L) : ON	Battery 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-34).**

NG

Repair or replace the harness or connector (See page IN-34).

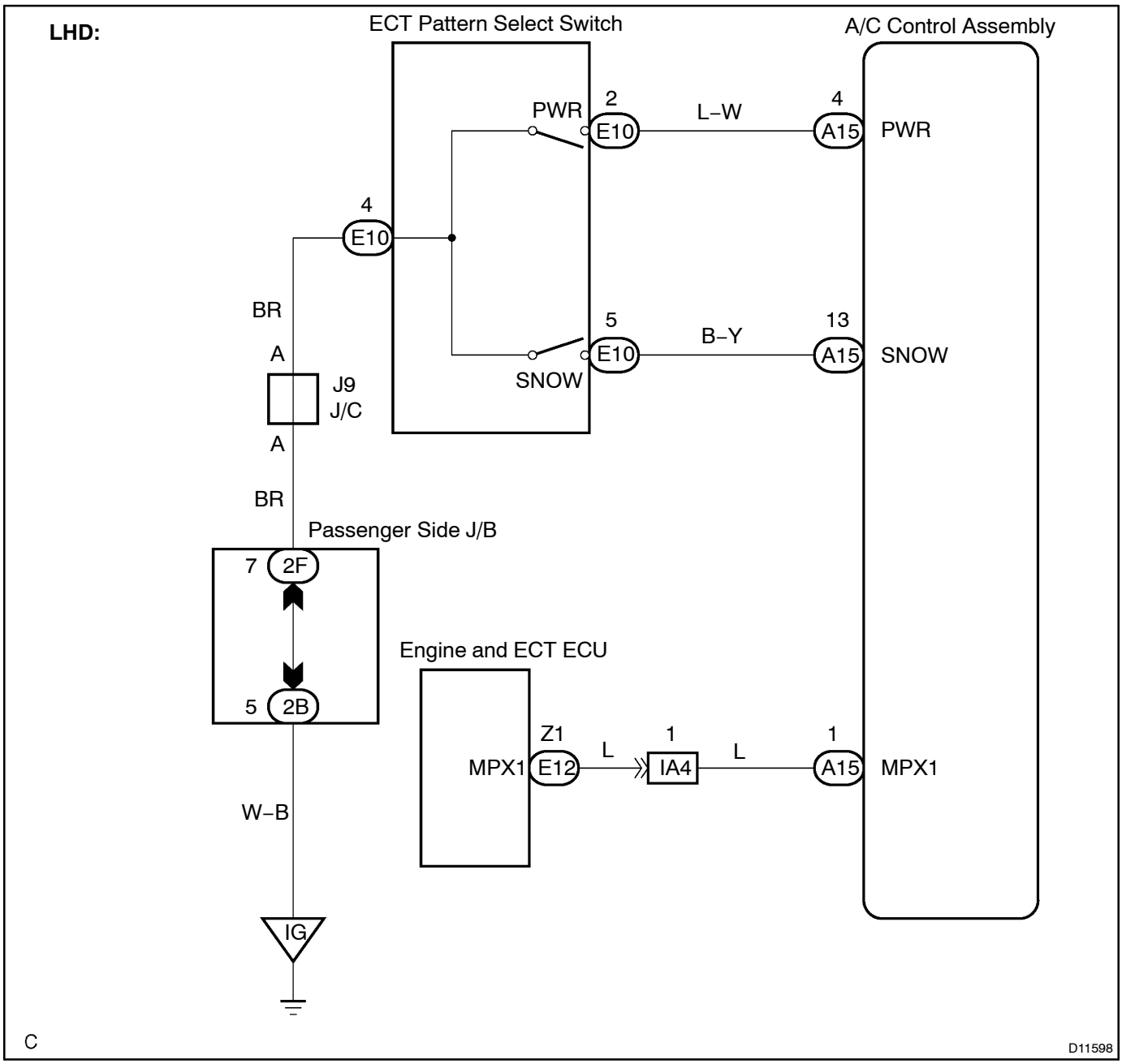
DI9HI–01

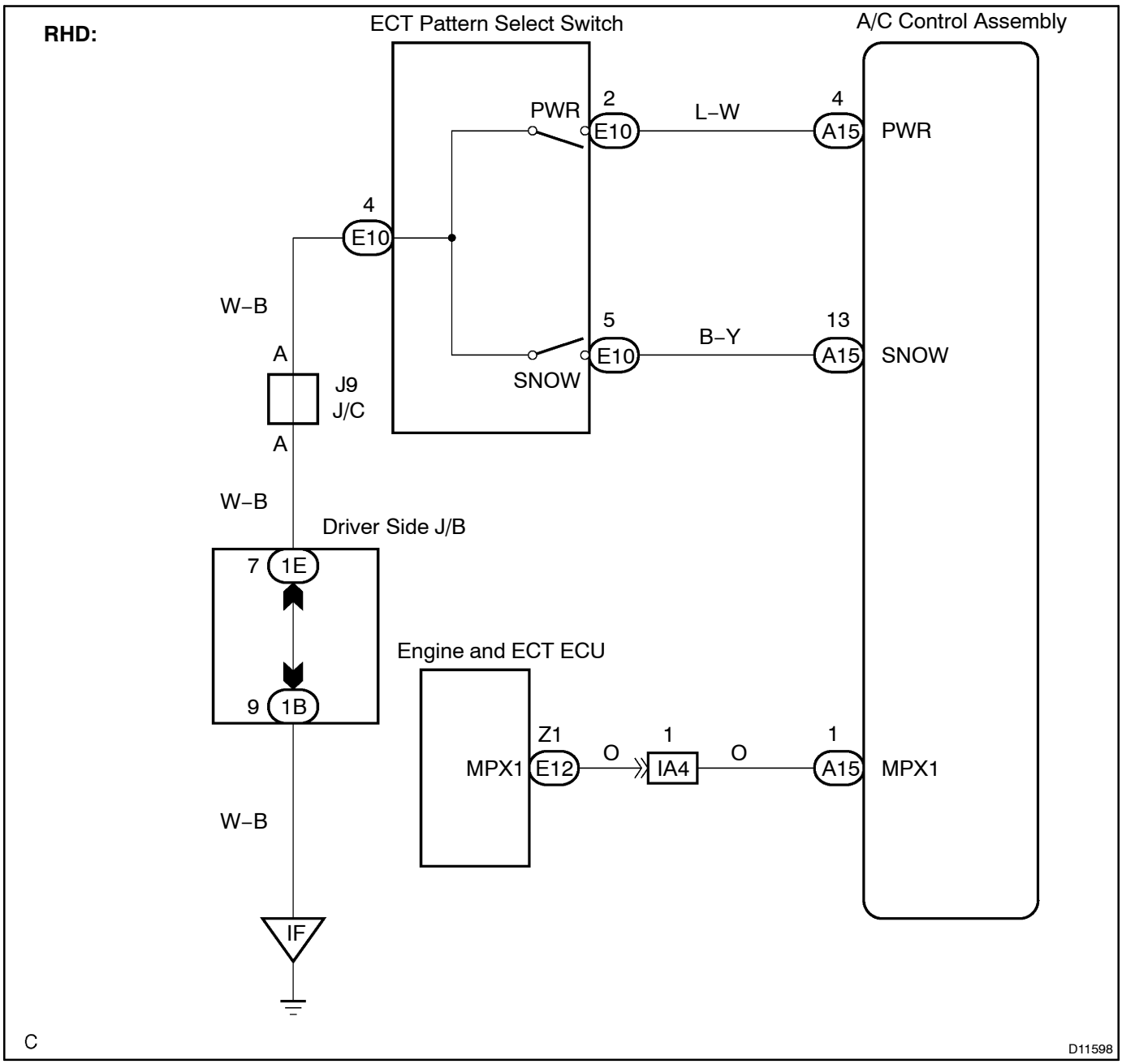
Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

The Engine and ECT ECU memory contains the shift programs for the NORMAL, POWER and SNOW patterns, 2 range, L range and the lock–up patterns. By following the programs corresponding to the signals from the pattern select switch, the nuetral range and other various sensors, the Engine and ECT ECU switchs the solenoid valves ON and OFF, and controls the transmission gear change and the lock–up clutch operation.

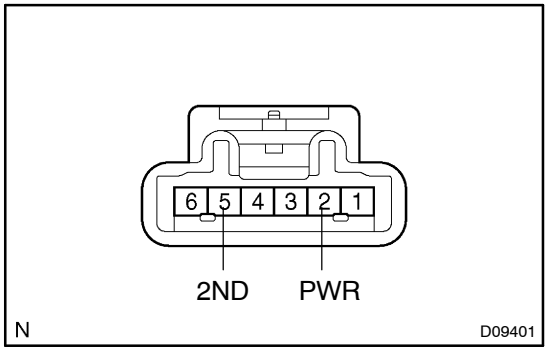
WIRING DIAGRAM




RHD:
ECT Pattern Select Switch
A/C Control Assembly
PWR
2
E10
L–W
4
A15
PWR
4
E10
W–B
5
E10
B–Y
13
A15
SNOW
A
SNOW
J9
J/C
A
W–B
Driver Side J/B
7
1E
9
1B
Engine and ECT ECU
Z1
MPX1
E12
O
1
IA4
O
1
A15
MPX1
W–B
IF
C
D11598

INSPECTION PROCEDURE

1	**Check pattern select switch.**



PREPARATION:

Disconnect the pattern select switch connector.

CHECK:

Check continuity between each terminal of pattern select switch connector when the select switch is set to PWR, NORM and SNOW positions.

OK:

Switch condition	Tester connection	Specified condition
PWR	2 – 3, 2 – 4	Continuity
NORM	3 – 4	No continuity
SNOW	3 – 4, 3 – 5	Continuity

If the continuity is not as specified, replace the switch.

DI7W2–03

E–shift Main Switch Circuit

CIRCUIT DESCRIPTION

When the shift lever is in the M range (with E–shift main switch for D and M pressed), "M" in the shift position indicator light will come on and when the shift lever is in the D range (with E–shift main switch for D and M released), "D" in the shift position indicator light will come on.
When the shift lever is in the L range (with E–shift main switch for 2 and L pressed), "L" in the shift position indicator light will come on and when the shift lever is in the 2 range (with E–shift main switch for 2 and L released), "2" in the shift position indicator light will come on.
When the shift lever is in M range, the Engine and ECT ECU prohibits shifting to 5th.

WIRING DIAGRAM

See page DI–231.

INSPECTION PROCEDURE

1	**Check operation of E–shift main switch.**

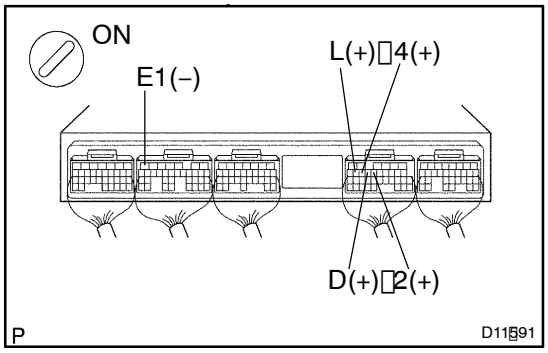
PREPARATION:
Turn the ignition switch ON.
CHECK:
Check the shift indicator light when the shift lever is in the each range.
OK:

Shift Lever Range	Specified Condition
D	"D" indicator light comes on
Except D	"D" indicator light goes off
M	"M" indicator light comes on
Except M	"M" indicator light goes off
2	"2" indicator light comes on
Except 2	"2" indicator light goes off
L	"L" indicator light comes on
Except L	"L" indicator light goes off

NG → **Check the combination meter (See page BE–2).**

OK

2	**Check voltage between each terminals of D, 4, 2, L and E1 of Engine and ECT ECU and body ground.**



PREPARATION:

Remove the Engine and ECT ECU with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Check voltage between each of terminals of D, 4, 2, L, and E1 of Engine and ECT ECU.

OK:

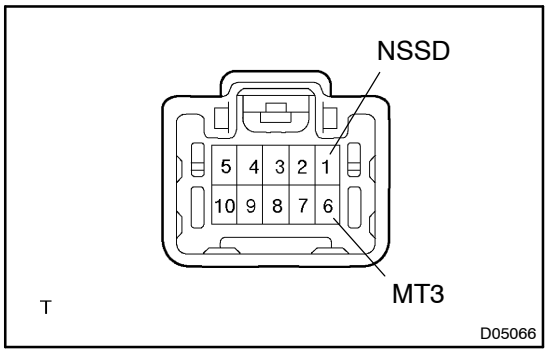
Tester connection	Shift lever range	Specified condition
D – Body ground	D or M	7.5 – 14 V
	Except D and M	Below 1.5 V
4 – Body ground	M	7.5 – 14 V
	Except M	Below 1.5 V
2 – Body ground	2 or L	7.5 – 14 V
	Except 2 and L	Below 1.5 V
L – Body ground	L	7.5 – 14 V
	Except L	Below 1.5 V

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI–190).

NG

3	**Check E–shift main switch.**



PREPARATION:

Disconnect the shift lock control computer connector and E–shift main switch connector.

CHECK:

Check continuity between each terminal of shift lock control computer and E–shift main switch.

OK:

Shift range	Tester connection	Specified valve
P	1 – 6 (NSSD – MT3)	No continuity
M		Continuity
2	4 – 5 (NSSL – MTL)	No continuity
L		Continuity

NG → **Replace the E–shift main switch (See page AT–24).**

OK →

Repair or replace the harness or connector (See page IN–34).

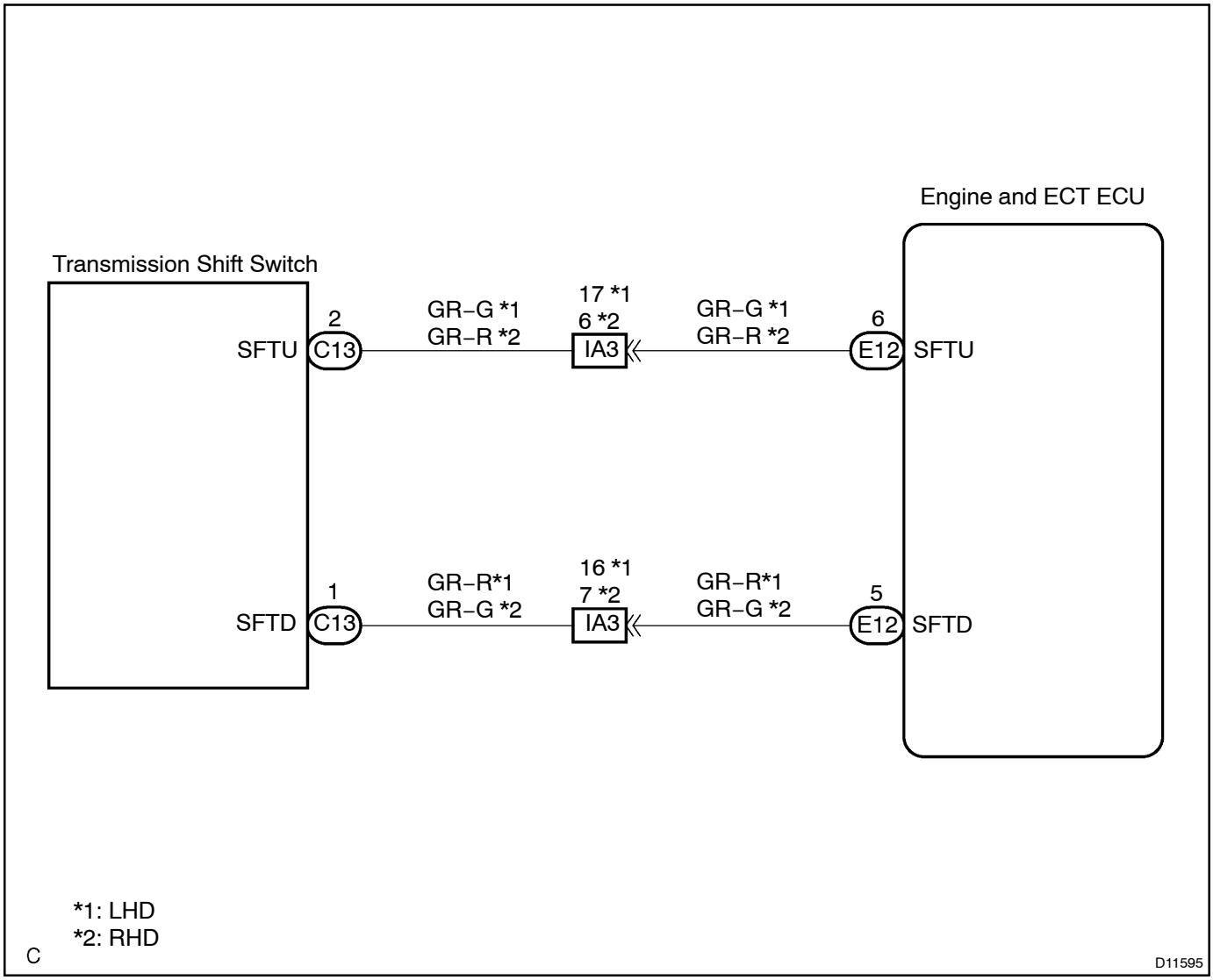
DI25Z–06

Transmission Shift Switch Circuit

CIRCUIT DESCRIPTION

When shifting the shift lever in M range, using the transmission shift switch, it is possible to shift in 2 – 5 ranges.
Pressing ”Up switch” once shifts up 1 range, ”Down switch” once shifts down 1 range respectively.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check the E–shift main switch (See page DI–240).

NG → Replace the E–shift main switch (See page AT–24).

OK

2	Check operation of transmission shift switch.

PREPARATION:

(a) Turn the ignition switch ON.

(b) Shift the shift lever into the M range.

CHECK:

Check the odo/trip display panel when the transmission shift switch is pressed.

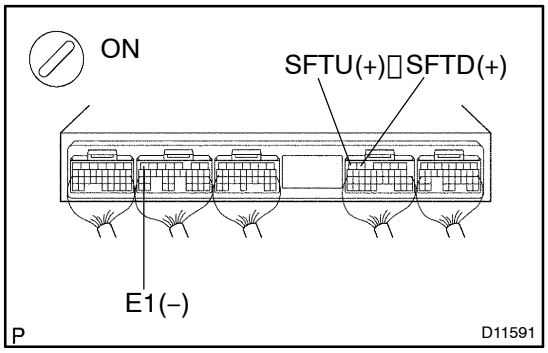
OK:

Switch condition	Odo/trip display panel
"Up" switch press	Shift up
"Down" switch press	Shift down

OK → Check and replace the Engine and ECT ECU (See page IN–34).

NG

3	**Check voltage between each of terminals SFTU, SFTD and E1 of Engine and ECT ECU.**



PREPARATION:

(a) Turn ignition switch ON.

(b) Remove the Engine and ECT ECU with connectors still connected.

CHECK:

Check voltage between each terminals of SFTU or SFTD and E1 of Engine and ECT ECU.

OK:

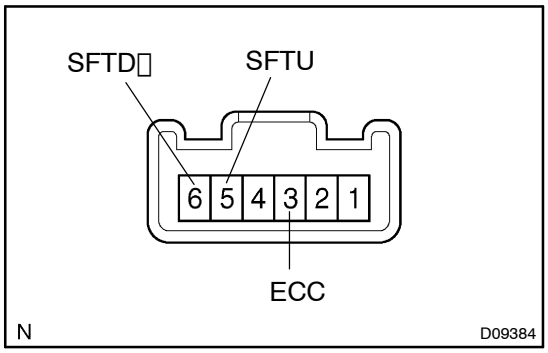
Switch condition	Tester connection	Specified condition
"Up" switch held pressing	SFTU – E1	7 – 14 V
"Up" switch released		Below 1.5 V
"Down" switch held pressing	SFTD – E1	7 – 14 V
"Down" switch released		Below 1.5 V

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–190).

NG

4	Check transmission shift switch.



PREPARATION:

(a) Remove the steering wheel pad.

(b) Disconnect the transmission shift switch connector.

CHECK:

Check continuity between each terminal of transmission shift switch connector.

OK:

Switch condition	Tester connection	Specified value
"Up" switch pressed	3 – 5	No continuity
"Up" switch released		Continuity
"Down" switch pressed	3 – 6	No continuity
"Down" switch released		Continuity

NG → Replace the steering wheel (See page SR–7).

OK →

Repair or replace harness or connector (See page IN–34).

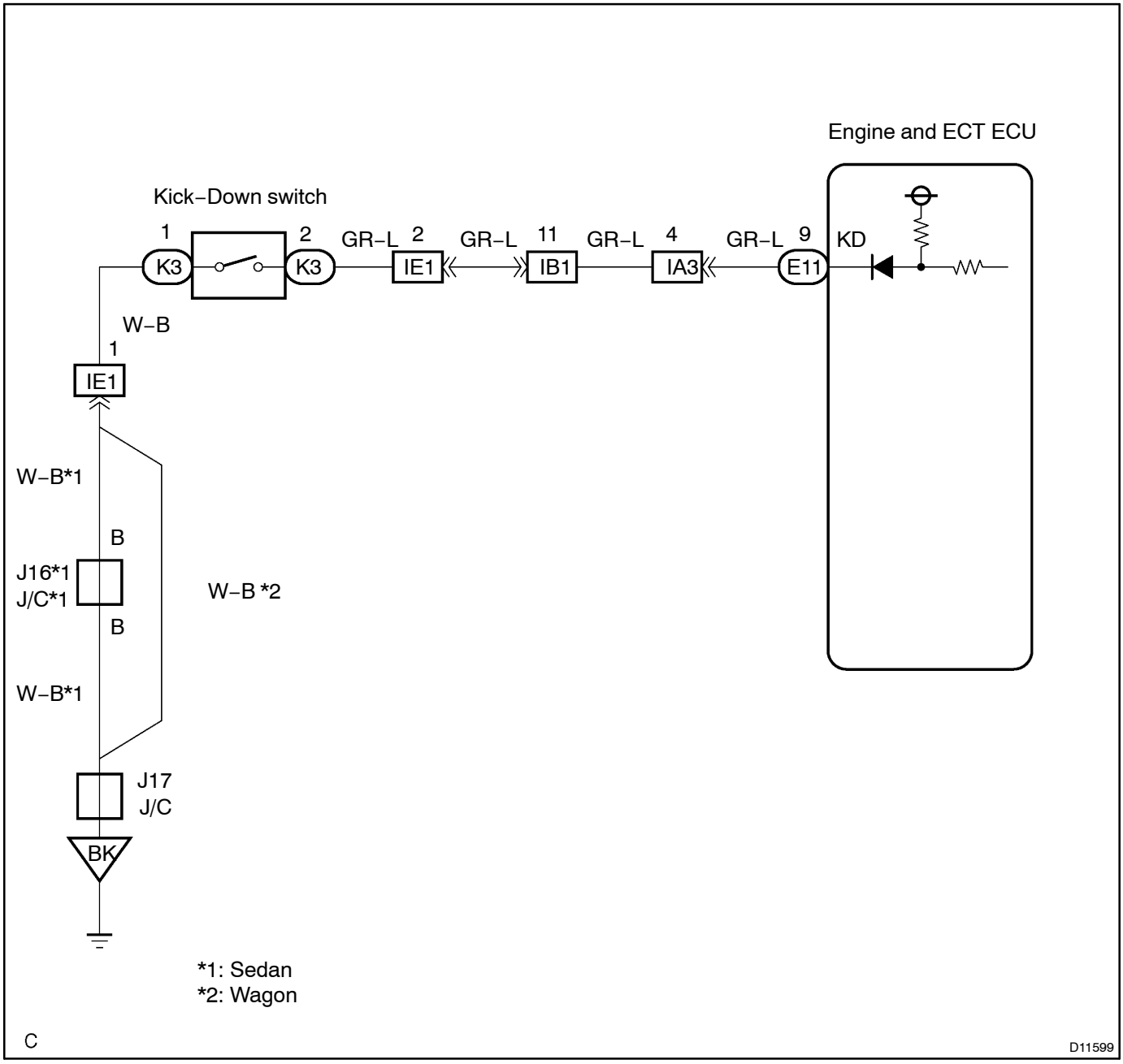
DI9HJ–01

Kick–down Switch Circuit

CIRCUIT DESCRIPTION

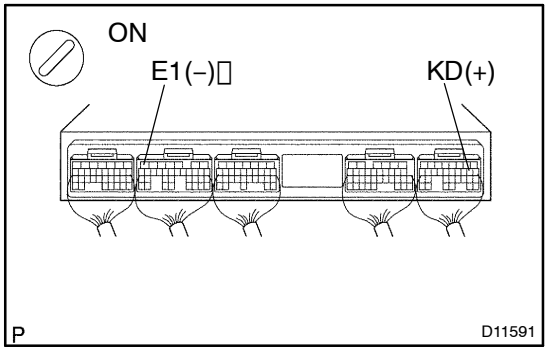
The kick–sown switch is turned ON when the accelerator pedal is depressed to the full throttle and sends signals to Engine and ECT ECU.
When the kick–down switch is turned ON, the Engine and ECT ECU controls gear shifting according to the programmed shift diagrams.
If a short circuit develops in the 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 voltage between terminal KD and E1 of Engine and ECT ECU.



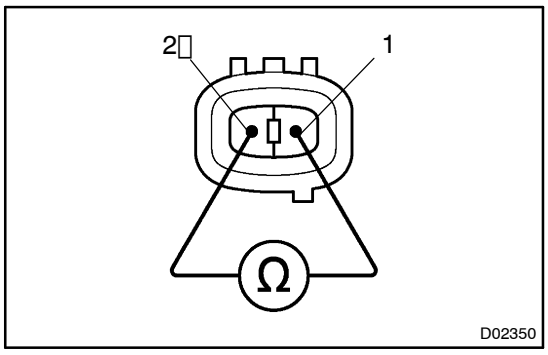
PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal KD and E1 of Engine and ECT ECU when accelerator pedal is fully depressed or not.
OK:

Accelerator pedal	Voltage
Fully depressed (Kick–down switch is ON)	Below 1 V
Released (Kick–down switch is OFF)	10 – 14 V

OK: **Proceed to next circuit inspection shown in problem symptoms table (See page DI–190).**

NG

2	Check kick–down switch.



PREPARATION:
Disconnect the kick–down switch connector.
CHECK:
Check continuity between terminals 1 and 2 of the kick–down switch connector when kick–down switch is ON and OFF.
OK:

Kick–down switch	Continuity
ON	Continuity
OFF	No continuity

NG: **Replace the kick–down switch.**

OK

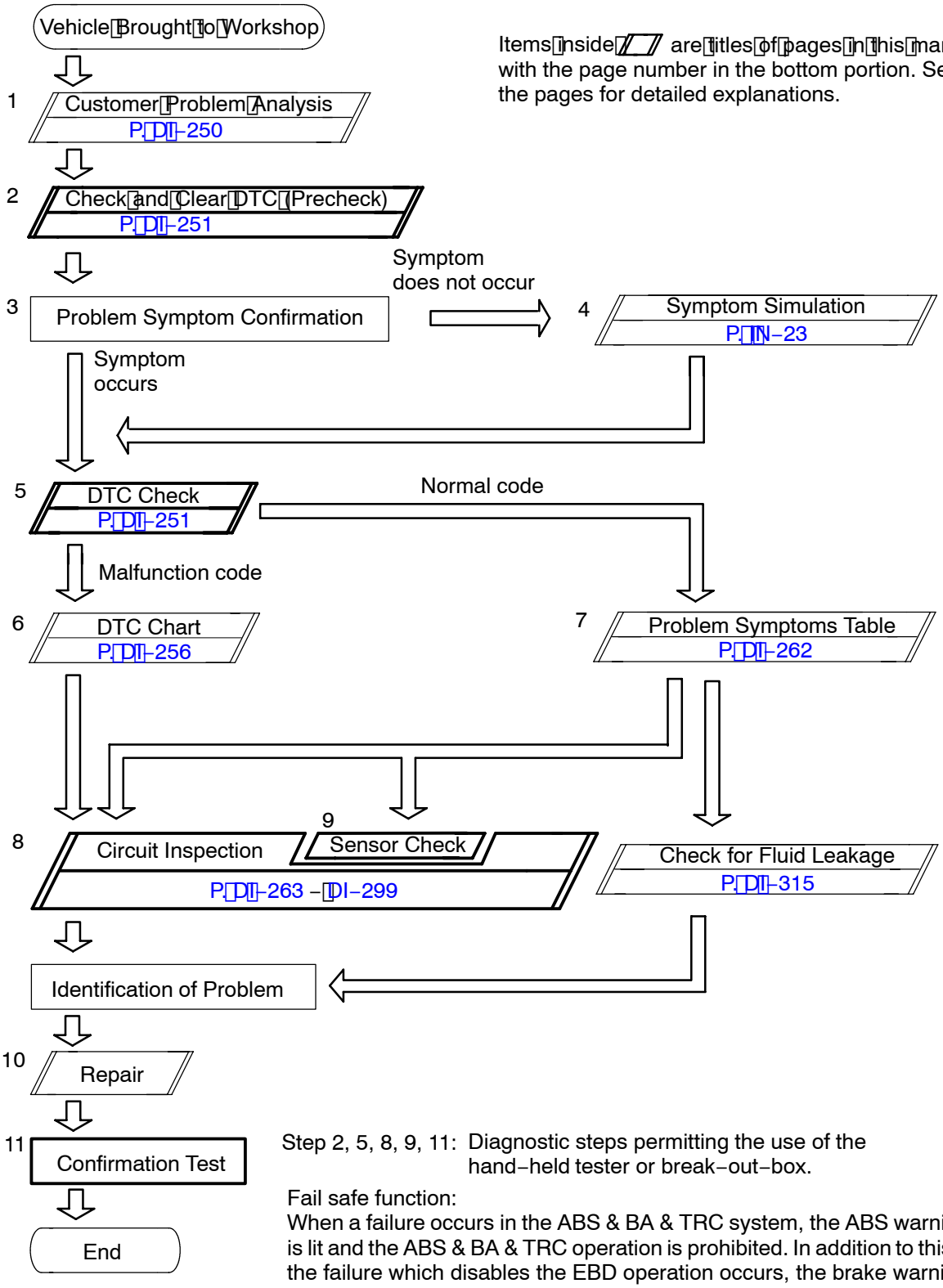
Repair or replace the harness or connector (See page IN–34).

ABS WITH EBD & BA & TRC SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI7UD–02

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 system, the ABS warning light is lit and the ABS & BA & TRC 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 the EBD operation is prohibited.

DI7UE–02

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & TRC 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 the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRC does not operate. (Wheels spin when starting rapidly.)	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRC OFF Indicator Light Abnormal	☐ Remains ON ☐ Blinks ☐ 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	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

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

DI9I5-01

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, BRAKE warning light, TRC OFF indicator light and SLIP indicator light go 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, BRAKE warning light circuit, TRC OFF indicator light circuit and SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	DI–303
BRAKE warning light circuit	DI–311
TRC OFF indicator light circuit	DI–306
SLIP indicator light circuit	DI–309

(c) In case of not using hand–held tester:

Check the DTC.

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

SST 09843–18040

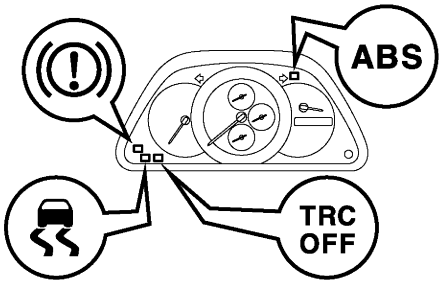
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and TRC OFF indicator light on the combination meter.

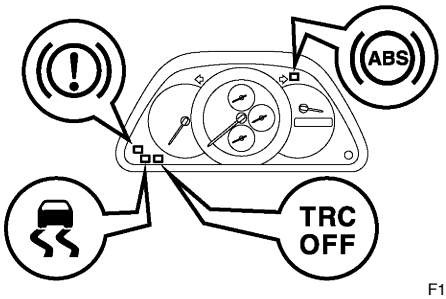
HINT:

- If no code appears, inspect the ABS warning light circuit or TRC OFF indicator light circuit (See page DI–303, DI–306).

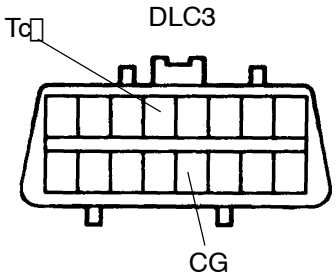
Australia:



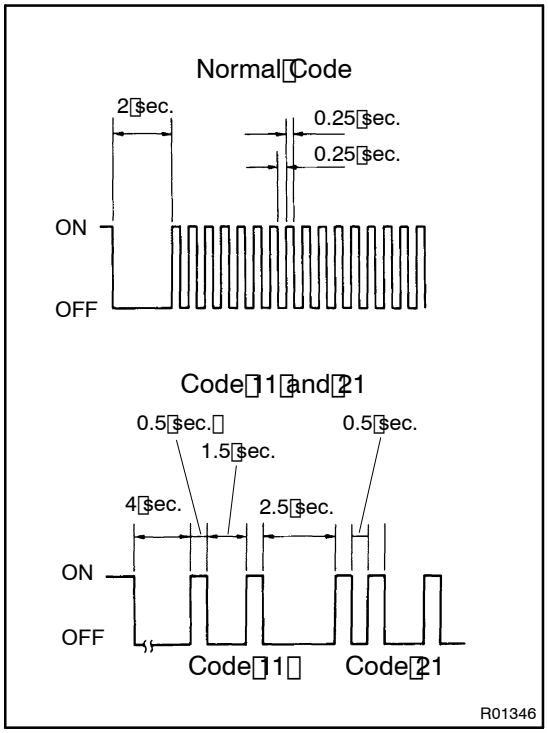
Except Ausutralia:



N F10770



F09750

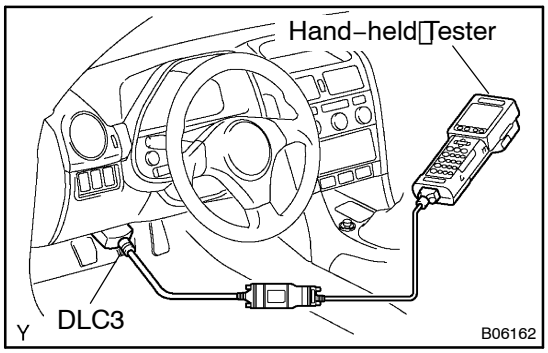


• As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI–256.

(5) After completing the check, disconnect terminals Tc and CG of DLC3 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) In case of using hand–held tester:

Check the DTC.

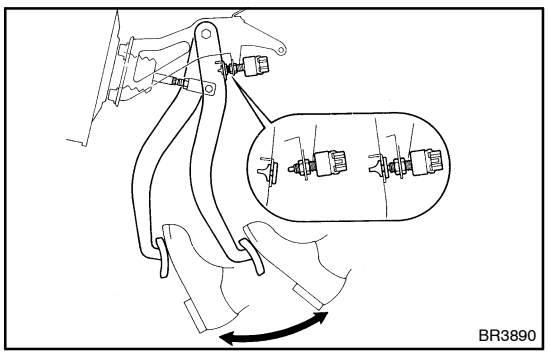
(1) Hook up the hand–held tester to the DLC3.

(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.



(e) In case of not using hand–held tester:

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 5 seconds.

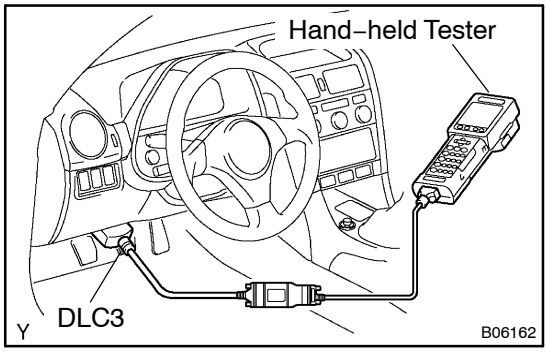
(4) Check that the warning light shows the normal code.

(5) Remove the SST from the terminals of DLC3.

SST 09843–18040

HINT:

The DTC stored in the ECU will be erased when the battery terminal is disconnected for the troubleshooting.



(f) 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. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand–held tester.

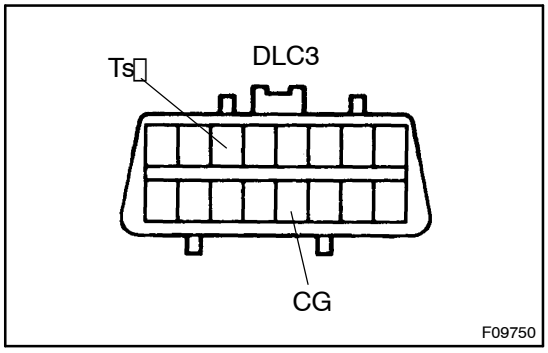
(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up–dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand–held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 – 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 – 0.9 V Depress brake pedal: 3.2 – 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	–30 – 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	–70 – 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	–1.5 – 1.5
G (BACK & FORTH)	Back and forth G	–1.5 – 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.



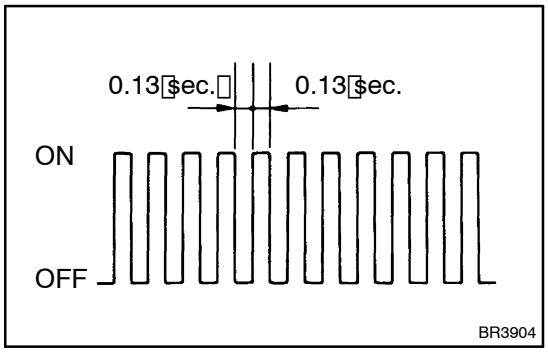
3. In case of not using hand-held tester: ABS SENSOR SIGNAL CHECK

(a) Procedures for test mode:

(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–303).

(b) Check the master cylinder pressure sensor.

(1) Leaving the vehicle in a stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.

(2) While the vehicle is stopped, release the brake pedal.

(3) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 sec.

HINT:
Repeat the operation until the ABS warning light is lit.

(c) Check the speed sensor signal.
Drive vehicle straight forward.
Drive vehicle faster than 45 km/h (28 mph) for several seconds.

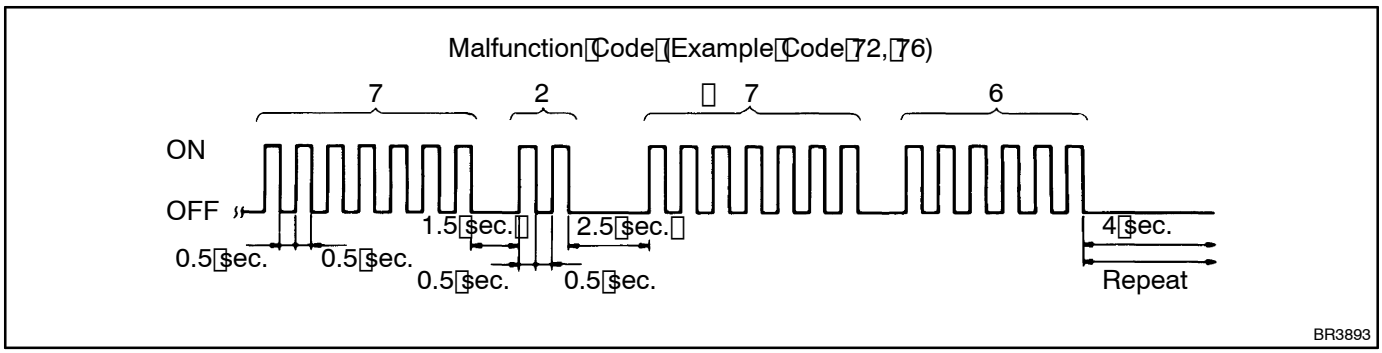
(d) Stop the vehicle.

(e) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

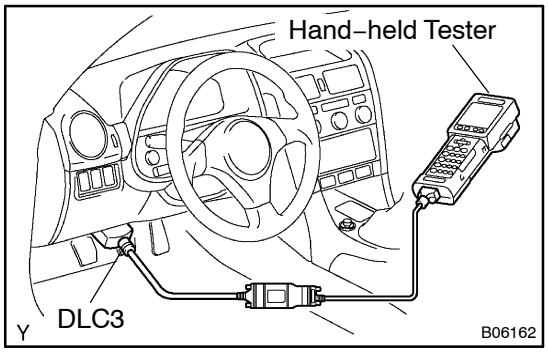
(f) Read the number of blinks of the ABS warning light.

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 malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3, and turn ignition switch OFF.
SST 09843–18040



4. In case of using hand–held tester:
ABS SENSOR SIGNAL CHECK

Check the speed sensor signal.

(1) Hook up the hand–held tester to the DLC3.
(2) Do step (b) to (c) 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 • Right front speed sensor circuit
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Left front speed sensor rotor • Left front speed sensor circuit
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Right rear speed sensor rotor • Right rear speed sensor circuit
C1274/74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Left rear speed sensor rotor • Left rear speed sensor circuit
C1275/75	Abnormal change in output voltage of right front speed sensor	• Right front speed sensor rotor • Right front speed sensor
C1276/76	Abnormal change in output voltage of left front speed sensor	• Left front speed sensor rotor • Left front speed sensor
C1277/77	Abnormal change in output voltage of right rear speed sensor	• Right rear speed sensor rotor • Right rear speed sensor
C1278/78	Abnormal change in output voltage of left rear speed sensor	• Left rear speed sensor rotor • Left rear speed sensor
C1281/81	Master cylinder pressure sensor output signal is faulty	• Master cylinder pressure sensor

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DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843–18040, connect the terminals Tc and CG of DLC3.
- 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, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of anti–lock brake system:

DTC No. (See Page)	Detection Item	Trouble Area
C0278/11 (DI–275)	Open circuit of ABS solenoid relay circuit	• ABS solenoid relay • ABS solenoid relay circuit
C0279/12 (DI–275)	Short circuit of ABS solenoid relay circuit	
C0273/13 *1 (DI–271)	Open circuit of ABS motor relay circuit	• ABS motor relay • ABS motor relay circuit
C0274/14 (DI–271)	Short circuit of ABS motor relay circuit	
C0226/21 (DI–269)	Open or short circuit of right front solenoid circuit	• Brake actuator • SFRR or SFRH circuit
C0236/22 (DI–269)	Open or short circuit of left front solenoid circuit	• Brake actuator • SFLR or SFLH circuit
C0246/23 (DI–269)	Open or short circuit of right rear solenoid circuit	• Brake actuator • SRRR or SRRH circuit
C0256/24 (DI–269)	Open or short circuit of left rear solenoid circuit	• Brake actuator • SRLR or SRLH circuit
C1225/25 (DI–287)	Open or short circuit of SM circuit	• Brake actuator • SM1 or SM2 circuit
C1226/26 (DI–287)	Open or short circuit of SRM circuit	• Brake actuator • SRM1 or SRM2 circuit
C1227/27 (DI–287)	Open or short circuit of SRC circuit	• Brake actuator • SRC1 or SRC2 circuit
C0200/31 *1 (DI–263)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Speed sensor rotor
C0205/32 *1 (DI–263)	Left front wheel speed sensor signal malfunction	
C0210/33 *1 (DI–263)	Right rear wheel speed sensor signal malfunction	
C0215/34 *1 (DI–263)	Left rear wheel speed sensor signal malfunction	
C1235/35 (DI–263)	Foreign matter is attached on the tip of the right front sensor	• Right front, left front, right rear, left rear speed sensor • Speed sensor rotor
C1236/36 (DI–263)	Foreign matter is attached on the tip of the left front sensor	
C1238/38 (DI–263)	Foreign matter is attached on the tip of the right rear sensor	
C1239/39 (DI–263)	Foreign matter is attached on the tip of the left rear sensor	

C1241/41 (DI–289)	Low battery positive voltage	• Battery • Charging system • Power source circuit
C1246/46*2 (DI–293)	Malfunction in master cylinder pressure sensor	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1249/49 (DI–296)	Open circuit of stop light switch circuit	• Stop light switch • Stop light switch circuit
C1251/51*1 (DI–299)	Pump motor is locked	• Brake actuator • Brake actuator circuit
Always ON (DI–301)	Malfunction in ECU	• Combination meter • Combination meter circuit • Battery • Skid control ECU

*1, *2:
Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

- *1:
  (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  (2) Clear the DTC (See page DI–251).
- *2:
  (1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.
  (3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (4) Clear the DTC (See page DI–251).

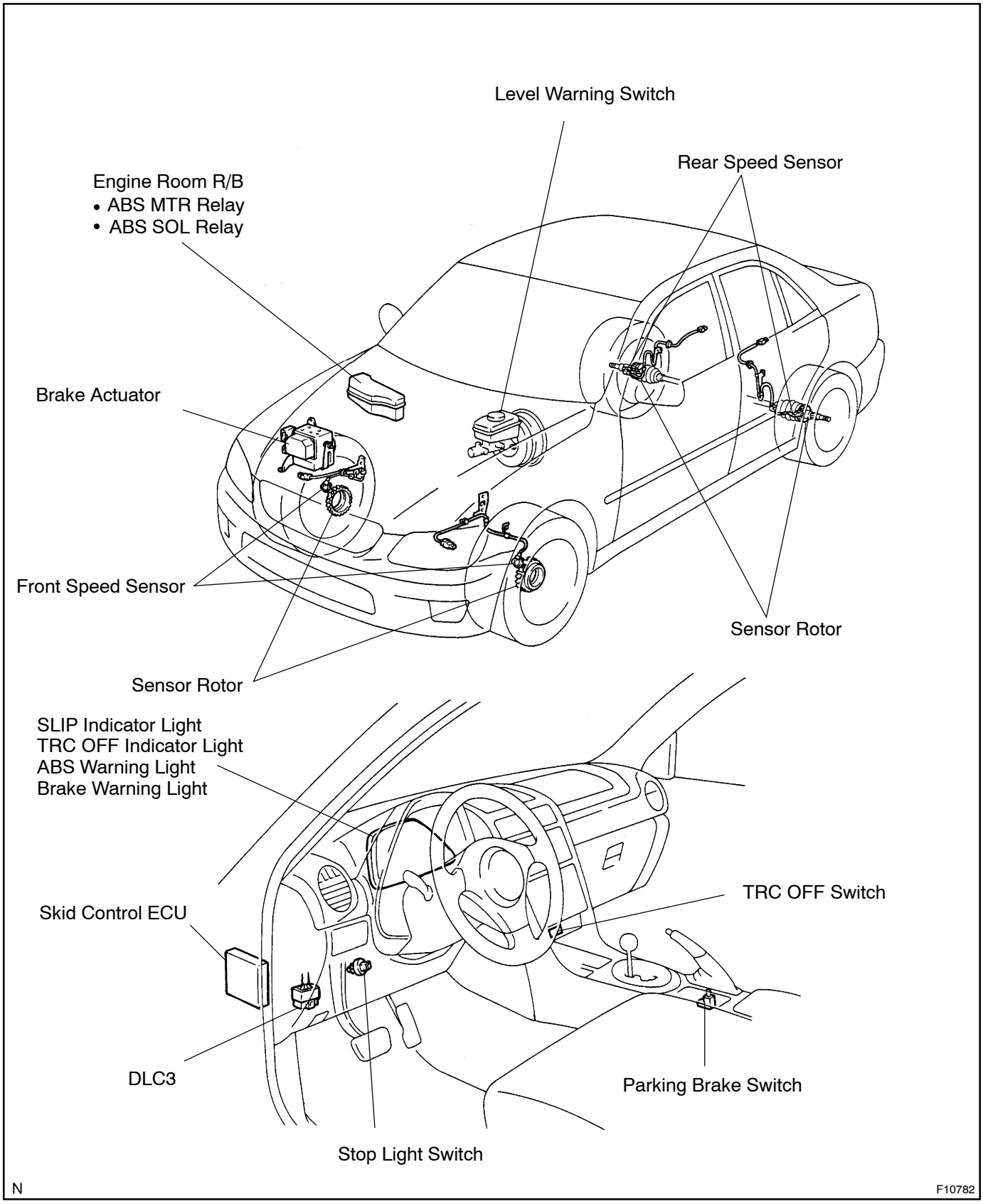
HINT:
There is a case that hand–held tester cannot be used when ABS warning light is always on.

DTC chart of traction control system:

C1223/43 (DI–284)	Malfunction in ABS control system	ABS control system
C1224/44 (DI–285)	Open or short circuit of NE signal circuit	• NEO circuit • Engine ECU
C1201/51 (DI–279)	Malfunction in engine control system	Engine control system
C1202/52 (DI–280)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	• Brake fluid level • Brake fluid warning switch • Brake fluid level warning switch circuit
C1203/53 (DI–282)	Malfunction in engine ECU communication circuit	• TRC+ or TRC – circuit • ENG+ or ENG– circuit • Engine ECU

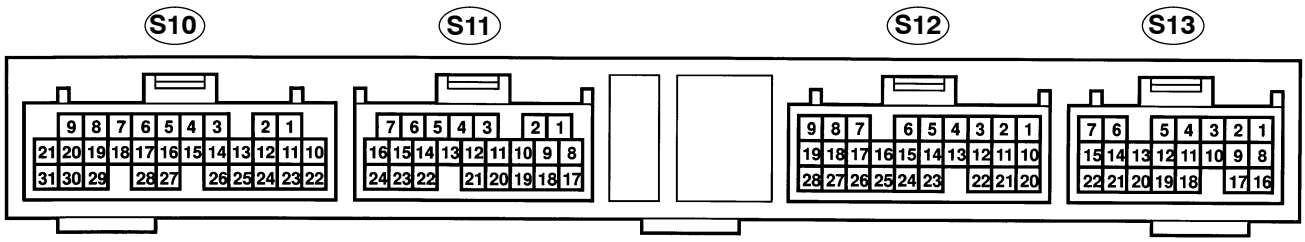
DI7UH–02

PARTS LOCATION



DI7UI–02

TERMINALS OF ECU



F02094

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S23 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	B ↔ W–B*1 R ↔ W–B*2	IG switch ON, ABS warning light OFF	10 – 14
SM1– (S23 – 2) – GND (S23 – 15, 22, S20 – 2, 3)	B–L ↔ W–B*1 L ↔ W–B*2	IG switch OFF	Continuity
SM1+ (S23 – 3) – GND (S23 – 15, 22, S20 – 2, 3)	B–R ↔ W–B*1 R–L ↔ W–B*2	IG switch ON, ABS warning light OFF	Below 1.0
SM2– (S23 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	L–B ↔ W–B	IG switch OFF	Continuity
SM2+ (S23 – 5) – GND (S23 – 15, 22, S20 – 2, 3)	G–B ↔ W–B*1 W–R ↔ W–B*2	IG switch ON, ABS warning light OFF	Below 1.0
AST (S23 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLH (S23 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	G–W ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRR (S23 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
E3 (S23 – 12) – GND (S23 – 15, 22, S20 – 2, 3)	Y ↔ W–B	IG switch OFF	Continuity
FSS (S23 – 13) – GND (S23 – 15, 22, S20 – 2, 3)	Shielded ↔ W–B	IG switch OFF	Continuity
MT (S23 – 14) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y ↔ W–B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S23 – 16) – GND (S23 – 15, 22, S20 – 2, 3)	B–W ↔ W–B*1 W–R ↔ W–B*2	IG switch ON, ABS warning light OFF	10 – 14
PMC2 (S23 – 18) – E3 (S23 – 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 – 0.8
VCM2 (S23 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	IG switch ON	4.5 – 5.5
CSW (S22 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	LG–R ↔ W–B	IG switch ON, CSW is OFF	10 – 14
NEO (S22 – 26) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	Engine idling	Pulse generation
D/G (S22 – 28) – GND (S23 – 15, 22, S20 – 2, 3)	W–R ↔ W–B*1 W ↔ W–B*2	IG switch ON	10 – 14
WA (S21 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON, ABS warning light ON	10 – 14
		IG switch ON, ABS warning light OFF	Below 2.0
SP1 (S21 – 2) – GND (S23 – 15, 22, S20 – 2, 3)	R–Y ↔ W–B*1 V–W ↔ W–B*2	Vehicle drives at about 20 km/h (12 mph)	Pulse generation

STP (S21 – 3) – GND (S23 – 15, 22, S20 – 2, 3)	G–R ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
WT (S21 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	LG ↔ W–B	IG switch ON, TRC OFF indicator light ON	Below 2.0
		IG switch ON, TRC OFF indicator light OFF	10 – 14
IND (S21 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y ↔ W–B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 – 14
IG1 (S21 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	B–R ↔ W–B	IG switch ON	10 – 14
BRL (S21 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	Y–G ↔ W–B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
		IG switch ON, fluid in master cylinder reservoir below MIN level or parking brake switch is ON (Brake warning light ON)	10 – 14
ENG+ (S21 – 9) – ENG– (S21 – 18)	L–B ↔ P	IG switch ON	Pulse generation
Ts (S21 – 10) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON	10 – 14
TRC+ (S21 – 11) – TRC– (S21 – 20)	R–Y ↔ W–G	IG switch ON, ABS warning light OFF	Pulse generation
FRO (S21 – 13) – GND (S23 – 15, 22, S20 – 2, 3)	W–R ↔ W–B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
RR+ (S21 – 16) – RR– (S21 – 15)	GR ↔ B*1 W ↔ B*2	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S21 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 – 14
RL+ (S21 – 22) – RL– (S21 – 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
R+ (S20 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	L–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRM1 (S20 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	B–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRC2 (S20 – 5) – GND (S23 – 15, 22, S20 – 2, 3)	G–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLH (S20 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	L–R ↔ W–B*1 W–G ↔ W–B*2	IG switch ON, ABS warning light OFF	10 – 14
SFLR (S20 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y ↔ W–B*1 W ↔ W–B*2	IG switch ON, ABS warning light OFF	10 – 14
SRRH (S20 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	L–O ↔ W–B*1 R–W ↔ W–B*2	IG switch ON, ABS warning light OFF	10 – 14
SRRR (S20 – 9) – GND (S23 – 15, 22, S20 – 2, 3)	G–Y ↔ W–B*1 W–L ↔ W–B*2	IG switch ON, ABS warning light OFF	10 –14
SR (S20 – 10) – R1+ (S10 – 1)	L–R ↔ L–B	IG switch ON, ABS warning light OFF	10 – 14
FR+ (S20 – 13) – FR– (S20 – 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S20 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	B–O ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
MR (S20 – 23) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON, ABS motor stops	10 – 14
MRF (S20 – 24) – GND (S23 – 15, 22, S20 – 2, 3)	R–Y ↔ W–B	IG switch ON, ABS warning light OFF	Below 2.0

LBL (S20 – 25) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, fluid in master cylinder reservoir above MIN level	4 – 10
FL+ (S20 – 28) – FL– (S20 – 27)	LG ↔ V	IG switch ON, slowly turn left front wheel	Pulse generation
SRC1 (S20 – 31) – GND (S23 – 15, 22, S20 – 2, 3)	G–O ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14

*1: LHD
*2: RHD

DI7UJ–02

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.

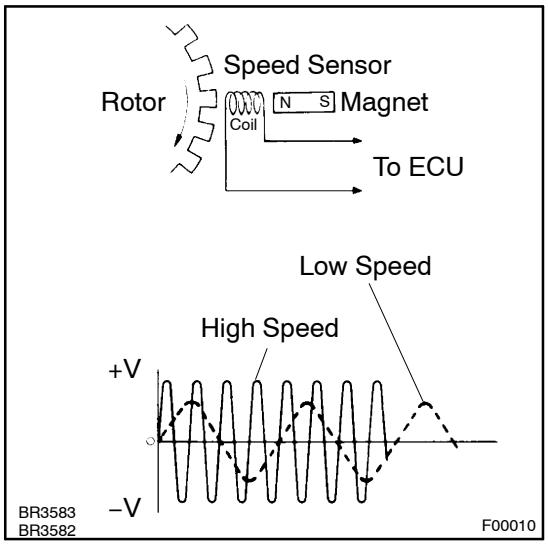
Symptom	Suspect Area	See page
ABS does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the Skid control ECU. 5. Check the DTC reconfirming that the normal code is output. 6. IG power source circuit 7. Speed sensor circuit 8. Check the brake actuator with hand–held tester. If abnormal, check the hydraulic circuit for leakage (See page DI–315).	 DI–251 DI–289 DI–263
ABS does not operate efficiently	Only when 1. to 4. are all normal and the problem is still occurring, replace the Skid control 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 hand–held tester. If abnormal, check the hydraulic circuit for leakage (See page DI–315).	 DI–251 DI–263 DI–296
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI–303 IN–34
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU	DI–311 IN–34
DTC check cannot be done	Only when 1. and 2. are all normal and the problem is still occurring, replace the Skid control ECU. 1. ABS warning light circuit 2. TRC OFF indicator light circuit	 DI–303 DI–306
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI–313 IN–34
TRC does not operate	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the Skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI–251 DI–289 DI–315 DI–263
SLIP indicator light abnormal	SLIP indicator light circuit	DI–309
TRC OFF indicator light abnormal	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the Skid control ECU. 1. TRC OFF indicator light circuit 2. TRC cut switch circuit	 DI–306 DI–306

DI9I6–01

CIRCUIT INSPECTION

DTC	C0200 / 31 – C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



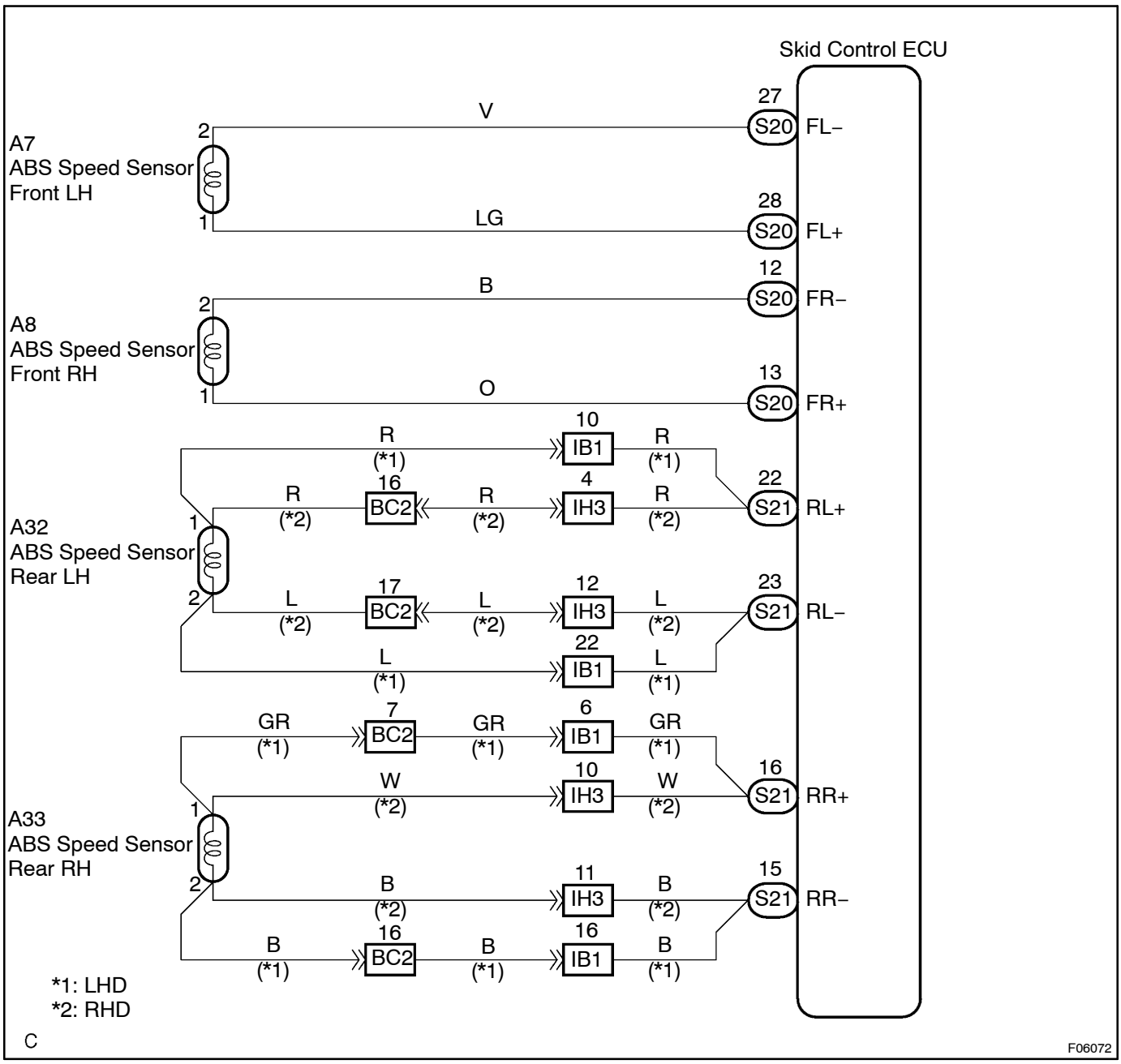
The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor 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 measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Nose have been counted 75 times in 5 sec.	• Right front, left front, right rear, left rear speed sensor • Sensor rotor

HINT:

- DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

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 speed sensor.**

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

CHECK:
Check that there is no difference between the speed value output from the speed sensor observed in the hand–held tester and the speed value displayed by the speedometer when the vehicle is in motion.

OK:

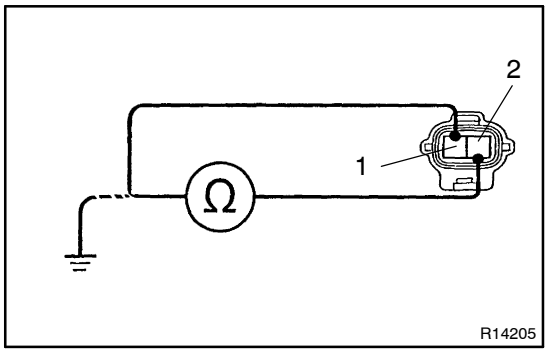
There is almost no difference in the displayed speed values.

HINT:
There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



Front:

PREPARATION:
(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.

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

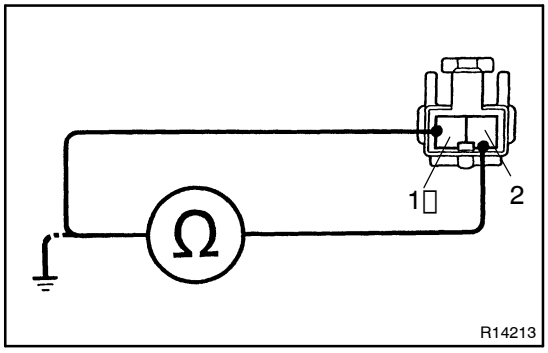
OK:

Resistance: 1.4 – 1.8 kΩ at 20°C

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

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.

(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.

(c) Disconnect the speed sensor connector.

CHECK:

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

OK:

Resistance: 0.9 – 1.3 kΩ at 25 ± 5°C

CHECK:

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

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal (See page DI–251).

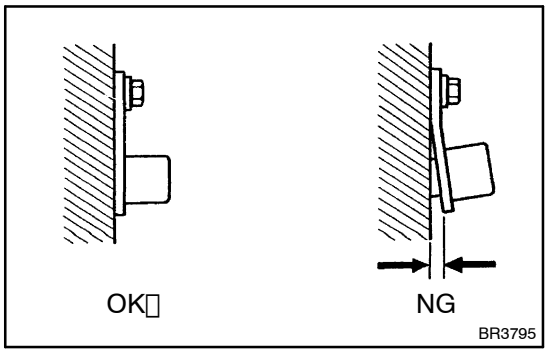
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN–34).**

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

OK

4	Check 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.

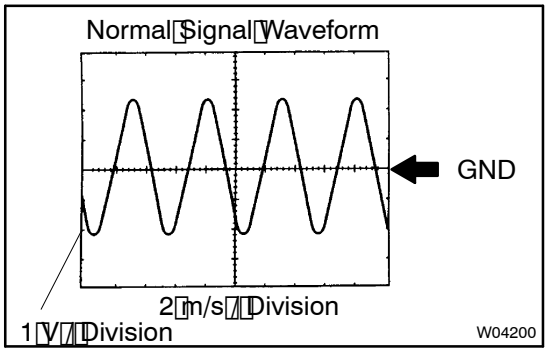
NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal first (See page DI–251).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with the connector still connected.

(b) Connect the oscilloscope to the terminals FR+ – FR–, FL+ – FL–, RR+ – RR– and RL+ – RL– of the skid control ECU.

CHECK:

Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

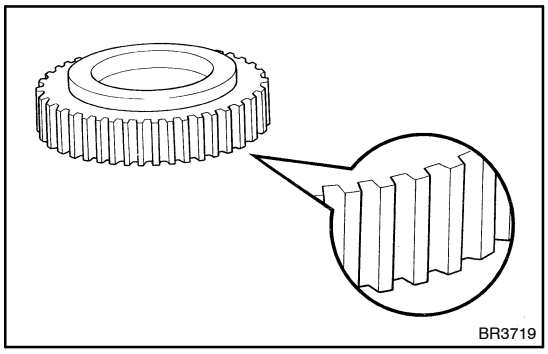
HINT:

- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK	Check and replace skid control ECU.

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front axle hub and the speed sensor.

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

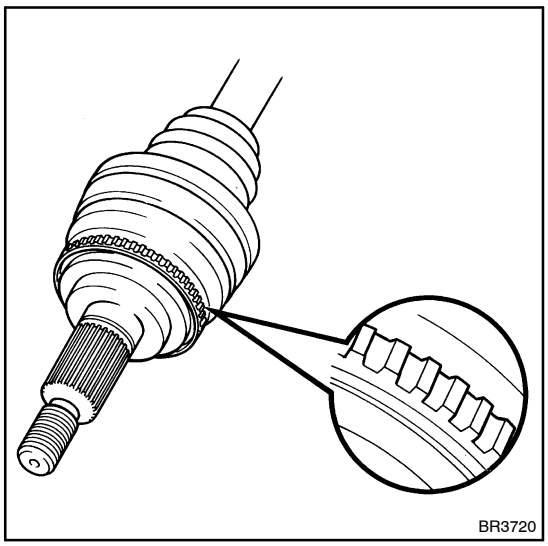
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.



Rear:

PREPARATION:

Remove the drive shaft.

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor.

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI–251).

OK

Check and replace skid control ECU.

DI1GI–09

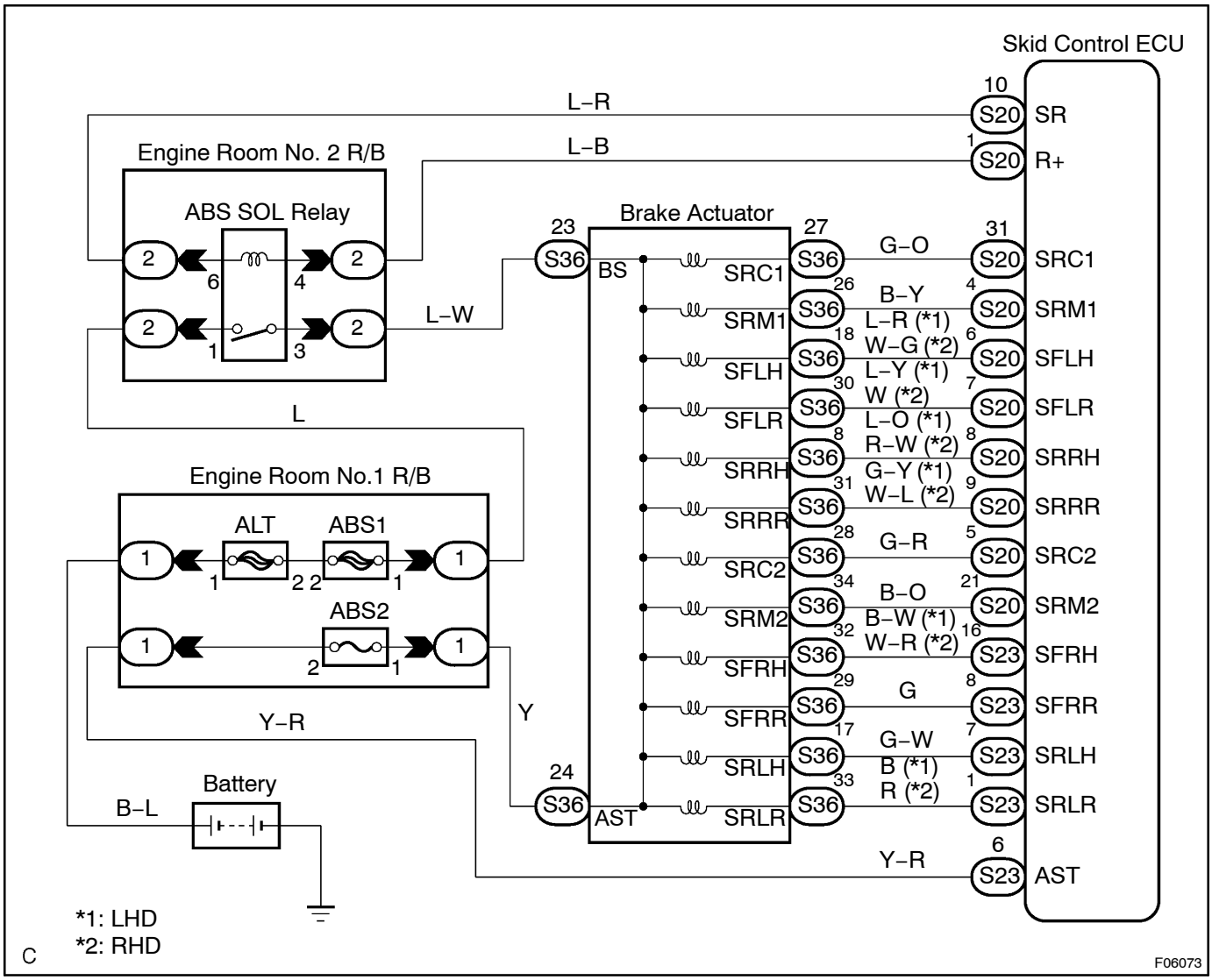
DTC	C0226 / 21 – C0256 / 24	ABS–Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS–related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

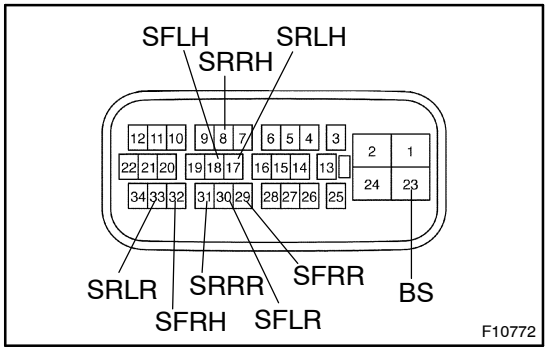
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	• Brake actuator • SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	• Brake actuator • SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	• Brake actuator • SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	• Brake actuator • SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



PREPARATION:
Disconnect the brake actuator connector.
CHECK:
Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid at 25°C
SFRH, SFLH, SRRH, SRLH: 8.1 – 9.1 Ω
SFRR, SFLR, SRRR, SRLR: 4.0 – 4.6 Ω

NG	**Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN–34).**

NG	**Repair or replace 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.

DI1GJ–14

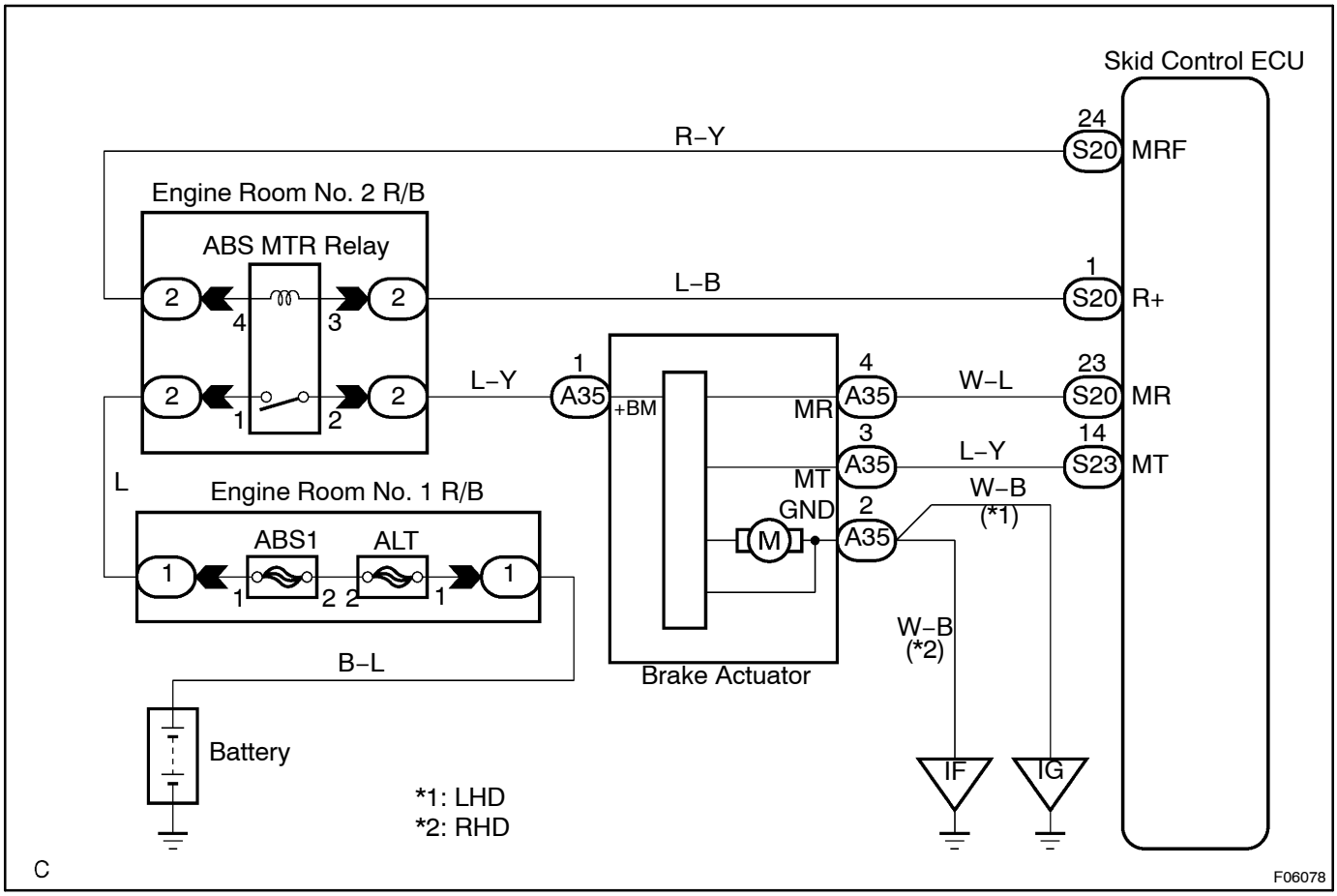
DTC	C0273 / 13, C0274 / 14	ABS Motor Relay Circuit

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1. and 2. continued for 0.12 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V in the initial check or ABS, TRC are in operation, and when the motor relay is ON, however, the contact point of the motor relay is OFF. 2. ECU terminal IG1 is 9.5 V or less, and when the motor relay is ON, but the contact point of the motor relay does not become ON.	• ABS motor relay • ABS motor relay circuit • Skid control ECU
C0274 / 14	When the motor relay is OFF, the condition that the contact point of motor relay is ON continues for 4 sec. or more.	

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 hand–held tester.

1	**Check ABS motor relay operation.**

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.

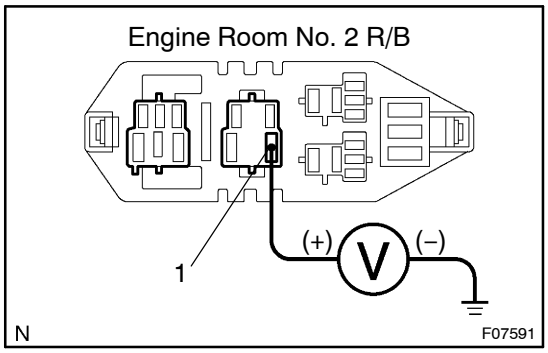
CHECK:
Check the operation sound of the ABS motor relay when operating it with the hand–held tester.

OK:
The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**



PREPARATION:
Remove the ABS motor relay from the engine room No. 2 R/B.

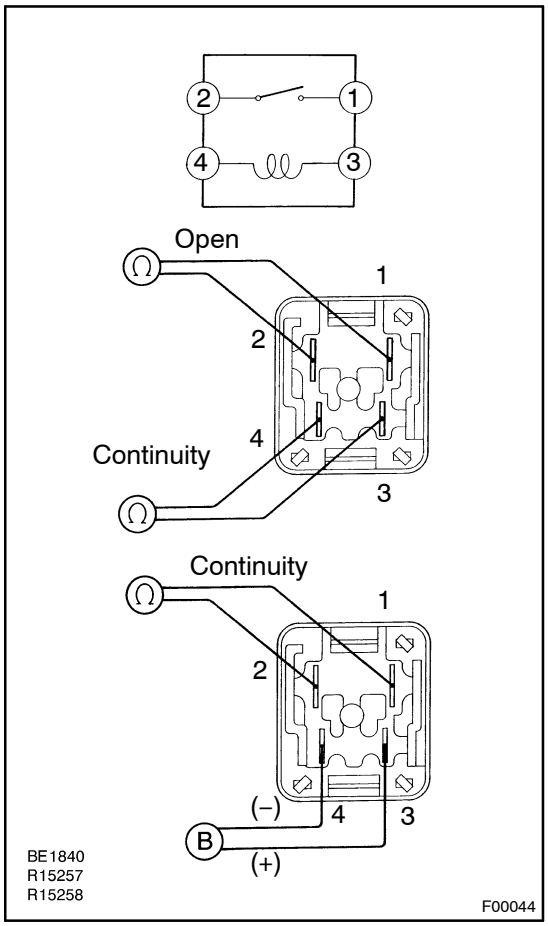
CHECK:
Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.

OK:
Voltage: 10 – 14 V

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

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery voltage between terminals 3 and 4.

(b) Check continuity between terminals.

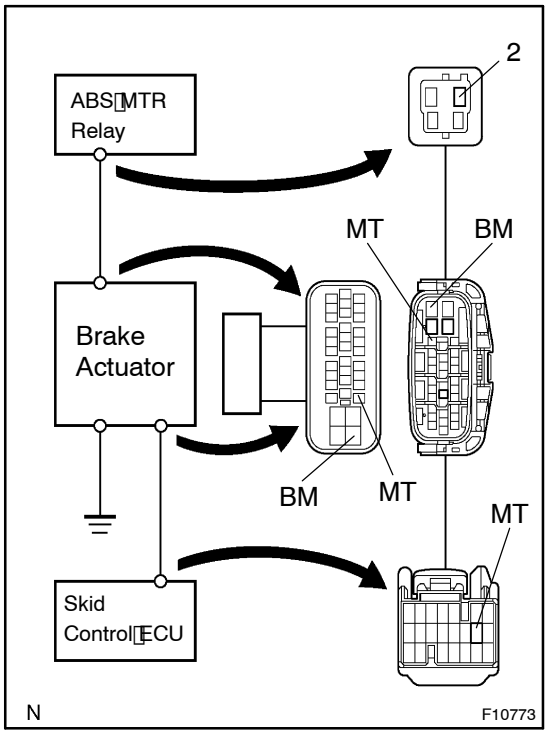
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is a no continuity between terminals BM and MT of brake actuator.

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN–34).**

NG → **Repair or replace 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.

DI1GK–09

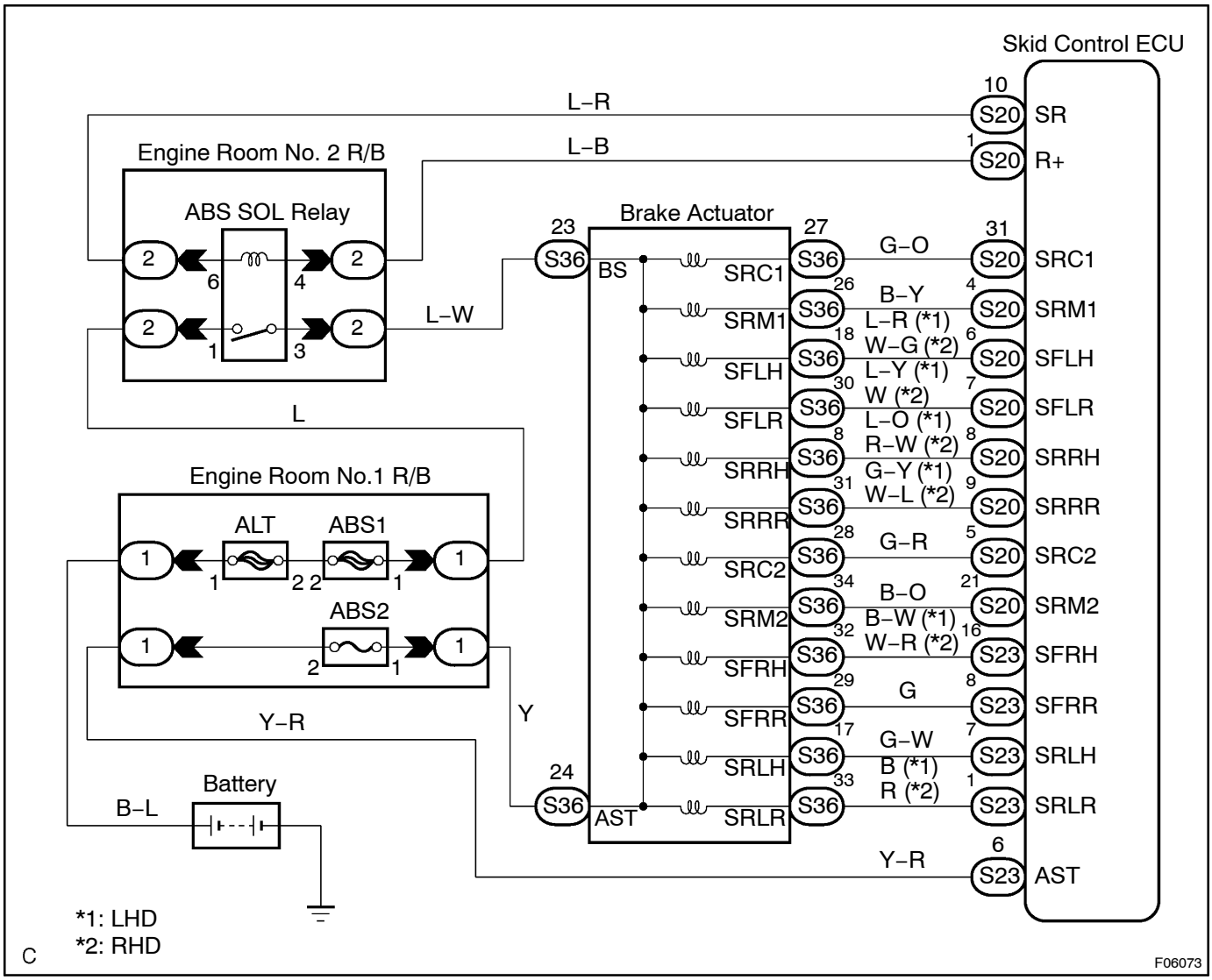
DTC	C0278 / 11, C0279 / 12	ABS Solenoid Relay Circuit

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	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF. 2. With solenoid relay ON driving, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the contact point of the solenoid relay is ON continues for 0.2 sec. or more.	

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 ABS solenoid relay operation.**

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.

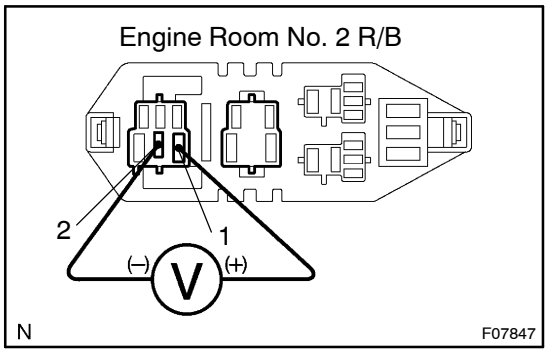
CHECK:
Check the operation sound of the ABS solenoid relay when operating it with the hand–held tester.

OK:
The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminals 1 and 2 of engine room No. 2 R/B (for ABS solenoid relay).**



PREPARATION:
Remove the ABS solenoid relay from the engine room No. 2 R/B.

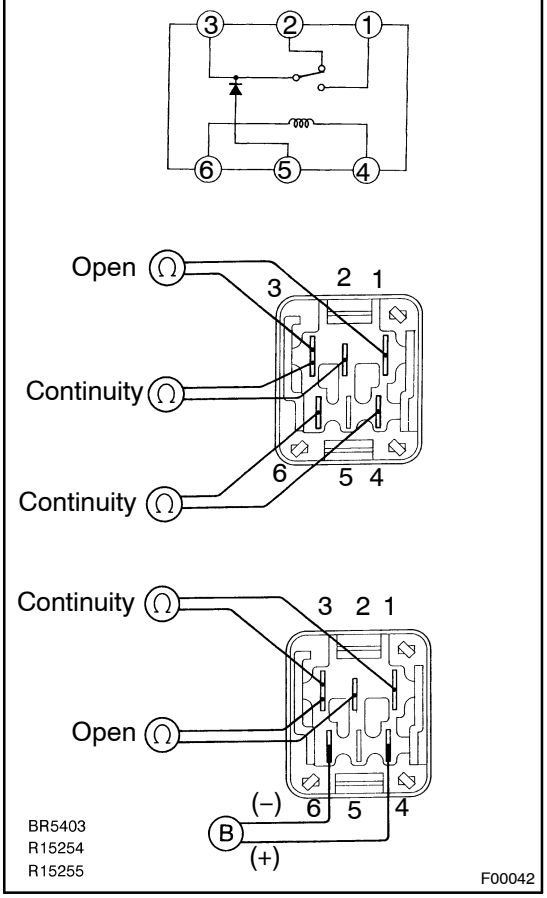
CHECK:
Measure the voltage between terminals 1 and 2 of engine room No. 2 R/B (for ABS solenoid relay).

OK:
Voltage: 10 – 14 V

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

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

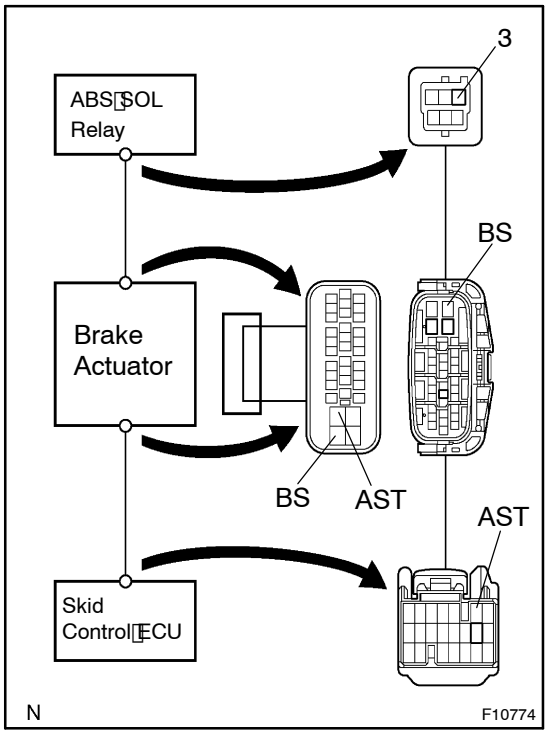
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG → **Repair or replace harness or brake actuator.**

OK

5	Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN–34).

NG → **Repair or replace 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.

DI1GY–14

CIRCUIT INSPECTION

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	• Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page 1G–FE: DI–4 of Pub. No. RM684E, 2JZ–GE: DI–4).**

***1** → **Repair engine control system according to the code output.**

***2**

Check for engine ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI1GZ–16

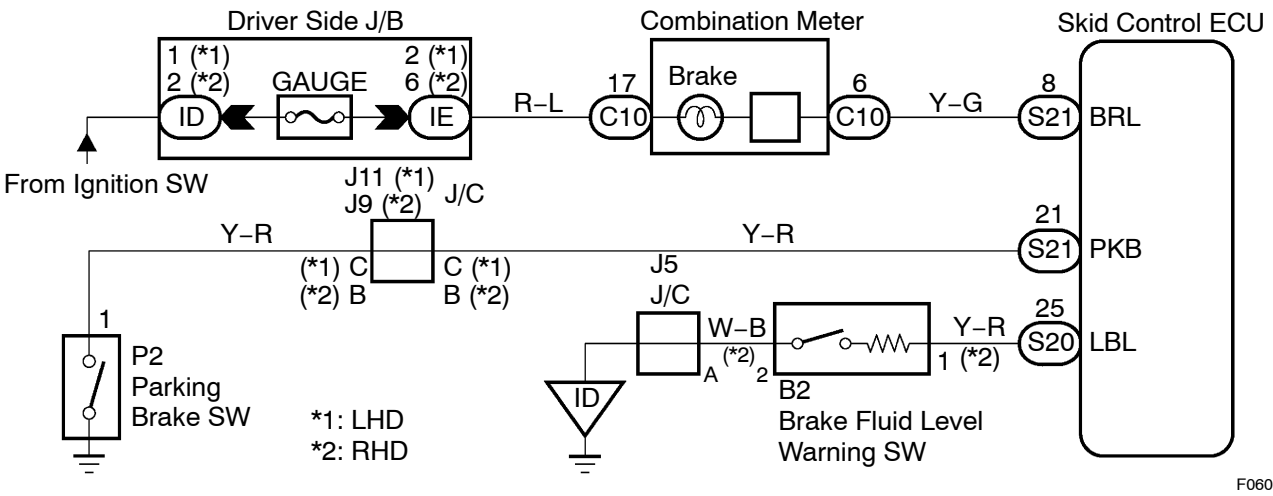
DTC	C1202 / 52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.
HINT:
Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202 / 52	When any of the following 1. or 2. is detected: 1. Low fluid level condition in the brake master cylinder reservoir tank continues for 10 sec. or more. 2. With ECU terminal IG1 voltage is 9.5 V to 17.2 V and open circuit for the brake fluid level warning switch circuit continues for 2 sec. or more.	• Brake fluid level • Brake fluid level warning switch • Brake fluid level warning switch circuit • Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:
Check the amount of fluid in the brake reservoir.

NG	**Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch (See Pub. No. RM684E on page BE–83).

NG → Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to brake fluid level warning light (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU.

DI1H0–16

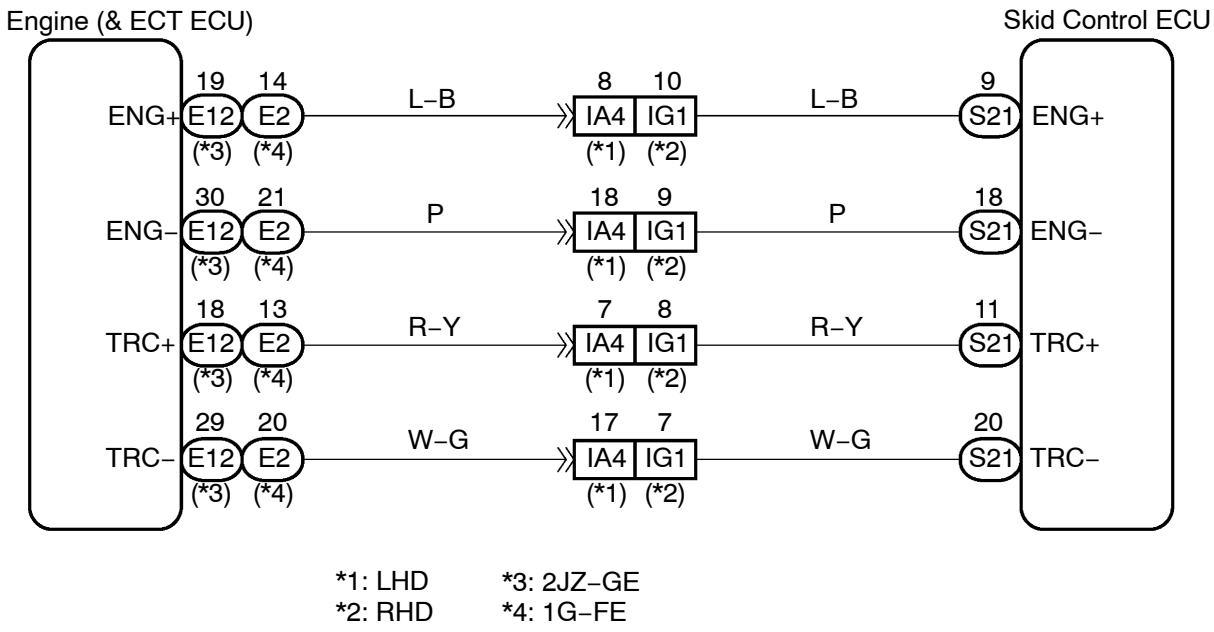
DTC	C1203 / 53	Enmgine ECU Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRC control information from the skid control ECU to the engine ECU (TRC+, TRC–), and engine control information from the engine ECU to the skid control ECU (ENG+, ENG–).

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	1. Either of the following (a),or (b) continues for 5 sec.: (a) When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to engine ECU continues for more than 5 sec. (b) When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from engine ECU is impossible. 2. The condition that the data sent from engine ECU becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec. 3. The condition that TRC ± communication is normal ↔ abnormal has been repeated more than 10 times in 60 sec.	• TRC+ or TRC– circuit • ENG+ or ENG– circuit • Engine ECU • Skid control ECU

WIRING DIAGRAM



C

F06075

INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG–, TRC+, TRC– of skid control ECU and engine ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace engine ECU or skid control ECU.

DI1H3-12

DTC	C1223/43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	• ABS control system

INSPECTION PROCEDURE

1	Check the DTC for the ABS (See page DI–251).

*1 → Repair ABS control system according to the code output.

*2

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

DI1H4–15

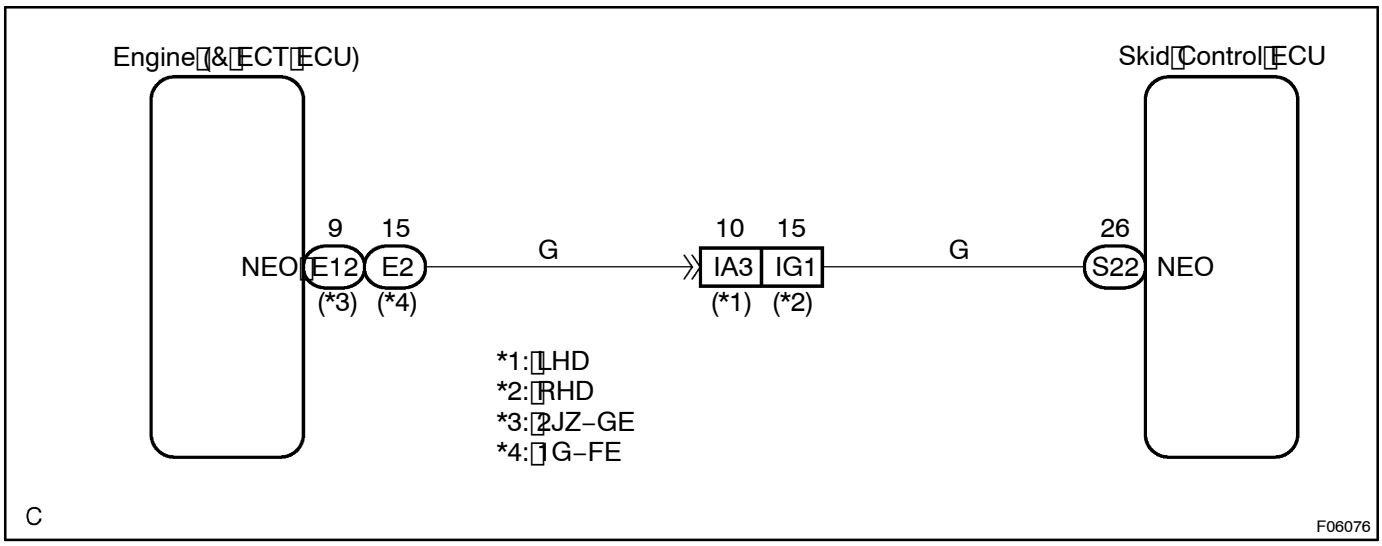
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid contorl ECU receives engine revolution speed signals (NE signals) from the engine ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the engine ECU is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	• NEO circuit • Engine ECU • Skid control ECU

WIRING DIAGRAM



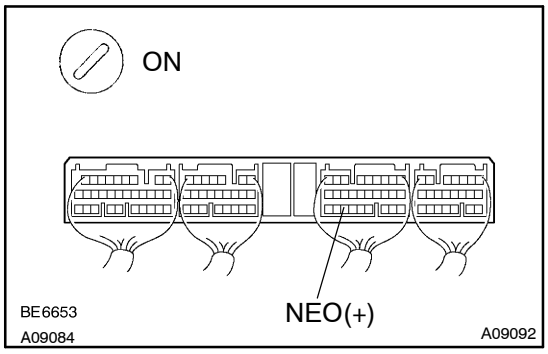
INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of engine ECU (See page IN–34).

NG → Repair or replace harness and connector.

OK

2	Check voltage between terminals NEO of skid control ECU and body ground.



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Turn the ignition switch ON.

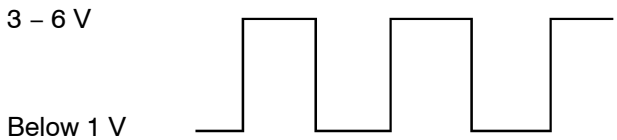
CHECK:

Measure voltage between terminal NEO of skid control 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 skid control ECU or engine ECU.**

OK

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

DI9I7–01

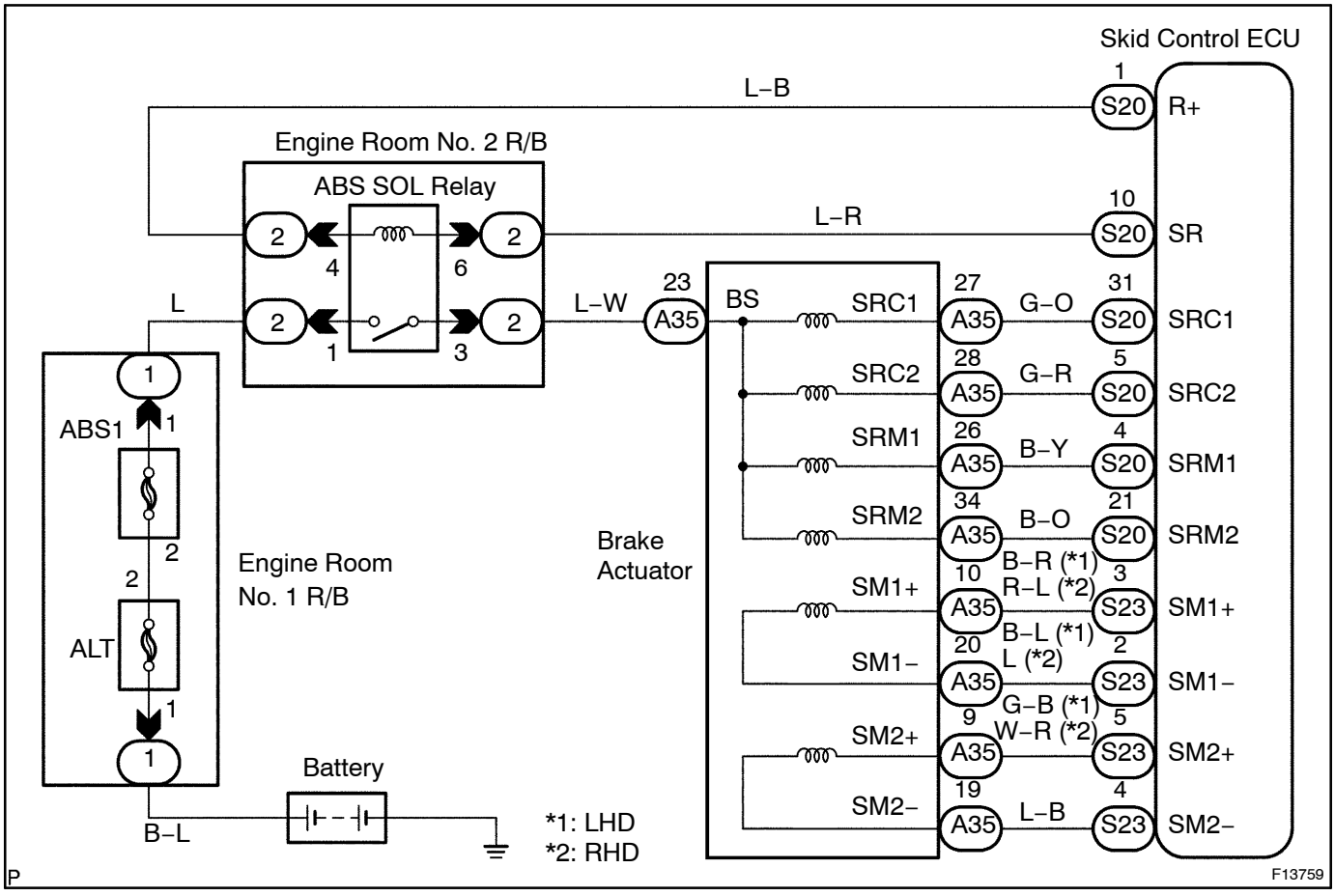
DTC	C1225 / 25 – C1227 / 27	TRC–Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

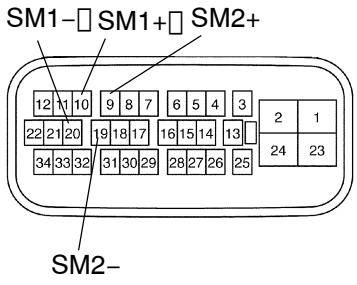
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 4.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 sec. or more. 2. When SM1 or SM2 is OFF, open circuit of SM1 or SM2 continues for 0.05 sec. or more. 3. When SM1 or SM2 is ON, open circuit of SM1 or SM2 continues for 0.1 sec. or more. 4. When SM1 or SM2 is OFF, electric current application on SM1 or SM2 continues for 0.1 sec. or more.	• Brake actuator • SM1 or SM2 circuit
C1226 / 26	Open or short circuit of SRM1 or SRM2 continues for 0.05 sec. or more.	• Brake actuator • SRM1 or SRM2 circuit
C1227 / 27	Open or short circuit of SRC1 or SRC2 continues for 0.05 sec. or more.	• Brake actuator • SRC1 or SRC2 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check brake actuator solenoid.



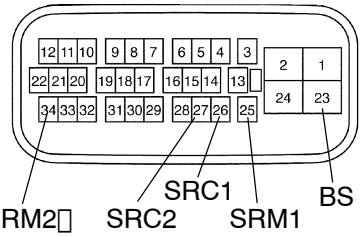
PREPARATION:
Disconnect the brake actuator connector.
CHECK:
Check continuity between terminals SM1+ – SM1–, and terminals SM2+ – SM2– of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid: 8.1 – 9.1 Ω at 25°C
CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid at 25°C
SRC1, SRC2: 8.1 – 9.1 Ω
SRM1, SRM2: 4.9 – 5.5 Ω



NG → Replace brake actuator.

OK

2	Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN–34).

NG → Repair or replace 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.

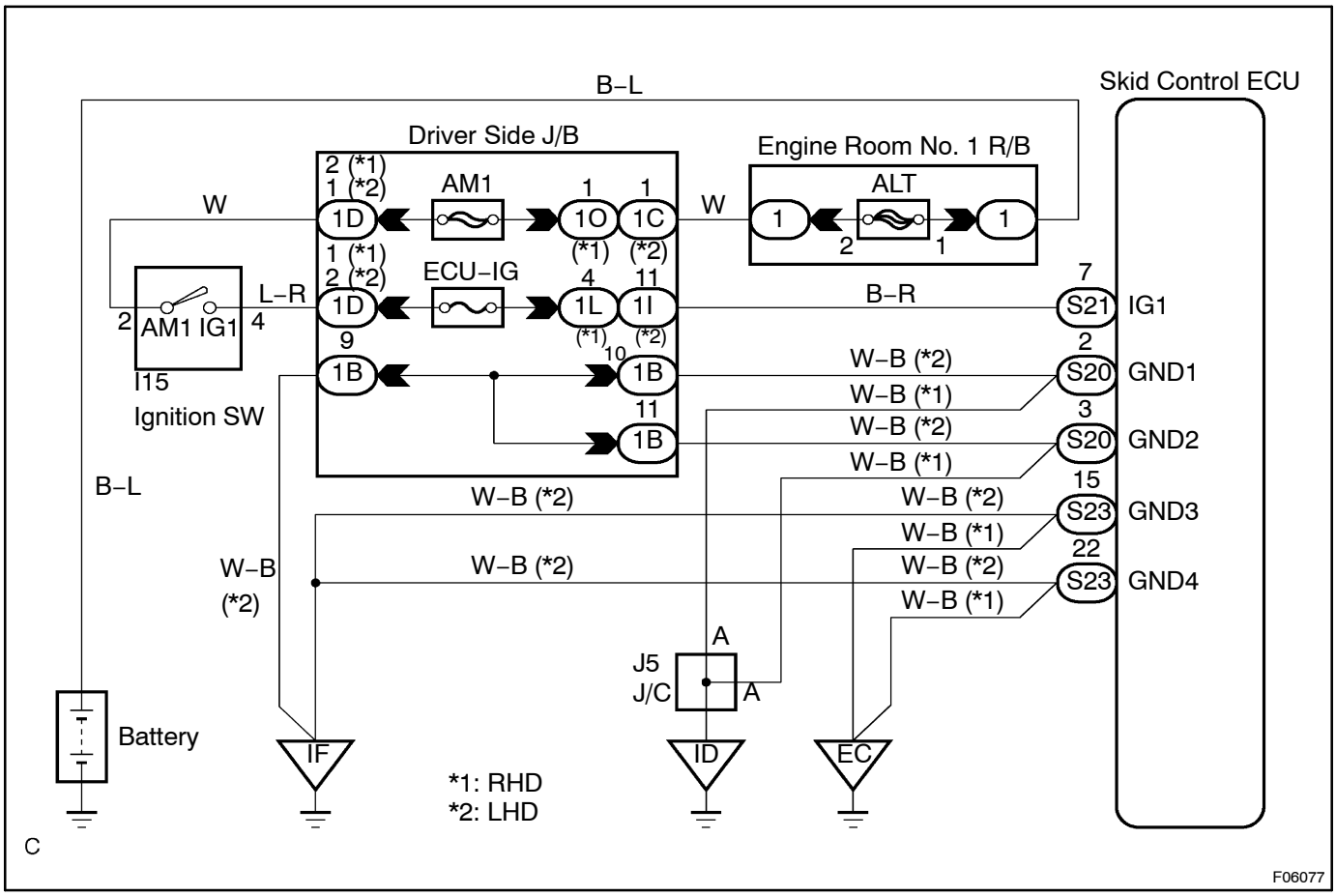
DI9I8–01

DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any of conditions 1. through 2.: 1. Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG remains at below 9.5 V for more than 10 sec. 2. While the condition that the solenoid relay is ON continues, ECU terminal IG1 voltage becomes 9.5 V or less, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more.	• Battery • Charging system • Power source circuit • Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**

PREPARATION:
Remove ECU–IG fuse from driver side 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

2	**Check battery voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair the charging system (See page 1G–FE: CH–1 of Pub. No. RM684E, 2JZ–GE: CH–1).**

OK

3	Check voltage of the ECU IG power souce.

In case of using the hand–held tester.

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.

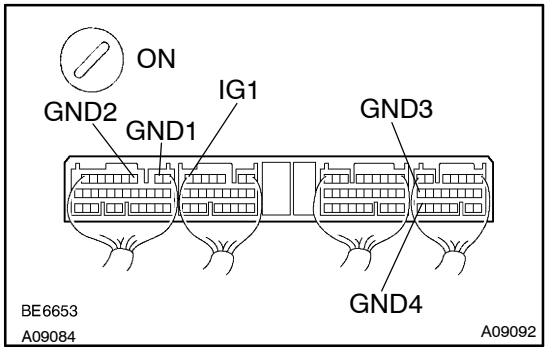
CHECK:

Check the voltage condition output from the ECU displayed by the hand–held tester.

OK:

"Normal" is displayed.

In case of not using the hand–held tester.



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of skid control ECU.

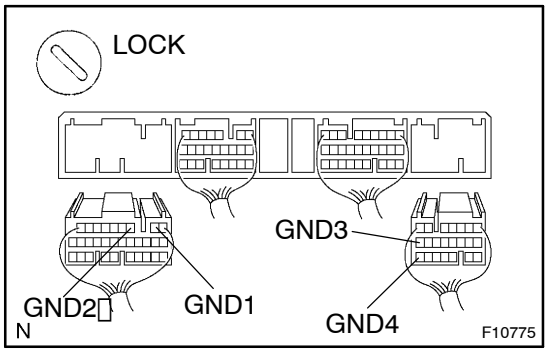
OK:

Voltage: 10 – 14 V

OK	Ignition switch OFF, check and replace skid control ECU.

NG

4	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

(a) Disconnect the 2 connector from the skid control ECU.

(b) Measure resistance between terminal GND of skid control ECU connector and body ground.

OK:

Resistance: 1 Ω or less

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

OK

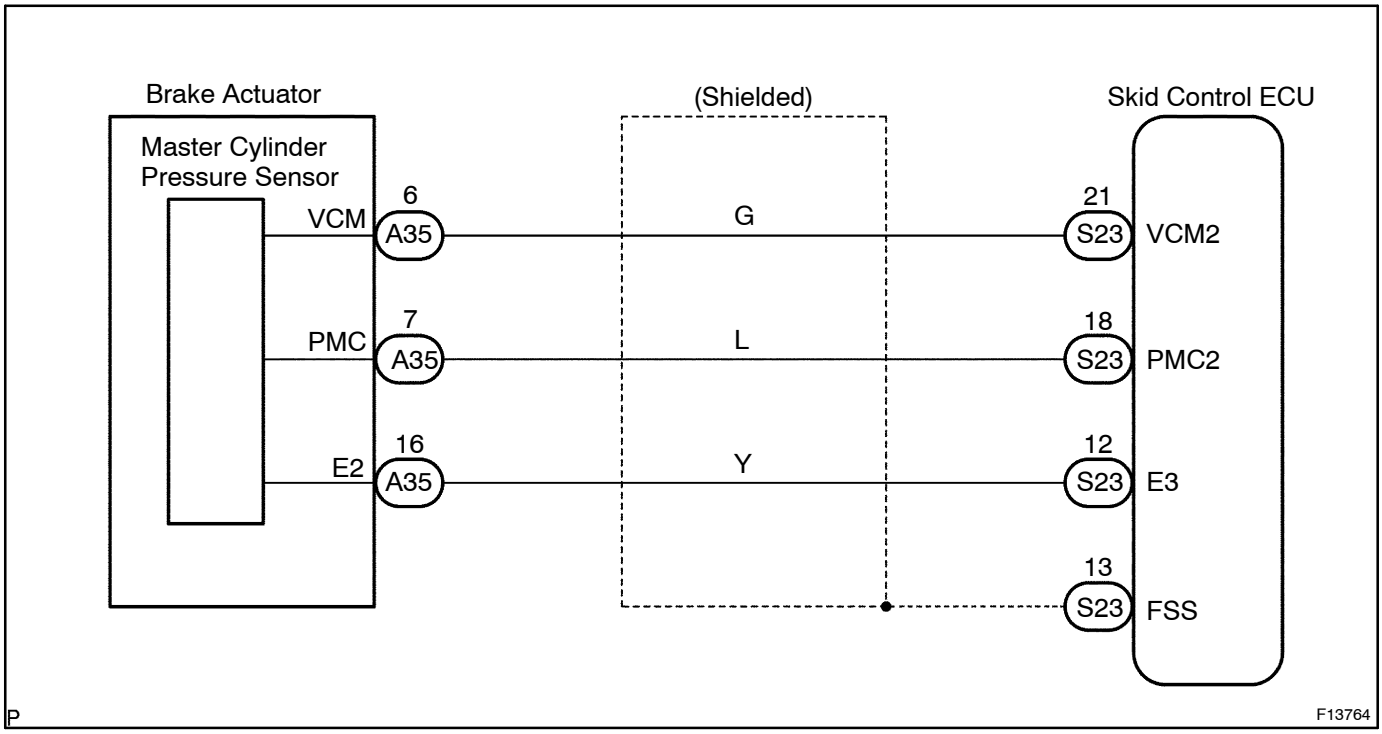
Check for open circuit in harness and connector between skid control ECU and battery (See page IN–34).

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Detection of any of conditions 1. through 5.: 1. When the vehicle speed is 7 km/h (4 mph) or more and ECU PMC2 terminal voltage exceeds 0.86 V, the condition that the voltage does not change 0.005 V or more continues for 30 sec. 2. Noise in ECU PMC2 terminal occurs 7 times or more in 5 sec. 3. When the ECU STP terminal is OFF, the condition that ECU PMC2 terminal voltage is 0.86 V or more, or less than 0.3 V continues for 5 sec. or more. 4. When IG1 terminal voltage is 9.5 to 17.2 V, the condition that ECU VCM terminal voltage is out of the range from 4.4 to 5.6 V continues for 1.2 sec. or more. 5. When ECU VCM terminal voltage is 4.4 to 5.6 V, the condition that the ECU PMC2 terminal voltage is out of the range from 0.14 to 4.85 V continues for 1.2 sec. or more.	• Master cylinder pressure sensor • Master cylinder pressure 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 master cylinder pressure sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and turn 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 observed in the hand–held tester is changing when the brake pedal is being depressed.

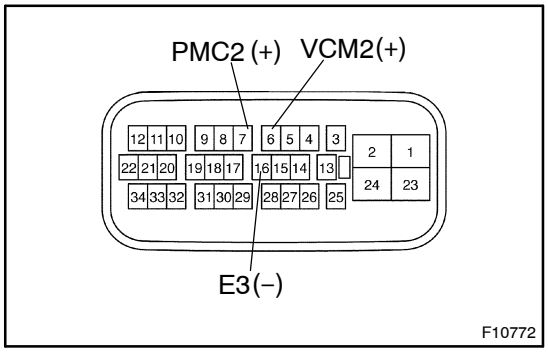
OK:

Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	**Check master cylinder pressure sensor.**



PREPARATION:

Install LSPV gauge to the front caliper bleeder plug portion, and bleed air from LSPV gauge.

SST 09709–29018

CHECK:

Start the engine and depress the brake pedal, then check how the fluid pressure affects voltage of PMC2 and E3 terminals of the master cylinder pressure sensor with the connector still connected to it.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 kgf/cm^2, 0 psi)	0.37 – 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 – 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 – 3.03 V

HINT:
Voltage of between terminals VCM2 and E3: 4.7 – 5.3 V

NG → **Replace brake actuator.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

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

NO → Check stop light switch circuit (See page BE–2).

YES

Check and replace skid control ECU.

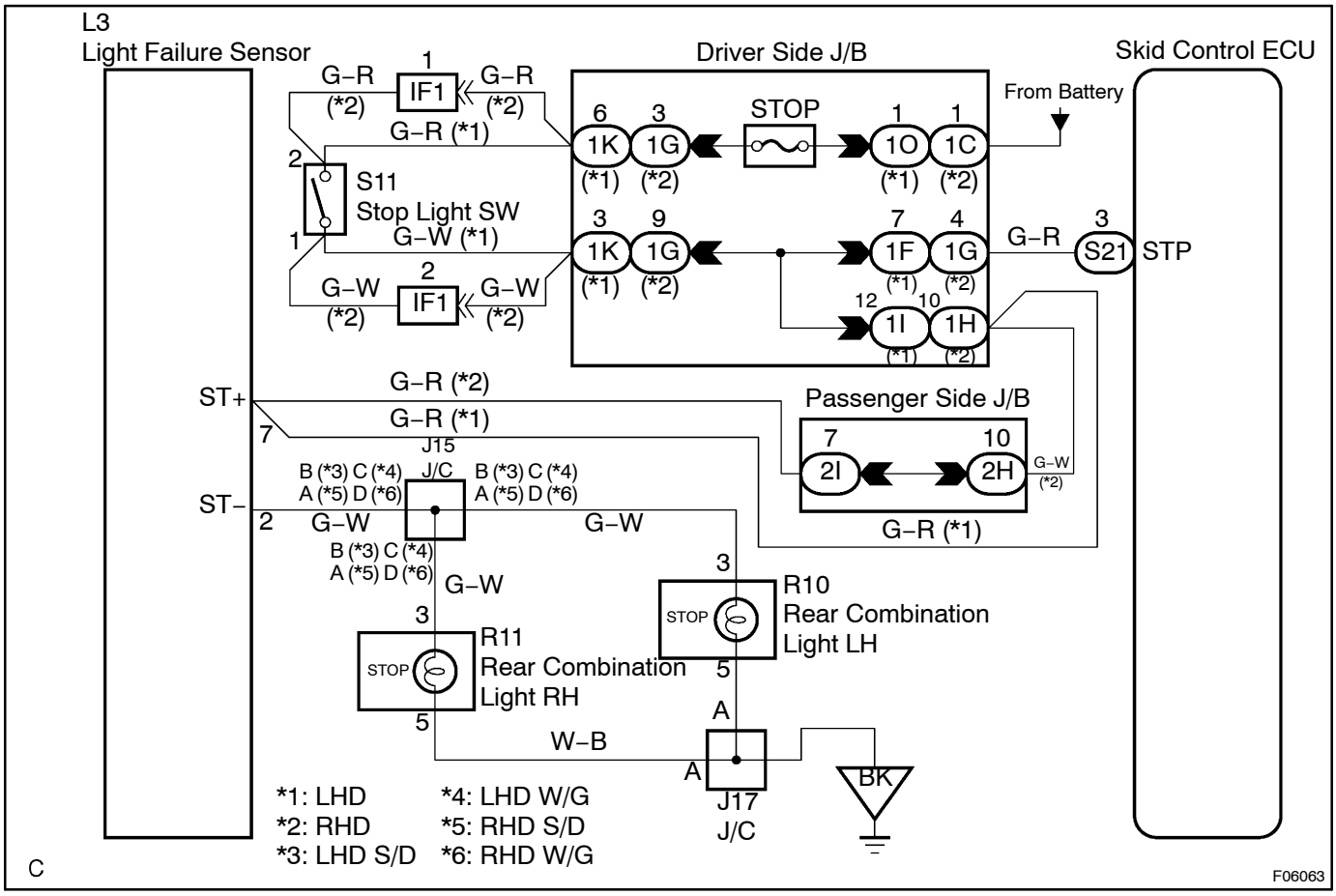
DI0WX–16

DTC	C1249 / 49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	ECU terminal IG1 voltage is 9.5 to 17.2 V and ABS is in non–operation, the open circuit of stop light switch circuit continues for 0.3 sec. or more.	• Stop light switch • Stop light switch circuit • Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of the stop light switch.

CHECK:

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

OK	Go to step 3.

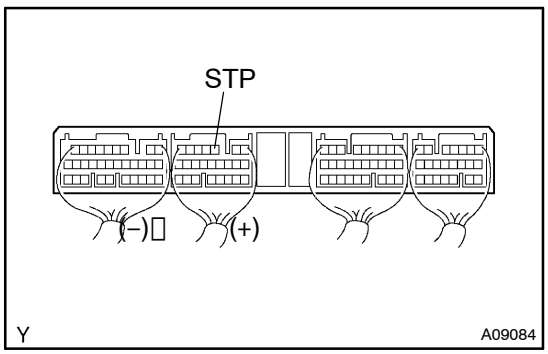
NG

2	Check stop light circuit (See page BE–25).

NG	Repair or replace stop light circuit.

OK

3	Check voltage between terminal STP of skid control ECU and body ground.



PREPARATION:

Remove skid control ECU with connectors still connected.

CHECK:

Measure voltage between terminal STP of skid control ECU and body ground when brake pedal is depressed.

OK:

Voltage: 8 – 14 V

OK	Check and replace skid control ECU.

NG

4	Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN–34).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–262).

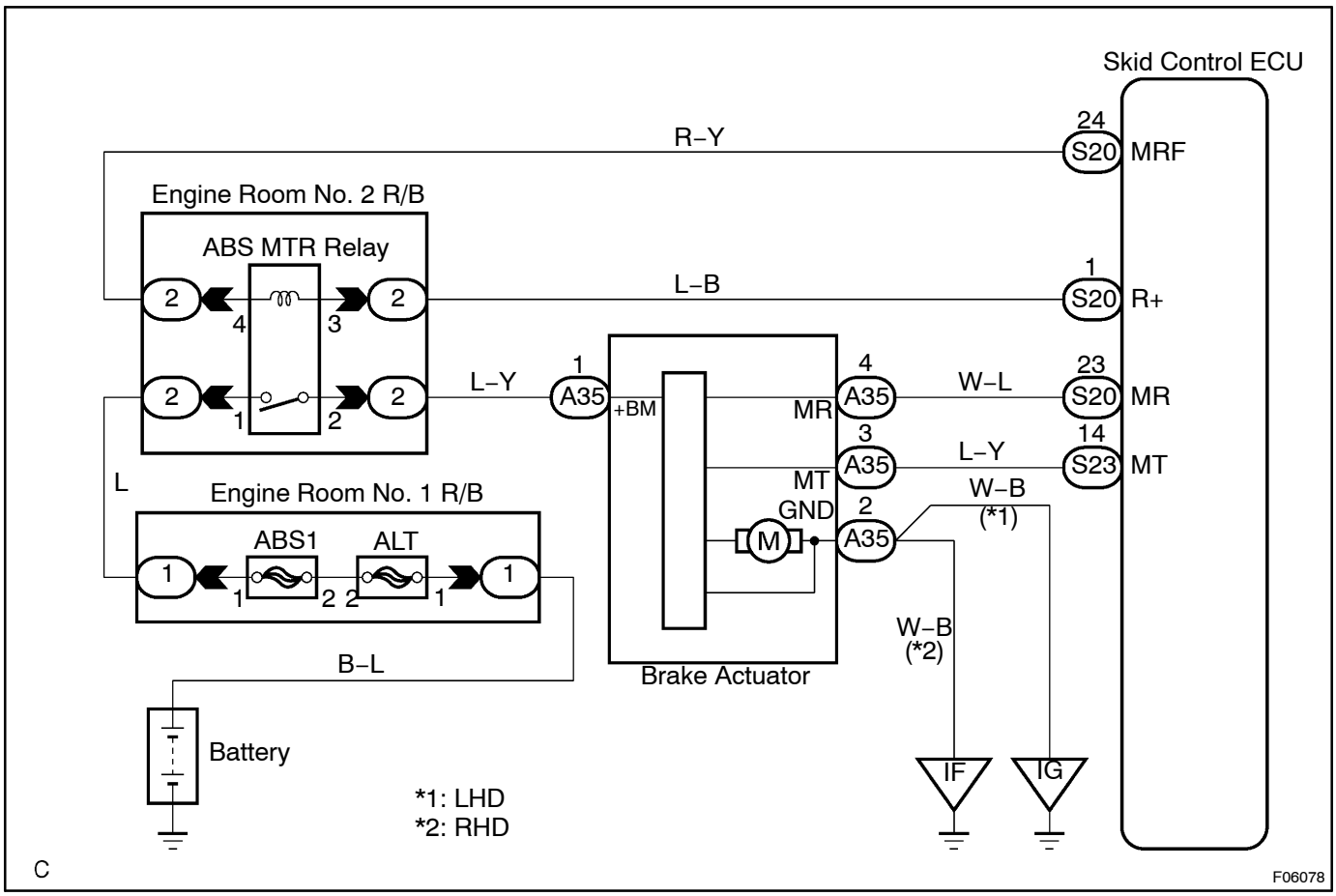
DI9I9–01

DTC	C1251 / 51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Either of the following 1. or 2. is detected: 1. Actuator drive motor is not operating normally. 2. Open circuit condition of actuator drive motor continues for 2 sec. or more.	• Brake Actuator • Brake Actuator 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 hand–held tester.

1	**Check ABS motor operation.**

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 the operation sound of the ABS motor when operating it with the hand–held tester.

OK:
The operation sound of the ABS motor should be heard.

NG → **Replace brake actuator.**

OK ↓

2	**Is there DTC C1251/51 being output again?**

YES → **Check and replace skid control ECU (See page IN–34).**

NO ↓

No problem.

DI0CG–07

DTC	Always ON	Skid Control ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Skid control ECU internal malfunction is detected.	• Skid control ECU

INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI–251.

YES → Repair circuit indicated by the code output.

NO

2	Is normal code displayed?

YES → Check solenoid relay. Check for short circuit in harness and connector between solenoid relay and check connector (See page IN–34).

NO

3	Does ABS warning light go off?

YES → Check for open or short circuit in harness and connector between ECU–IG fuse and skid control ECU (See page IN–34).

NO

4	**Check battery voltage.**

CHECK:

Check the battery voltage.

OK:

10 – 14 V

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

OK

5	**Check ABS warning light.**

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the connector from the skid control ECU.

(c) Turn the ignition switch ON.

CHECK:

Check the ABS warning light goes off.

OK → **Check and replace skid control ECU.**

NG

Check for short circuit in harness and connector between ABS warning light, DLC3 and skid control ECU (See page IN–34).

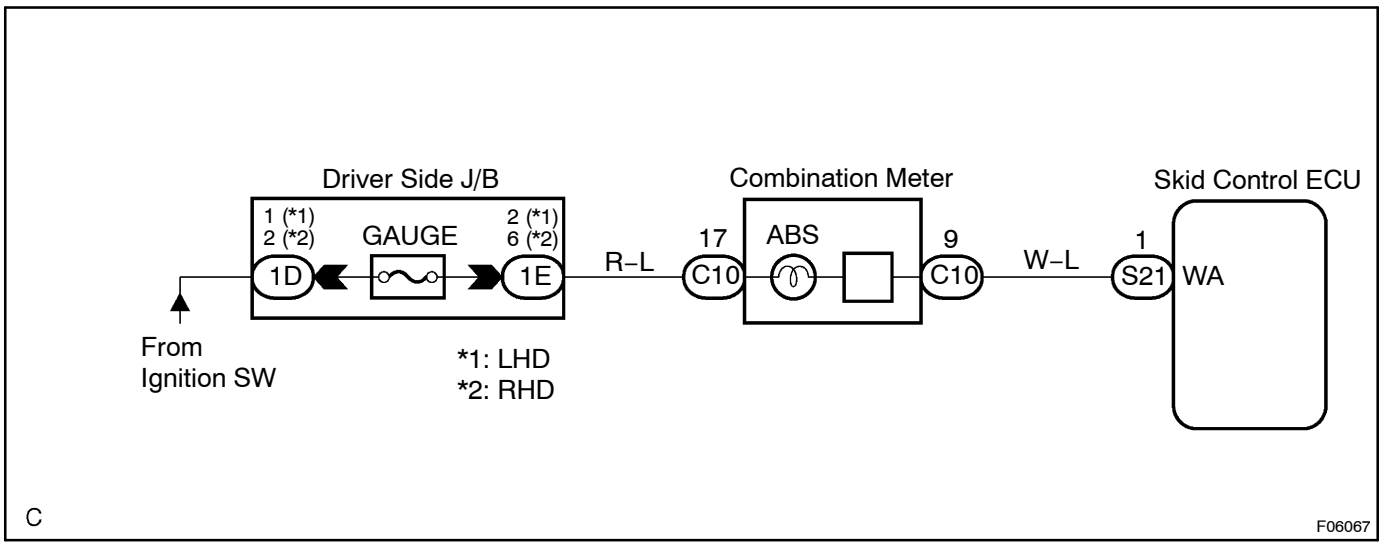
DI9IA–01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a 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.
Connect terminals Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

ABS warning light does not light up	*1
ABS warning light remains on	*2

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

*2: After inspection with step 3, start the inspection from step 4 in case of using the hand–held tester and start from step 5 in case of not using 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 by the hand–held tester.

HINT:

ABS warning light turns "OFF" automatically 2 sec. after is turned "ON".

OK → **Check and replace skid control ECU.**

NG

2	**Check ABS warning light.**

See combination meter troubleshooting (See page BE–2).

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

OK

Repair or replace and check for open circuit in harness and connector between combination meter and skid control ECU (See page IN–34).

3	Check that the skid control ECU connectors are securely connected to the skid control ECU.

NO → Connect the connector to the skid control ECU.

YES

4	Check operation of the ABS warning light (See step 1).

OK → Check and replace skid control ECU.

NG

5	Is DTC output?

Check DTC on page DI–251.

YES → Repair circuit indicated by the output code.

NO

6	Check ABS solenoid relay (See step 3).

NG → Ignition switch OFF, replace ABS solenoid relay.

OK

Check for short circuit in harness and connector between DLC3 and ABS solenoid relay (See page IN–34).

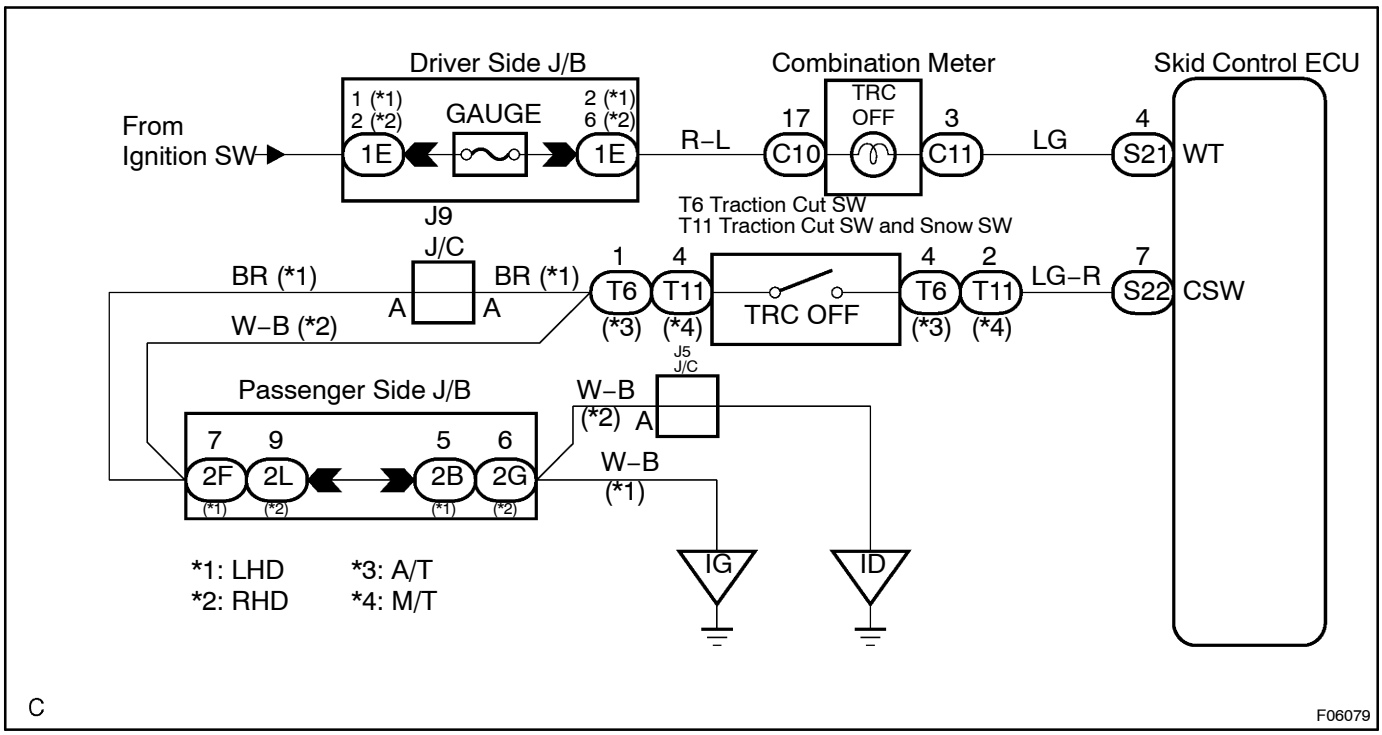
DI559–07

TRC OFF Indicator, TRC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRC control main switch. When the TRC cut switch is pushed on, TRC control goes off and the TRC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

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 TRC OFF indicator light.**

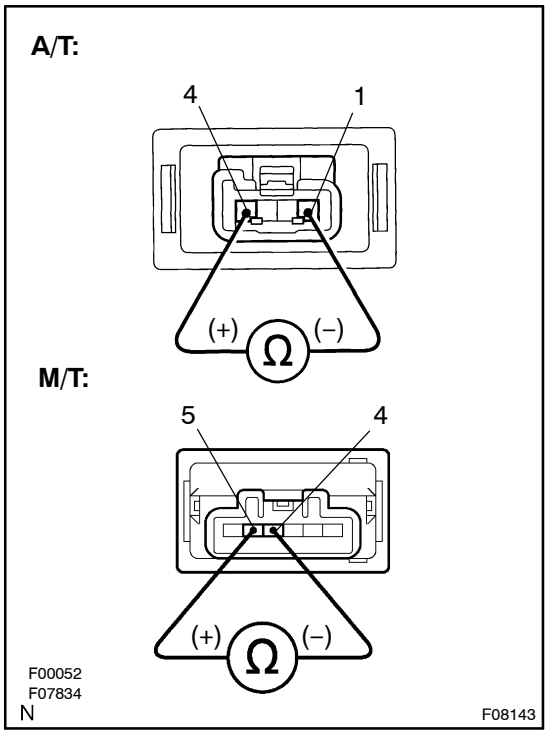
PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:
Check that ”ON” and ”OFF” of the TRC OFF indicator light can be shown on the combination meter by the hand–held tester.

NG → **Go to step 4.**

OK

2	**Check TRC OFF switch.**



PREPARATION:
Remove the TRC OFF switch and disconnect the connector from the TRC OFF switch.

CHECK:
Measure resistance between terminals 1 and 4 (A/T) or 4 and 5 (M/T) of TRC OFF switch when TRC OFF switch is on and off.

OK:

TRC OFF switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRC OFF switch.**

OK

3	Check for open and short circuit in harness and connector between terminal CSW of skid control ECU and TRC OFF switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check TRC OFF indicator light.

See combination meter troubleshooting on page BE–2.

NG → Repair bulb or combination meter assembly.

OK

5	Check for open and short circuit in harness and connector between terminal WT of skid control ECU and TRC OFF indicator light (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU.

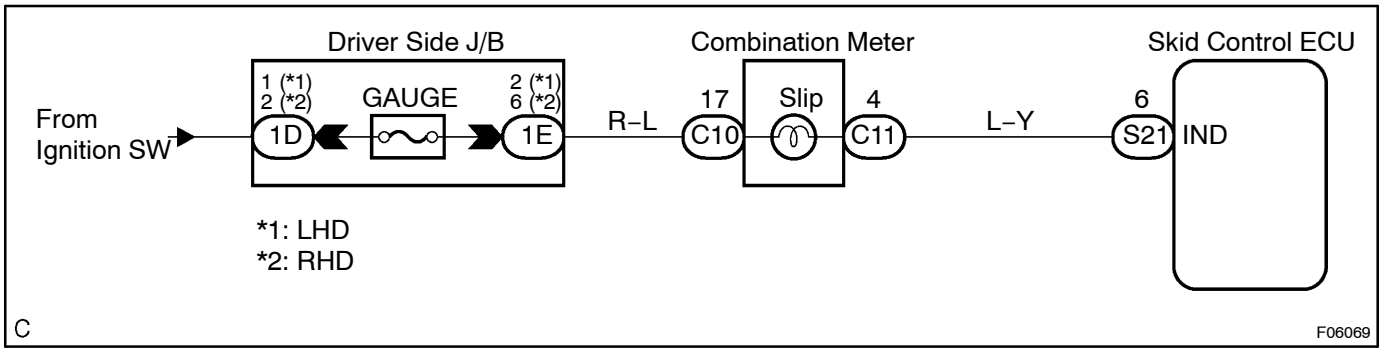
DI55A–04

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRC 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 by the hand–held tester.

OK → **Go to step 4.**

NG

2	**Check that the SLIP indicator light is ON for 3 seconds soon after ignition switch is turned ON.**

OK → **Check and replace skid control ECU.**

NG

3	**Check SLIP indicator light.**

See combination meter troubleshooting on page BE–2.

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

OK

4	**Check for open and short circuit in harness and connector between skid control ECU and SLIP indicator light (See page IN–34).**

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

OK

Check and replace skid control ECU.

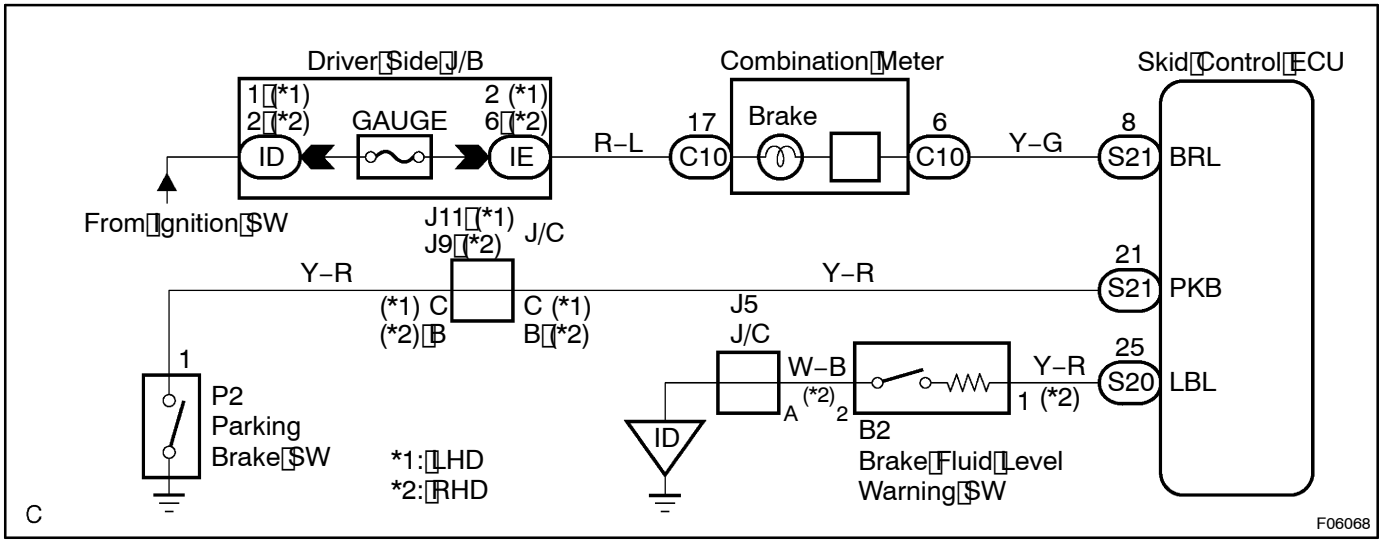
DI6QP–09

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check parking brake switch circuit (See page BE–2).

NG → Repair or replace parking brake switch circuit.

OK

2	Check brake fluid level warning switch circuit (See page BE–2).

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

OK

3	**Is DTC output for ABS?**

Check DTC on page DI–251.

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

No

4	**Check BRAKE warning light.**

See combination meter troubleshooting on page BE–2.

NG → **Repair or replace combination meter.**

OK

Check and replace skid control ECU.

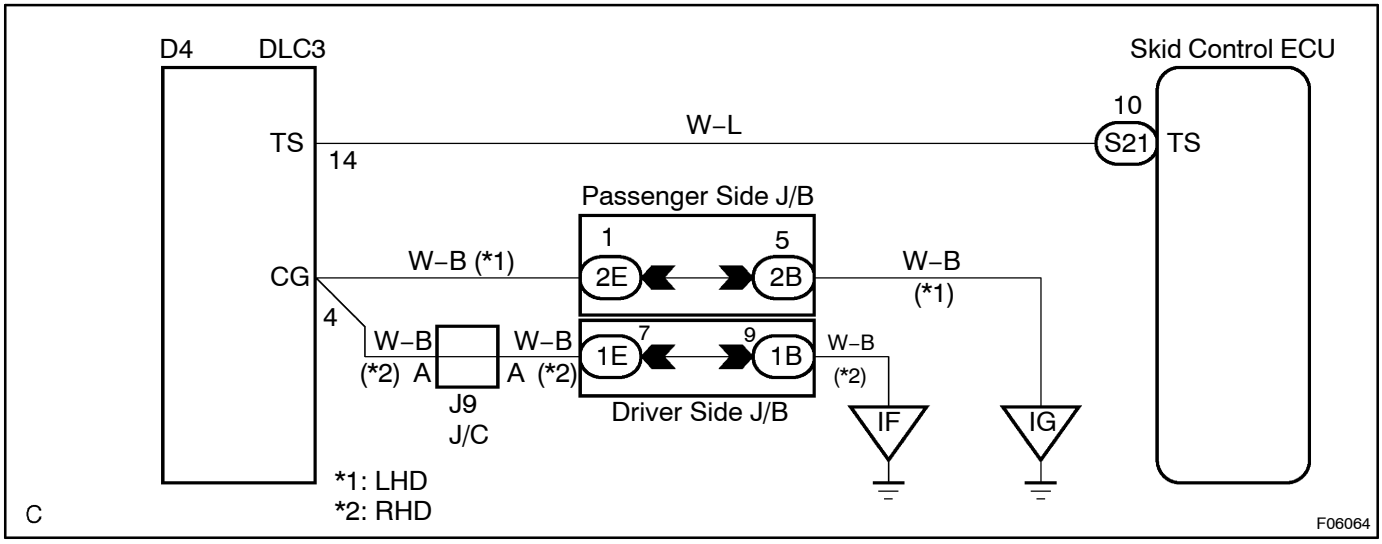
DI0CM–09

Ts Terminal Circuit

CIRCUIT DESCRIPTION

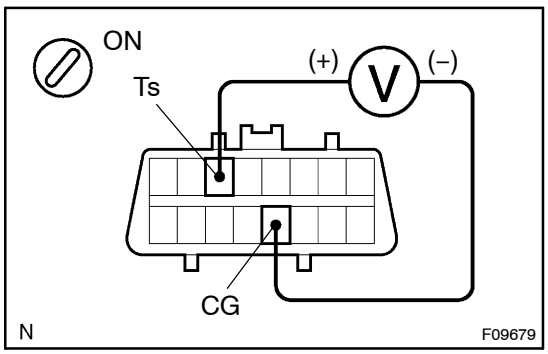
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check. Connecting terminals Ts and CG of the DLC3 starts the check.

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: 10 – 14 V

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

NG

2	Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN–34).

NG → Repair or replace harness or connector.

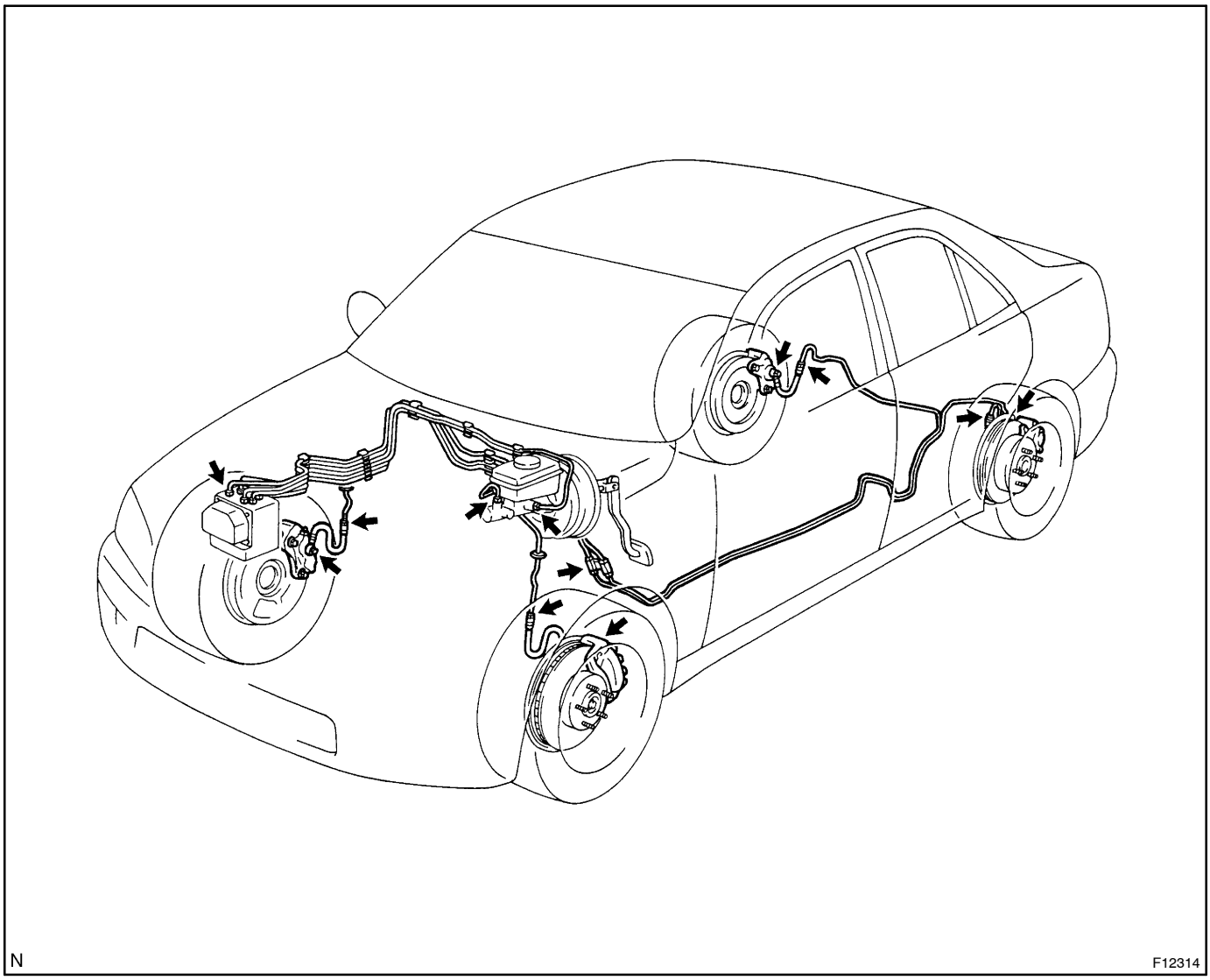
OK

Check and replace skid control ECU.

DI7V2–02

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



N

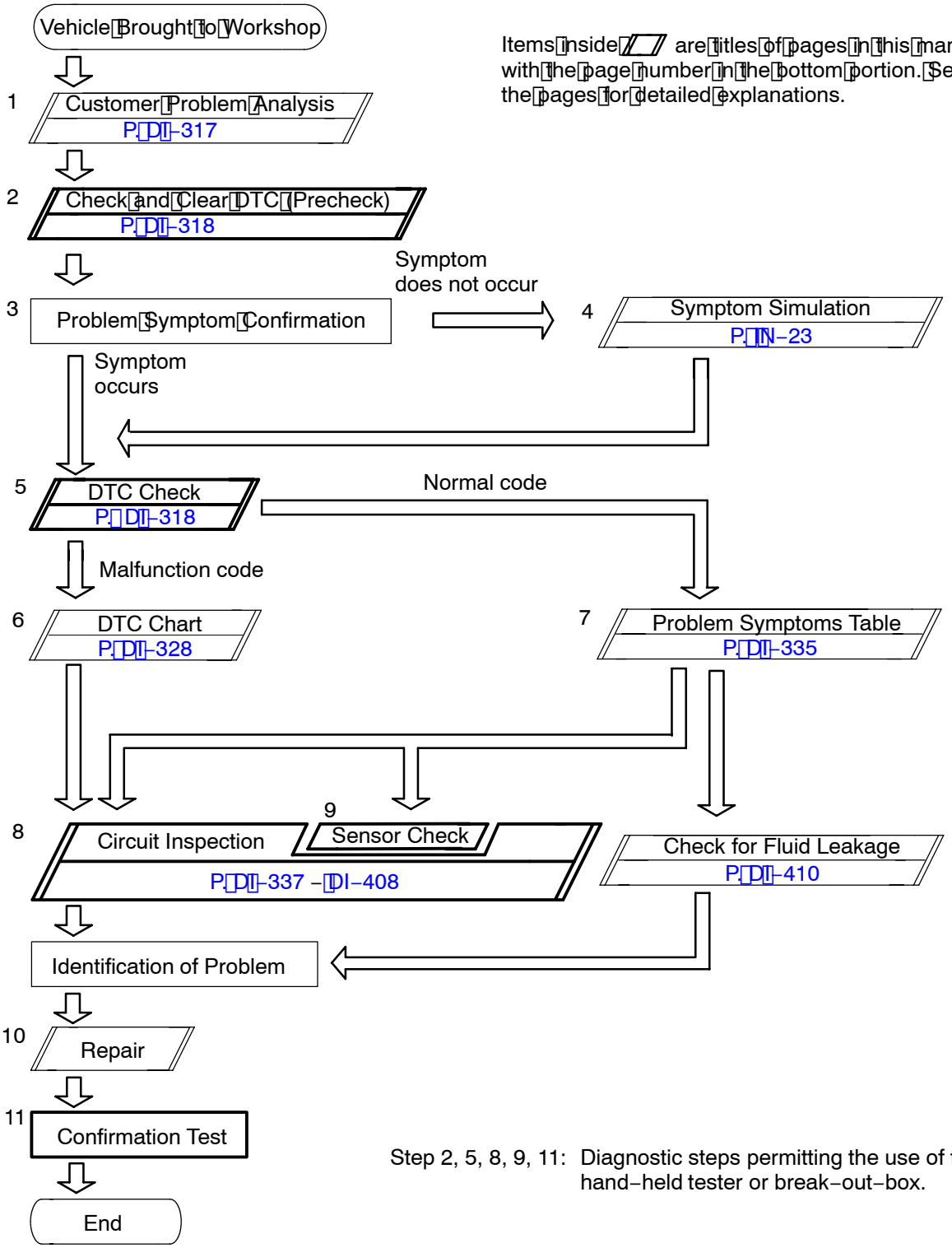
F12314

ABS WITH EBD & BA & TRC & VSC SYSTEM

DI7ZB–02

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,TRC OFF, BRAKE 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

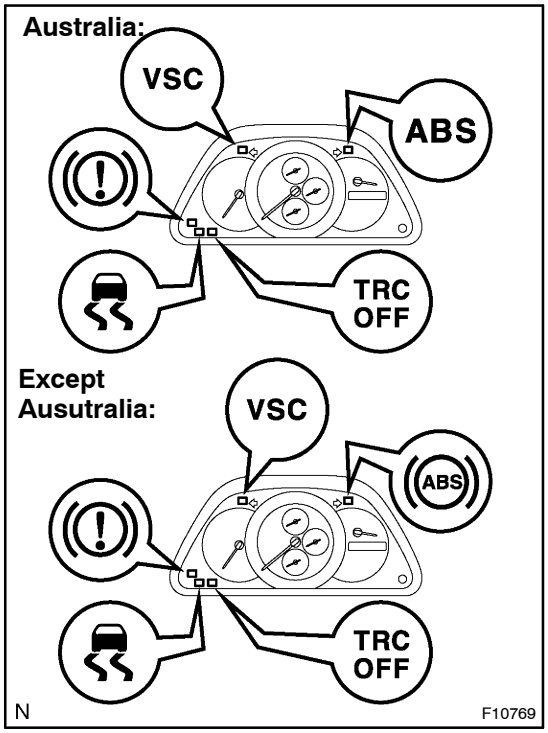
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

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)

DI9IB–01



PRE–CHECK

1. DIAGNOSIS SYSTEM

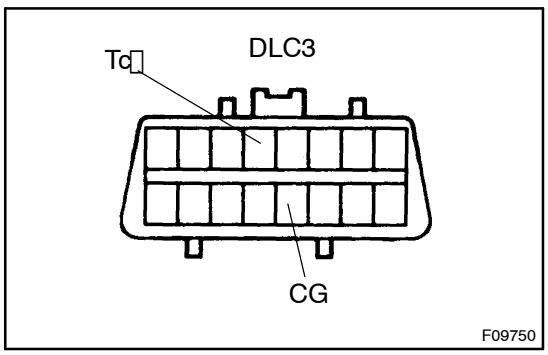
(a) Inspect the battery voltage.
Battery voltage: 10 – 14 V

(b) Check the warning lights and indicator lights.
(1) Release the parking brake pedal.
(2) When the ignition switch is ON, check that the ABS warning light, BRAKE warning light, TRC OFF indicator light and SLIP indicator light, VSC warning light go on for 3 sec.

HINT:

- If the ECU stores DTC, VSC warning light, ABS warning light, BRAKE warning light and TRC OFF indicator light are ON.
- If the check result is not normal, proceed to troubleshooting for the light circuit.

Trouble Area	See Page
ABS warning light circuit	DI–393
BRAKE warning light circuit	DI–401
VSC warning light circuit	DI–405
TRC OFF indicator light circuit	DI–396
SLIP indicator light circuit	DI–399

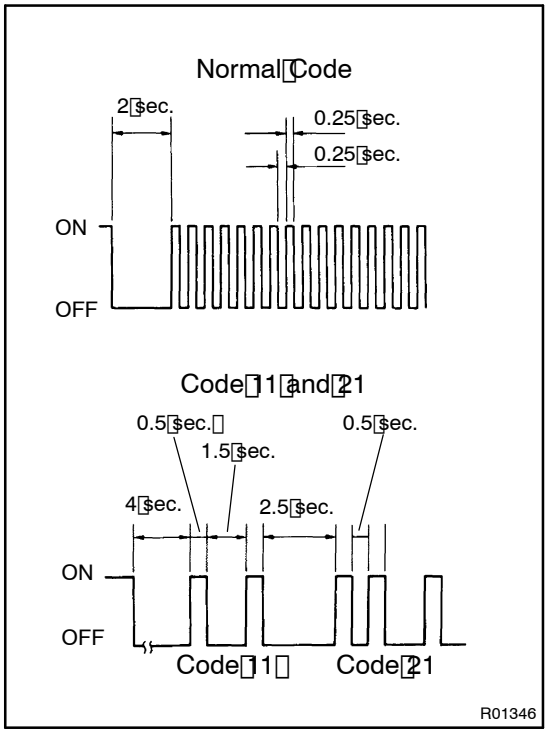


(c) In case of not using the hand–held tester:
Check the DTC of ABS system.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(2) Turn the ignition switch ON.
(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.

HINT:

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

Trouble Area	See page
ABS warning light circuit	DI–393
VSC warning light circuit	DI–403

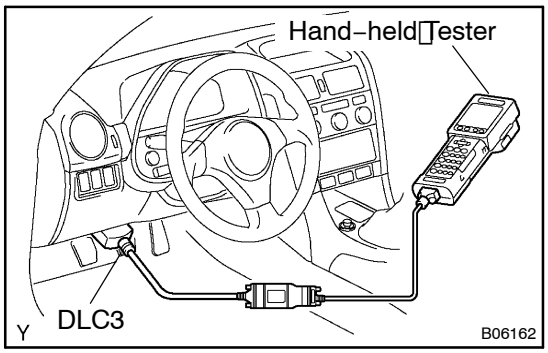


• As an example, the blinking patterns for the normal code and codes 11 and 21 are shown on the left.

(4) Codes are examples in the code table on page DI–328.

(5) After completing the check, disconnect terminal Tc and CG of DLC3, and turn off the display.

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



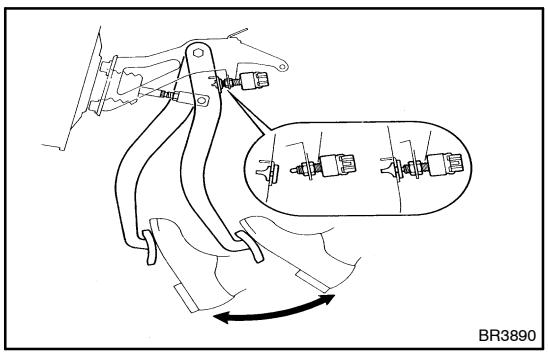
(d) In case of using the hand–held tester:
Check the DTC.

(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.



(e) In case of not using the hand–held tester:
Clear the DTC.

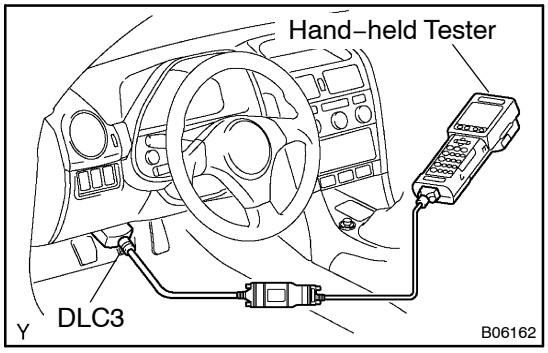
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

(2) Turn the ignition switch ON.

(3) Clear the DTC stored in ECU by depressing the brake pedal 8 times or more within 5 sec.

(4) Check that the warning light show the normal code.

(5) Remove the SST from the terminals of DLC3.
SST 09843–18040



(f) In case of using the 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.

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

2. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand–held tester.
(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up–dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand–held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 – 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 – 0.9 V Depress brake pedal: 3.2 – 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	–30 – 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	–70 – 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	–1.5 – 1.5
G (BACK & FORTH)	Back and forth G	–1.5 – 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

3. In case of not using the hand-held tester: ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

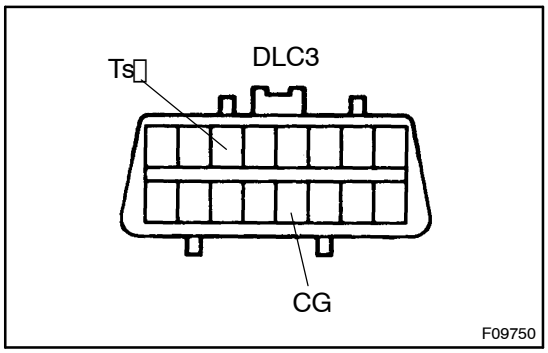
HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

(a) Procedures for test mode:

(1) Turn the ignition switch OFF.

(2) Set the shift lever to P range.



(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09846–18040

(4) Check that the steering wheel is in the straight-ahead position.

(5) Turn the ignition switch ON.

(6) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit or Ts terminal circuit.

Trouble Area	See page
Ts terminal circuit	DI–408
ABS warning light circuit	DI–393

(b) Check the deceleration sensor.
Keep the vehicle in a stationary condition on a level place for 1 sec. or more.

(c) Check the master cylinder pressure sensor.

(1) Leaving the vehicle in a stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.

(2) While the vehicle is stopped, release the brake pedal.

(3) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 sec.

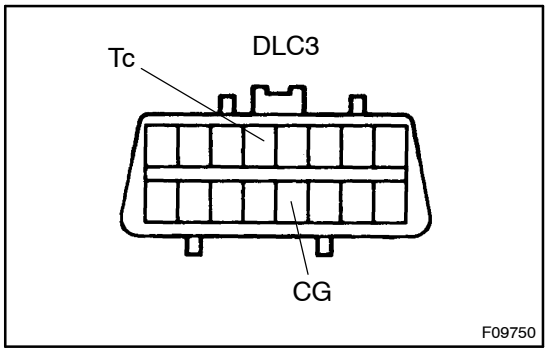
HINT:

Repeat the operation until the ABS warning light is lit.

(d) Check the speed sensor signal.
Drive the vehicle straightforward.
Drive the vehicle with the speed faster than 45 km/h (28 mph) for several seconds and check that the ABS warning light comes off.

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

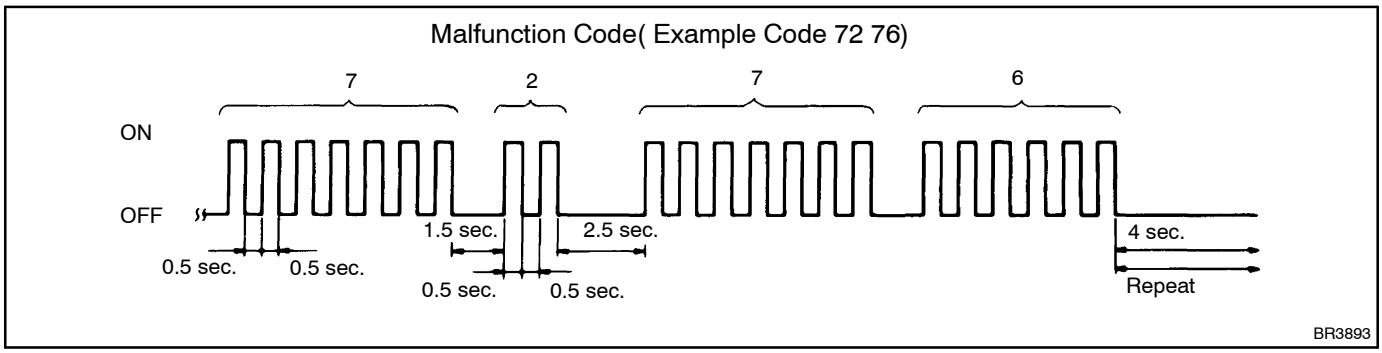
(e) Stop the vehicle.



(f) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

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

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

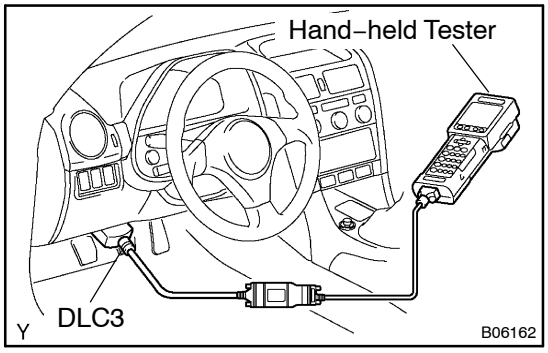


(h) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843–18040

4. In case of using the hand–held tester:
ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand–held tester to the DLC3.
(b) Do steps 3.–(a)–(2), (4) and (5) and from (b) to (e) on the previous pages.
(c) 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 ABS sensor check function:

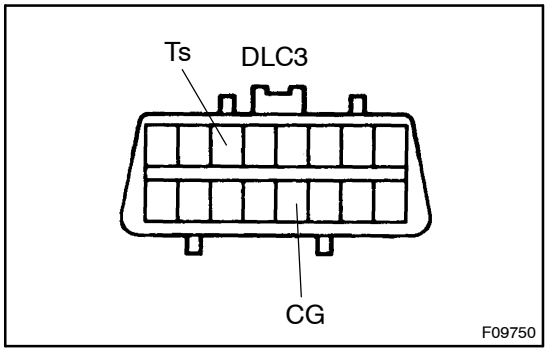
Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of Left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278 / 78	Abnormal change in output voltage of Left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	• Deceleration sensor • Sensor installation
C1281 / 81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor

5. In case of not using the hand–held tester: VSC SENSOR SIGNAL CHECK (TEST MODE)

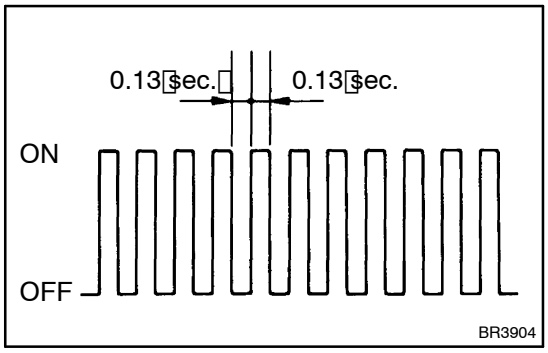
NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

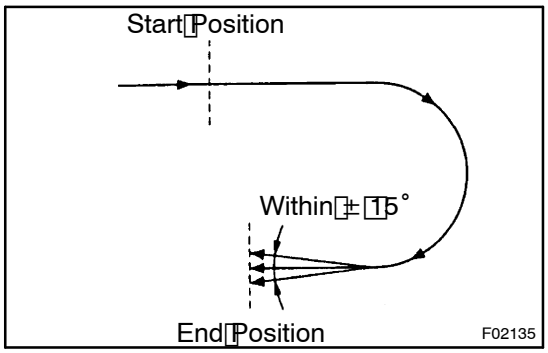


(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever position is at P range. Turn the steering wheel to the straight–ahead position.
(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040
(4) Start the engine.



(5) Check that the VSC warning light blinks.

HINT:
If the VSC warning light does not blink, inspect the VSC warning light circuit and Ts terminal circuit (See page DI–290, DI–307).



(b) Check the yaw rate sensor.
(1) Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 50 km/h (30 mph). Turn the steering wheel either to left or right for 90° or more, and maintain 180° circular drive for the vehicle.
Stop the vehicle and shift the shift lever to the P range. Check that the VSC warning buzzer sounds for 3 sec.

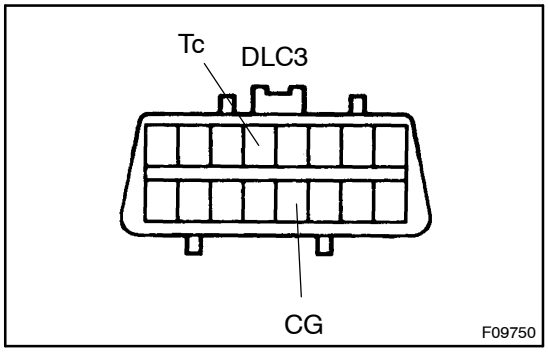
If the VSC warning buzzer sounds, the sensor check is in normal completion.
If the VSC warning buzzer does not sound, check the VSC warning buzzer circuit, then do the sensor check again.

Trouble Area	See page
VSC warning buzzer circuit	DI–405

If the VSC warning buzzer still does not sound, there is malfunction in the VSC sensor, so check the DTC.

HINT:
- Drive the vehicle circularly by 180°. At the end of the turn, the direction of the vehicle should be within 180° ± 15° from its start position.
- Do not spin the wheels.

(2) Check the steering angle sensor.
Turn the steering wheel to either left or right to the full lock position, from the vehicle stationary condition, and turn back the steering wheel to the neutral position.



(c) Read the DTC.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(2) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(3) Read the number of blinks of the VSC warning light.

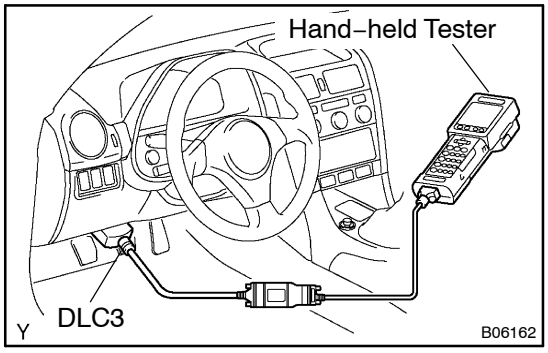
HINT:
- See the list of DTC shown in the next page.
- If every sensor is normal, a normal code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)

(4) 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

6. In case of using the hand–held tester:
VSC SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand–held tester to the DLC3.
(b) Do steps 5.–(a)–(2), (a)–(4) and (b) on the previous pages.
(c) 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 VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	• Yaw rate sensor • Yaw rate sensor circuit

7. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS

HINT:

- When having replaced the yaw rate sensor, deceleration sensor or the ECU, make sure to perform yaw rate and deceleration sensors' zero point calibration. Be sure to complete this step 6. once it is started.
- During step 6., a not–replaced sensor also requires zero point calibration.

NOTICE:

- **While obtaining the zero point, do not give any vibration to the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to do this on a level surface (within an inclination of 1 %).**

(a) Clear the zero points of the yaw rate and deceleration sensors.

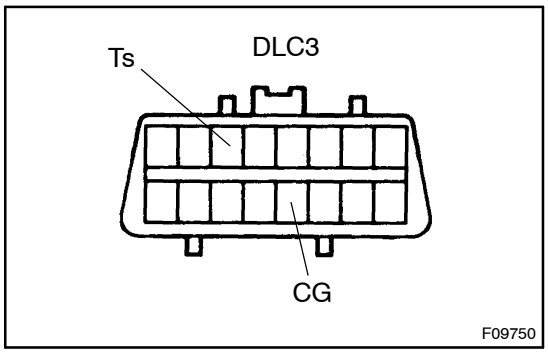
(1) Shift the shift lever to P range.

(2) Turn the ignition switch ON in a stationary condition.

(3) With the lit switch ON, using SST, repeat a cycle of short and open between terminals Ts and CG of DLC3 4 times or more within 8 sec. Check that the TRC OFF indicator light and VSC warning light is lit indicating the recorded zero point is erased.

SST 09843–18040

(4) Turn the ignition switch OFF.



(b) Obtain zero point of the yaw rate sensor.

(1) Make the terminals Ts and CG of DLC3 disconnected.

(2) Turn the ignition switch ON.

HINT:

The vehicle should be in a stationary condition with the shift lever in P range.

(3) Check that the lit TRC OFF indicator light and VSC warning light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

Even if the ignition is not turned OFF in step (a)–(4) and remains ON, the yaw rate sensor zero point calibration can be completed. In this case, the TRC OFF indicator light and VSC warning light is lit for about 15 sec. and then VSC warning light starts blinling.

(4) After ensuring that the TRC OFF indicator light and VSC warning light remains OFF for 2 sec., turn the ignition switch OFF.

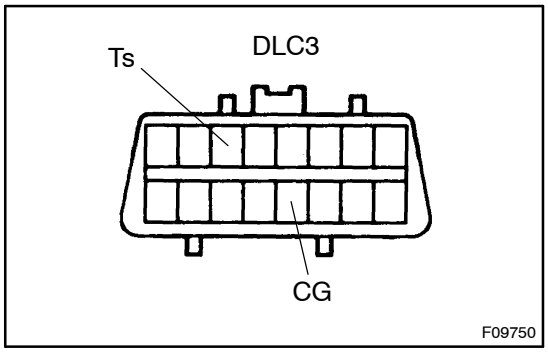
HINT:

If the ignition switch is not turned OFF in step (a)–(4), make sure that the VSC warning light light blinks for 2 sec. Then turn the ignition switch OFF.

(c) Perform deceleration sensor zero point calibration.

NOTICE:

After step (b) (the yaw rate sensor zero point calibration), the VSC warning light goes off. At this time, if the vehicle is driven without performing step (c) (deceleration sensor zero point calibration), deceleration sensor zero point calibration malfunction will be detected and the TRC OFF indicator light and VSC warning light will light up. Therefore, perform step (c) right after step (b).



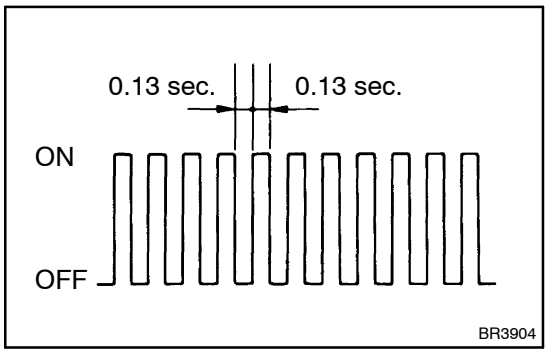
(1) Using SST, connect the terminals Ts and CG of DLC3.

SST 09843–18040

(2) Turn the ignition switch ON.

HINT:

Place the vehicle in a stationary condition with the shift lever in P range.



(3) After turning the ignition switch ON, check that the VSC warning light is lit for about 4 sec. and then starts quick blinking at 0.13 sec. intervals.

(4) After ensuring the blinking of the VSC warning light for 2 sec., turn the ignition switch OFF.

(5) Remove the SST and make the terminals Ts and CG of DLC3 disconnected.

SST 09843–18040

DI0WA–15

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Before replacing or removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843–18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is not found on inspected parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit indicated by DTC. For details of each code, turn to the pages in the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0200 / 31*1 (DI–337)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Sensor rotor
C0205 / 32*1 (DI–337)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI–337)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI–337)	Left rear wheel speed sensor signal malfunction	
C0226 / 21 (DI–343)	Open or short circuit in brake actuator solenoid circuit (SFR circuit)	• Brake actuator • SFRH or SFRR circuit
C0236 / 22 (DI–343)	Open or short circuit in brake actuator solenoid circuit (SFL circuit)	• Brake actuator • SFLH or SFLR circuit
C0246 / 23 (DI–343)	Open or short circuit in brake actuator solenoid circuit (SRR circuit)	• Brake actuator • SRRH or SRRR circuit
C0256 / 24 (DI–343)	Open or short circuit in brake actuator solenoid circuit (SRL circuit)	• Brake actuator • SRLH or SRLR circuit
C0273 / 13*1 (DI–345)	Open circuit in ABS MTR relay circuit	• ABS MTR relay • ABS MTR relay circuit
C0274 / 14 (DI–345)	Short circuit in ABS MTR relay circuit	
C0278 / 11 (DI–349)	Open circuit in ABS SOL relay circuit	• ABS SOL relay • ABS SOL relay circuit
C0279 / 12 (DI–349)	Short circuit in ABS SOL relay circuit	
C1225 / 25 (DI–361)	Open or short circuit in brake actuator solenoid circuit (SM circuit)	• Brake actuator • SMF or SMR circuit
C1226 / 26 (DI–361)	Open or short circuit in brake actuator solenoid circuit (SRM circuit)	• Brake actuator • SRMF or SRMR circuit
C1227 / 27 (DI–361)	Open or short circuit in brake actuator solenoid circuit (SRC circuit)	• Brake actuator • SRCF or SRCR circuit
C1235 / 35 (DI–337)	Foreign matter is attached on the tip of the right front sensor	• Right front, left front, right rear, left rear speed sensor • Sensor rotor
C1236 / 36 (DI–337)	Foreign matter is attached on the tip of the left front sensor	
C1238 / 38 (DI–337)	Foreign matter is attached on the tip of the right rear sensor	
C1239 / 39 (DI–337)	Foreign matter is attached on the tip of the left rear sensor	

C1241 / 41 (DI–370)	Low battery voltage	• Battery • Charging system • Power source circuit
C1243 / 43*1 (DI–373)	Malfunction in deceleration sensor (constant output)	• Deceleration sensor • Wire harness for deceleration sensor system
C1244 / 44 (DI–373)	Open or short circuit in deceleration sensor circuit	• Deceleration sensor • Deceleration sensor circuit
C1245 / 45*1 (DI–373)	Malfunction in deceleration sensor (output error)	• Deceleration sensor • Wire harness for deceleration sensor system
C1246 / 46*2 (DI–377)	Malfunction in master cylinder pressure sensor	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1249 / 49 (DI–381)	Open circuit in stop light switch circuit	• Stop light bulb • Stop light switch circuit
C1251 / 51*1 (DI–384)	ABS pump motor is locked Open circuit in pump motor circuit	ABS pump motor
C1360 / 61 (DI–377)	Malfunction in comparative master cylinder pressure sensor	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
Always ON (DI–386)	Malfunction in skid control ECU	• Power source circuit • ABS warning light circuit • Multiplex communication circuit • Skid control ECU

*1, *2:

Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

- *1:
  (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  (2) Clear the DTC (See page DI–318).
- *2:
  (1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.
  (3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (4) Clear the DTC (See page DI–318).

HINT:

There is a case that hand–held tester cannot be used when ABS warning light is always on.

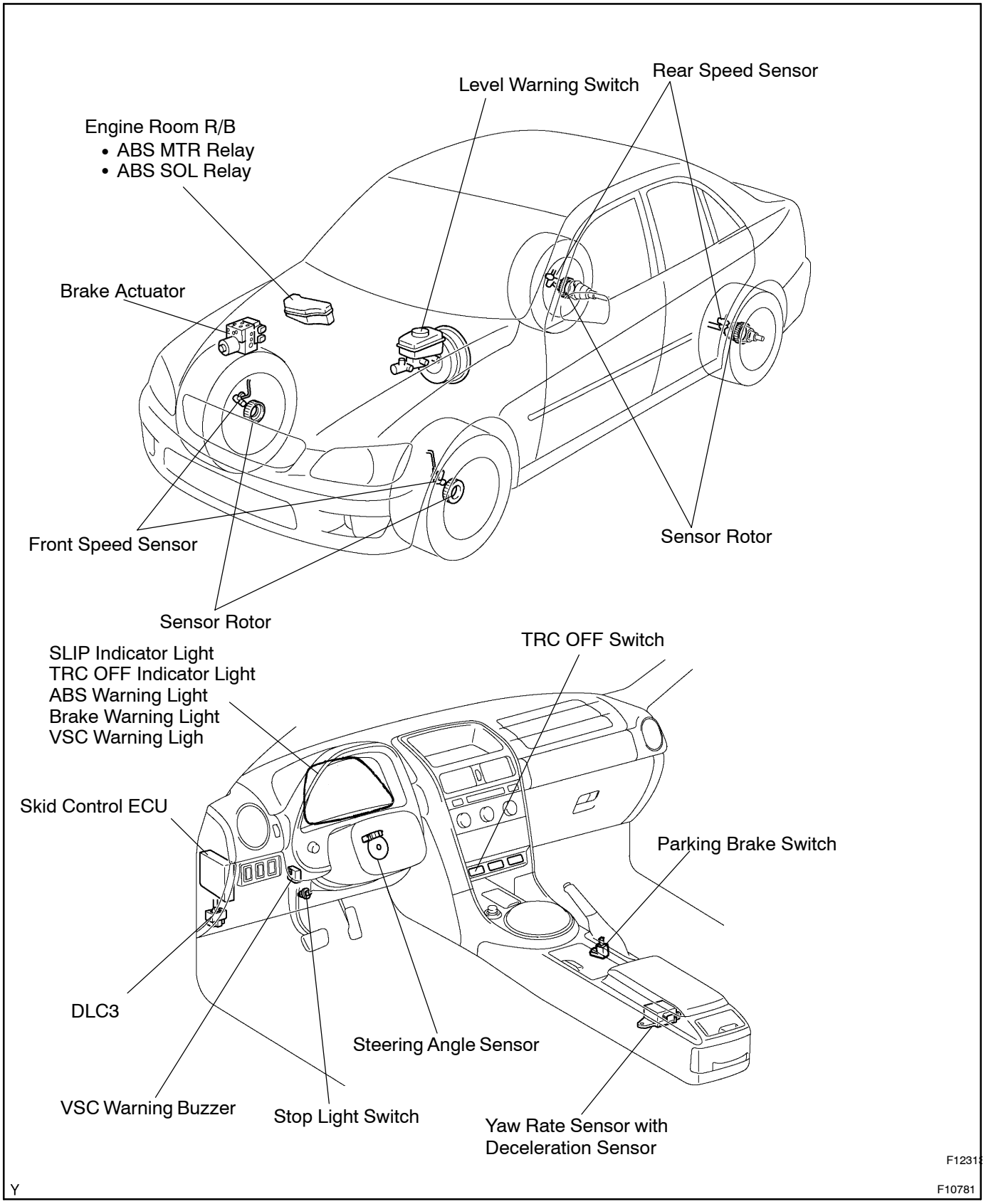
DTC chart of VSC:

DTC No. (See Page)	Detection Item	Trouble Area
C1201 / 51 (DI–353)	Malfunction in engine and ECT ECU	Engine control system
C1202 / 52 (DI–354)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	• Brake fluid level • Brake fluid level warning switch • Brake fluid level warning switch circuit
C1203 / 53 (DI–356)	Malfunction in engine and ECT ECU communication circuit	• TRC+ or TRC– circuit • ENG+ or ENG– circuit • Engine and ECT ECU
C1223 / 43 (DI–358)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI–359)	Open or short circuit in NEO signal circuit	• NEO circuit • Engine and ECT ECU
C1231 / 31 (DI–363)	Malfunction in steering angle sensor	• Steering angle sensor • Steering angle sensor circuit
C1233 / 33 (DI–367)	Open or short circuit in yaw rate sensor circuit	• Yaw rate sensor • Yaw rate sensor circuit
C1234 / 34 (DI–367)	Malfunction in yaw rate sensor	
C1335 / 35 (DI–363)	Open circuit in steering angle sensor	• Steering angle sensor • Steering angle sensor circuit
Always ON (DI–390)	Malfunction in skid control ECU Open circuit in VSC warning indicator circuit	• Power source circuit • Skid control ECU

HINT:
In some cases hand–held tester cannot be used when VSC warning light is always on.

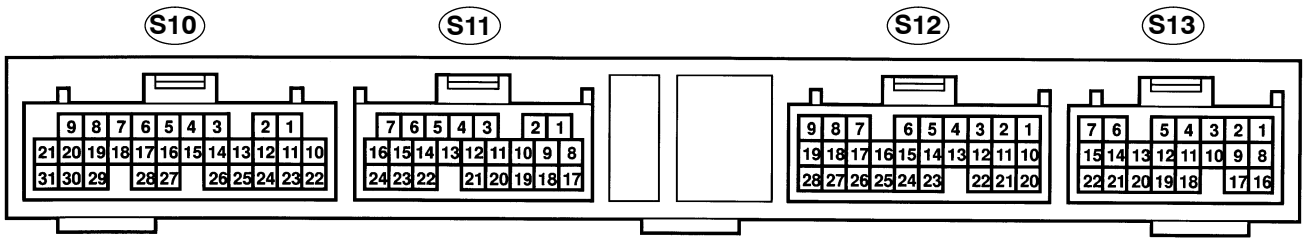
DI9IC–01

PARTS LOCATION



DI1GG–10

TERMINALS OF ECU



F02094

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S23 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	B*1 ↔ W–B R*2 ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SM1– (S23 – 2) – GND (S23 – 15, 22, S20 – 2, 3)	B–L*1 ↔ W–B L*2 ↔ W–B	IG switch OFF	Continuity
SM1+ (S23 – 3) – GND (S23 – 15, 22, S20 – 2, 3)	B–R*1 ↔ W–B R–L*2 ↔ W–B	IG switch ON, ABS warning light OFF	Below 1.0
SM2– (S23 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	L–B ↔ W–B	IG switch OFF	Continuity
SM2+ (S23 – 5) – GND (S23 – 15, 22, S20 – 2, 3)	G–B*1 ↔ W–B W–R*2 ↔ W–B	IG switch ON, ABS warning light OFF	Below 1.0
AST (S23 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLH (S23 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	G–W ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRR (S23 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
PMC (S23 – 10) – E2 (S23 – 19)	R ↔ W	IG switch ON, stop light switch OFF	0.3 – 0.8
E3 (S23 – 12) – GND (S23 – 15, 22, S20 – 2, 3)	Y ↔ W–B	IG switch OFF	Continuity
FSS (S23 – 13) – GND (S23 – 15, 22, S20 – 2, 3)	Shielded ↔ W–B	IG switch OFF	Continuity
MT (S23 – 14) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y ↔ W–B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S23 – 16) – GND (S23 – 15, 22, S20 – 2, 3)	LG ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
PMC2 (S23 – 18) – E3 (S23 – 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 – 0.8
E2 (S23 – 19) – GND (S23 – 15, 22, S20 – 2, 3)	W ↔ W–B	IG switch OFF	Continuity
VCM (S23 – 20) – GND (S23 – 15, 22, S20 – 2, 3)	B ↔ W–B	IG switch ON	4.5 – 5.5
VCM2 (S23 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	IG switch ON	4.5 – 5.5
VYS (S22 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	L ↔ W–B	IG switch ON	4.5 – 5.5
YSS (S22 – 3) – GND (S23 – 15, 22, S20 – 2, 3)	Shielded ↔ W–B	IG switch OFF	Continuity

TRIG (S22 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON	Above 3.5
CSW (S22 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	LG–R ↔ W–B	IG switch ON, TRC OFF switch OFF	10 – 14
YAW2 (S22 – 10) – GND (S23 – 15, 22, S20 – 2, 3)	R*1 ↔ W–B BR*2 ↔ W–B	IG switch ON, yawrate sensor is stationary	2 – 3
GSS (S22 – 12) – GND (S23 – 15, 22, S20 – 2, 3)	Shielded ↔ W–B	IG switch OFF	Continuity
YD (S22 – 16) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	IG switch ON, VSC warning light OFF	Above 4.5
SS1+ (S22 – 18) – SS1– (S22 – 27)	LG–B ↔ LG	Engine idling, slowly tun steering wheel	Pulse generation
GYAW (S12 – 20) – GND (S23 – 15, 22, S20 – 2, 3)	Y ↔ W–B	IG switch OFF	Continuity
GL1 (S22 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	W ↔ W–B	IG switch ON, vehicle is stopped	0.5 – 4.5
GL2 (S22 – 22) – GND (S23 – 15, 22, S20 – 2, 3)	BR*1 ↔ W–B R*2 ↔ W–B	IG switch ON, vehicle is stopped	0.5 – 4.5
NEO (S22 – 26) – GND (S23 – 15, 22, S20 – 2, 3)	G ↔ W–B	Engine idling	Pulse generation
D/G (S22 – 28) – GND (S23 – 15, 22, S20 – 2, 3)	W–R*1 ↔ W–B W*2 ↔ W–B	IG switch ON	10 – 14
WA (S21 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON, ABS warning light ON	4 – 8
		IG switch ON, ABS warning light OFF	Below 2.0
SP1 (S21 – 2) – GND (S23 – 15, 22, S20 – 2, 3)	R–Y*1 ↔ W–B V–W*2 ↔ W–B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
STP (S21 – 3) – GND (S23 – 15, 22, S20 – 2, 3)	G–R ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
WT (S21 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	LG ↔ W–B	IG switch ON, TRAC OFF indicator light ON	Below 2.0
		IG switch ON, TRAC OFF indicator light OFF	10 – 14
BZ (S21 – 5) – GND (S23 – 15, 22, S20 – 2, 3)	L–R ↔ W–B	IG switch ON, VSC buzzer is sounded	Below 1.0 ↔ 10 – 14
		IG switch ON, VSC buzzer is not sounded	10 – 14
IND (S21 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y ↔ W–B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 – 14
IG1 (S21 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	B–R ↔ W–B	IG switch ON	10 – 14
BRL (S21 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	Y–G ↔ W–B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
		IG switch ON, fluid in master cylinder reservoir below MIN level or parking brake switch is ON (Brake warning light ON)	10 – 14
ENG+ (S21 – 9) – ENG– (S21 – 18)	L–B ↔ P	IG switch ON	Pulse generation
Ts (S21 – 10) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON	10 – 14
TRC+ (S21 – 11) – TRC– (S21 – 20)	R–Y ↔ W–G	IG switch ON	Pulse deneration
FRO (S21 – 13) – GND (S23 – 15, 22, S20 – 2, 3)	W–R ↔ W–B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation

VSCW (S21 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	Y–B ↔ W–B	IG switch ON, VSC warning light ON	Below 2.0
		IG switch ON, VSC warning light OFF	10 – 14
RR+ (S21 – 16) – RR– (S21 – 15)	G*1 ↔ B W*2 ↔ B	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S21 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 – 14
RL+ (S21 – 22) – RL– (S21 – 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
+BO (S21 – 24) – GND (S23 – 15, 22, S20 – 2, 3)	W ↔ W–B	Always	10 – 14
R+ (S20 – 1) – GND (S23 – 15, 22, S20 – 2, 3)	L–B ↔ W–B	IG switch ON	10 – 14
SRM1 (S20 – 4) – GND (S23 – 15, 22, S20 – 2, 3)	B–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRC2 (S20 – 5) – GND (S23 – 15, 22, S20 – 2, 3)	G–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLH (S20 – 6) – GND (S23 – 15, 22, S20 – 2, 3)	L–R*1 ↔ W–B W–G*2 ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLR (S20 – 7) – GND (S23 – 15, 22, S20 – 2, 3)	L–Y*1 ↔ W–B W*2 ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRH (S20 – 8) – GND (S23 – 15, 22, S20 – 2, 3)	L–O*1 ↔ W–B R–W*2 ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRR (S20 – 9) – GND (S23 – 15, 22, S20 – 2, 3)	G–Y*1 ↔ W–B W–L*2 ↔ W–B	IG switch ON, ABS warning light OFF	10 –14
SR (S20 – 10) – R+ (S10 – 1)	L–R ↔ L–B	IG switch ON, ABS warning light OFF	Below 1.0
FR+ (S20 – 13) – FR– (S20 – 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S20 – 21) – GND (S23 – 15, 22, S20 – 2, 3)	B–O ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
+BI (S20 – 22) – GND (S23 – 15, 22, S20 – 2, 3)	W–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
MR (S20 – 23) – GND (S23 – 15, 22, S20 – 2, 3)	W–L ↔ W–B	IG switch ON, ABS motor stops	10 – 14
MRF (S20 – 24) – GND (S23 – 15, 22, S20 – 2, 3)	R–Y ↔ W–B	IG switch ON	10 – 14
LBL (S20 – 25) – GND (S23 – 15, 22, S20 – 2, 3)	Y–R ↔ W–B	IG switch ON, fluid in master cylinder reservoir above MIN level	4 – 8
FL+ (S20 – 28) – FL– (S20 – 27)	LG ↔ V	IG switch ON, slowly turn left front wheel	Pulse generation
SRC1 (S20 – 31) – GND (S23 – 15, 22, S20 – 2, 3)	G–O ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14

DI0WG–15

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 skid control ECU, sensor or etc., turn the ignition switch OFF.

Symptom	Suspect Area	See page
ABS does not operate BA does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 3. Check the DTC again and make sure that the normal code is output. 4. IG power source circuit 5. Speed sensor circuit 6. Check the brake actuator with a hand–held tester. If abnormal, check the hydraulic circuit for leakage. (See page DI–410)	 DI–318 DI–370 DI–337 BR–20
ABS does not operate efficiently BA does not operate efficiently	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure 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. (See page DI–410)	 DI–318 DI–337 DI–381 BR–20
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI–393 IN–34
DTC of ABS check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	 DI–318
Sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI–408 IN–34
TRC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI–318 DI–370 DI–410 DI–337
VSC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit	 DI–318 DI–370 DI–410 DI–337 DI–373 DI–367 DI–363

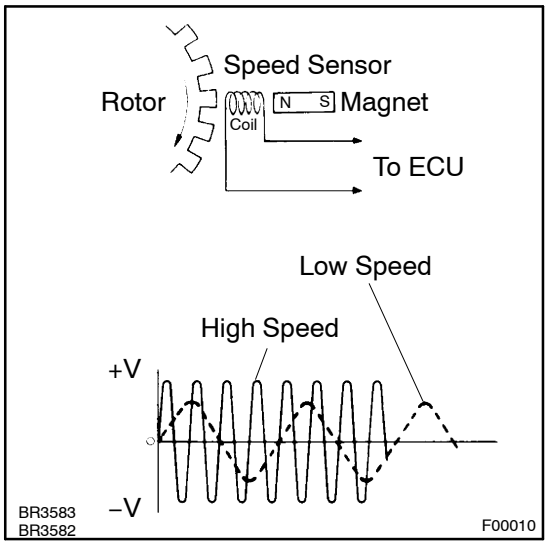
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI–399 IN–34
TRC OFF indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. TRC OFF switch circuit	 DI–318 DI–396
DTC of VSC check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	 DI–318
VSC warning indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. VSC warning indicator circuit	 DI–318 DI–403

DI9ID–01

CIRCUIT INSPECTION

DTC	C0200 / 31 – C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



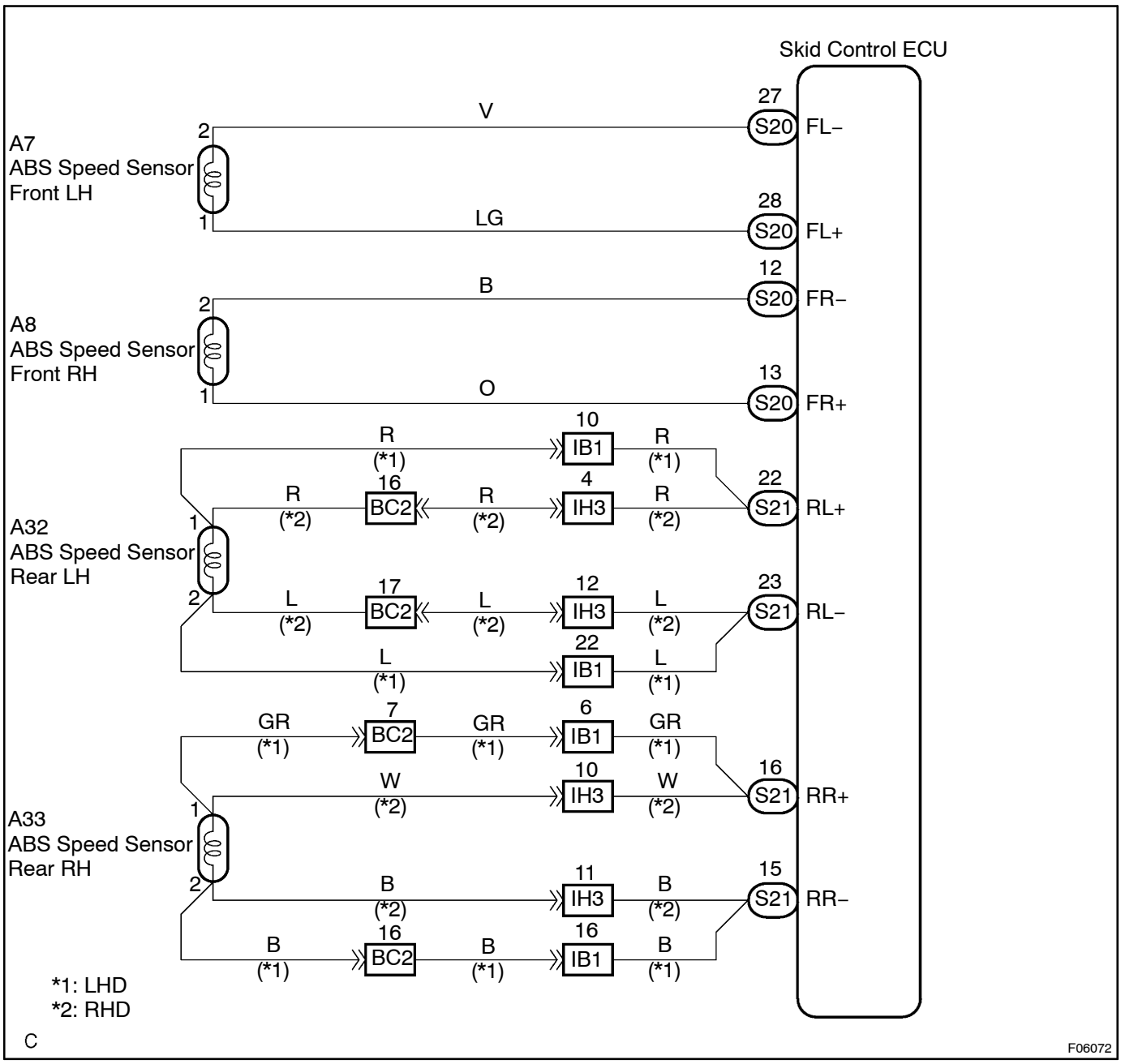
The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRC & VSC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed 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 measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	• Right front, left front, right rear, left rear speed sensor • Each speed sensor circuit • Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Nose have been counted 75 times in 5 sec.	• Right front, left front, right rear, left rear speed sensor • Sensor rotor

HINT:

- DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

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 speed sensor.**

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

CHECK:
Check that there is no difference between the speed value output from the speed sensor observed in the hand–held tester and the speed value displayed by the speedometer when the vehicle is in motion.

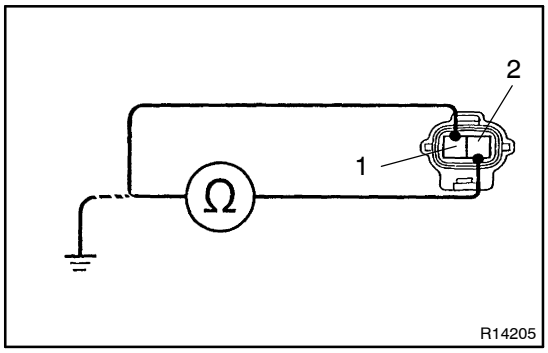
OK:
There is almost no difference in the displayed speed values.

HINT:
There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



Front:

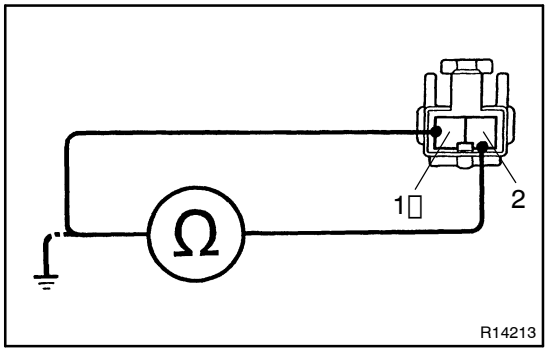
PREPARATION:
(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.
(c) Turn the ignition switch OFF.

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

OK:
Resistance: 1.6 – 1.8 kΩ at 20°C

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

OK:
Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.
(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(c) Disconnect the speed sensor connector.
(d) Turn the ignition switch OFF.

CHECK:

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

OK:

Resistance: 0.9 – 1.3 kΩ at 25 ± 5°C

CHECK:

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

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor or sub–wire harness.**

NOTICE:

Check the speed sensor signal (See page DI–318).

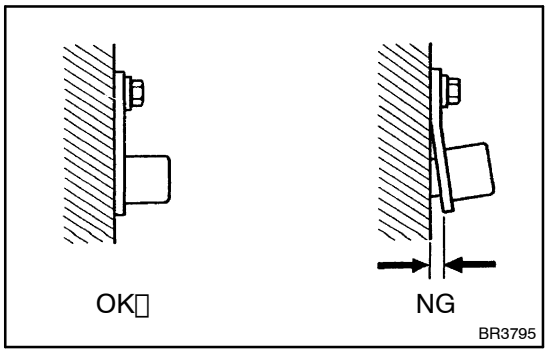
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN–34).**

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

OK

4	Check 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.

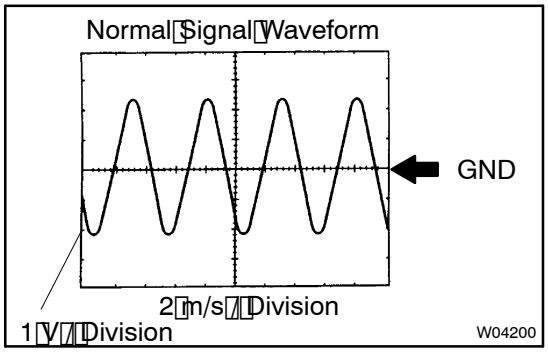
NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal (See page DI–318).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with the connector still connected.

(b) Connect the oscilloscope to the terminals FR+ – FR–, FL+ – FL–, RR+ – RR– and RL+ – RL– of the skid control ECU.

CHECK:

Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

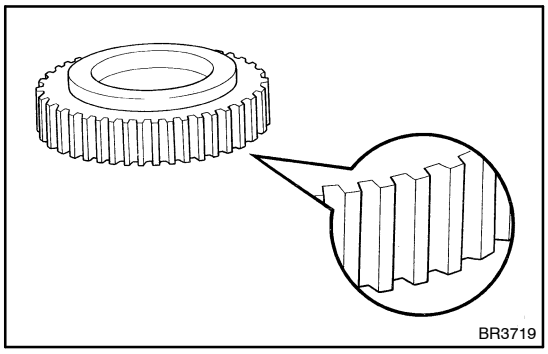
HINT:

- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK	Check and replace skid control ECU.

NG

6	Check sensor rotor and sensor tip.


BR3719

Front:

PREPARATION:

Remove the front axle hub and the speed sensor.

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

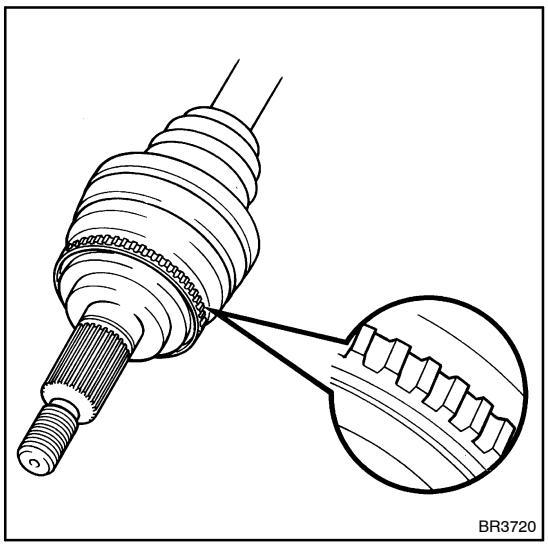
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.


BR3720

Rear:

PREPARATION:

Remove the drive shaft.

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor.

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI–318).

OK

Check and replace skid control ECU.

DI1GI–10

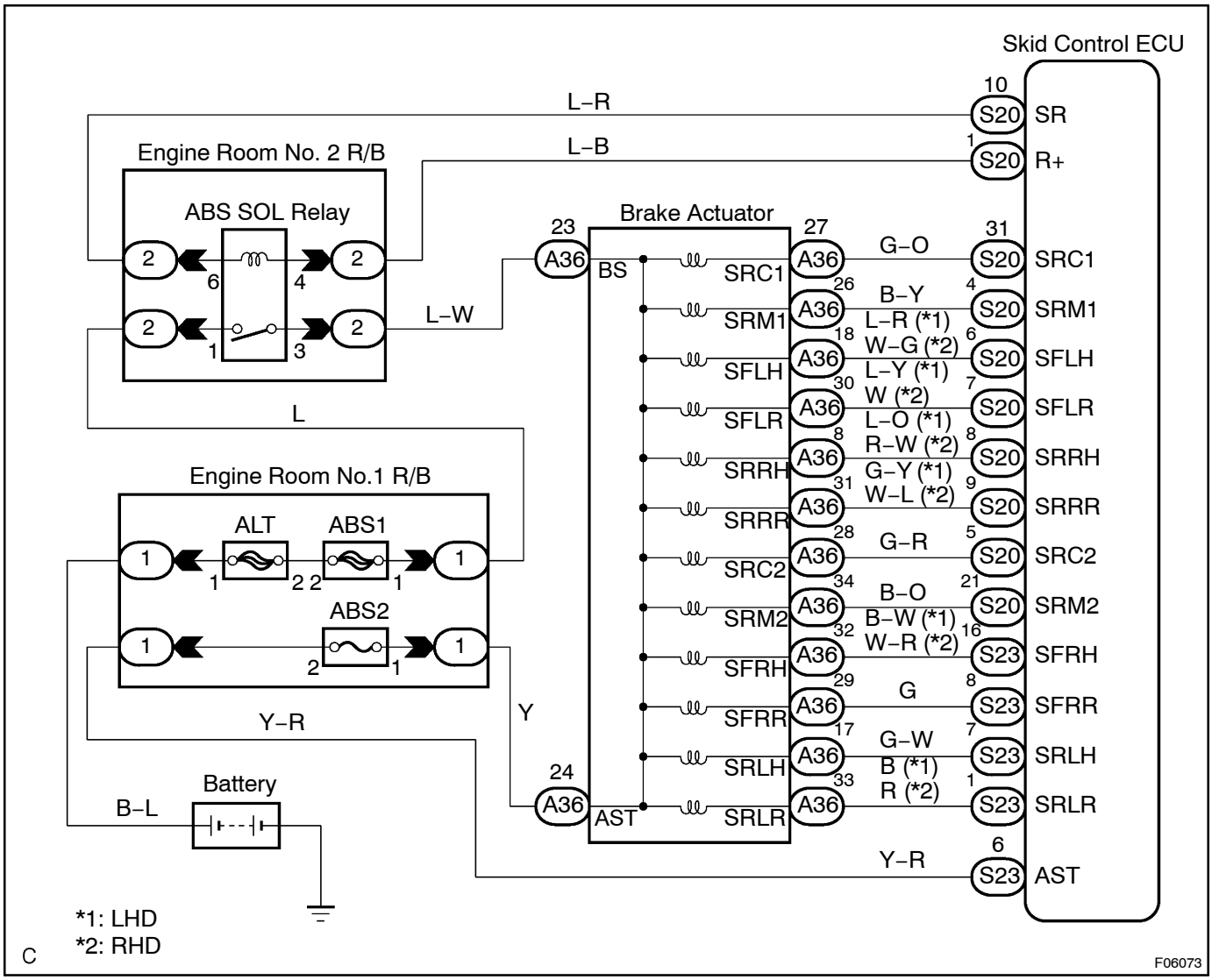
DTC	C0226 / 21 – C0256 / 24	ABS–Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS–related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

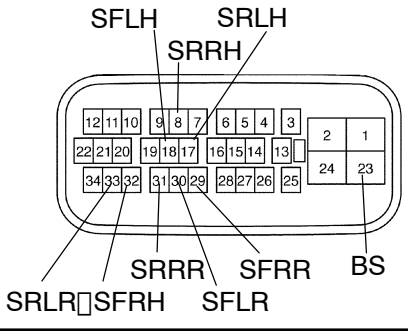
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	• Brake actuator • SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	• Brake actuator • SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	• Brake actuator • SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	• Brake actuator • SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the brake actuator connector.

CHECK:

Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.

OK:

Continuity

HINT:

Resistance of each solenoid at 25°C

SFRH, SFLH, SRRH, SRLH: 8.1 – 9.1 Ω

SFRR, SFLR, SRRR, SRLR: 4.0 – 4.6 Ω

NG	**Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN–34).**

NG	**Repair or replace 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.

DI1GJ–15

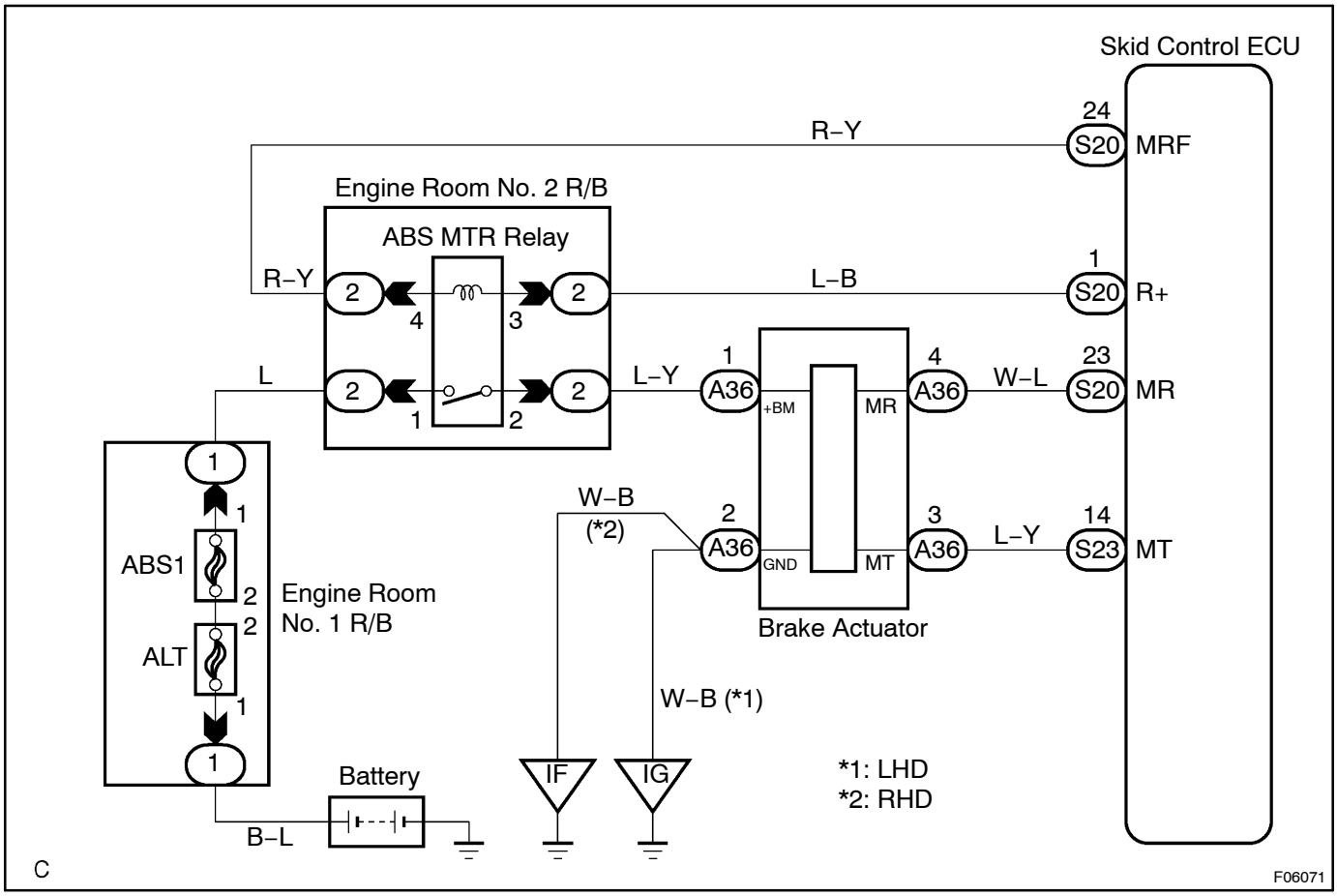
DTC	C0273 / 13, C0274 / 14	ABS Motor Relay Circuit

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1. and 2. continued for 0.12 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V in the initial check or ABS, TRC and VSC are in operation, and when the motor relay is ON, however, the contact point of the motor relay is OFF. 2. ECU terminal IG1 is 9.5 V or less, and when the motor relay is ON, but the contact point of the motor relay does not become ON.	• ABS motor relay • ABS motor relay circuit • Skid control ECU
C0274 / 14	When the motor relay is OFF, the condition that the contact point of motor relay is ON continues for 4 sec. or more.	

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 hand–held tester.

1	**Check ABS motor relay operation.**

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.

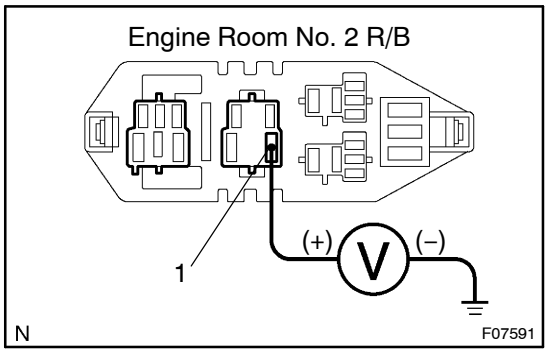
CHECK:
Check the operation sound of the ABS motor relay when operating it with the hand–held tester.

OK:
The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**



PREPARATION:
Remove the ABS motor relay from the engine room No. 2 R/B.

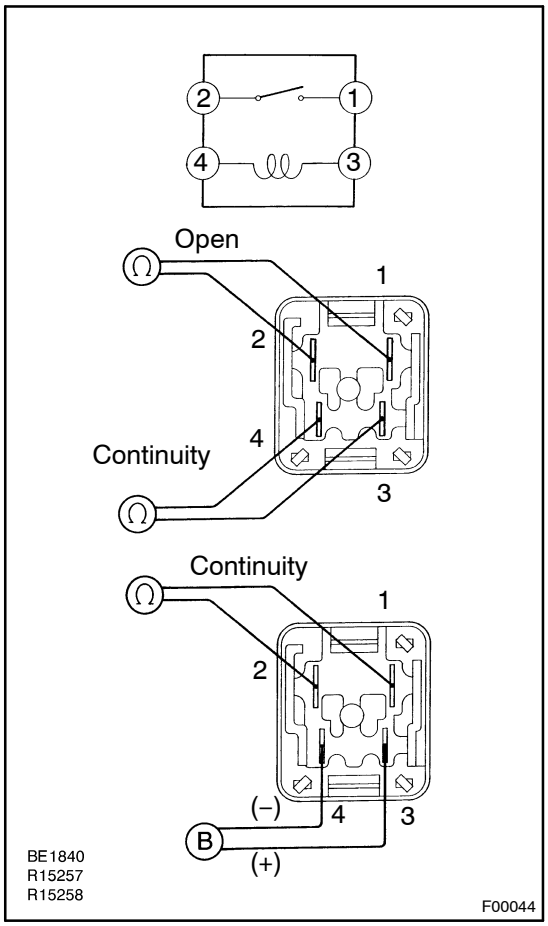
CHECK:
Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.

OK:
Voltage: 10 – 14 V

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

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery voltage between terminals 3 and 4.

(b) Check continuity between terminals.

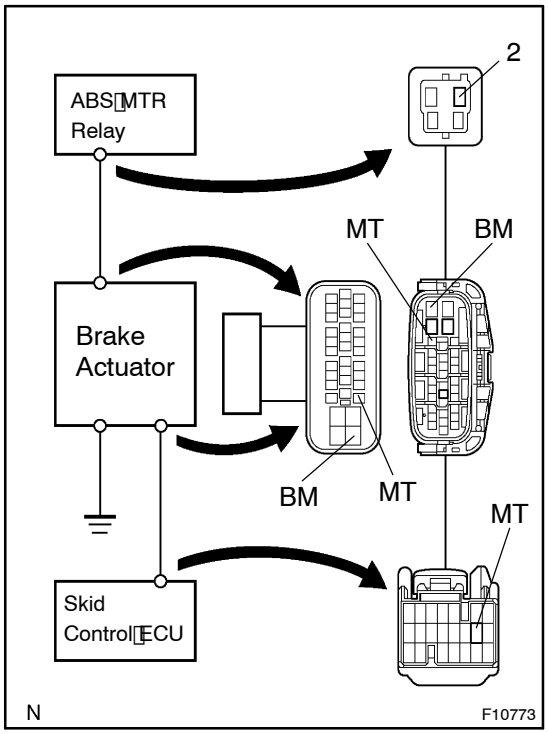
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is a no continuity between terminals BM and MT of brake actuator.

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN–34).**

NG → **Repair or replace 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.

DI1GK–10

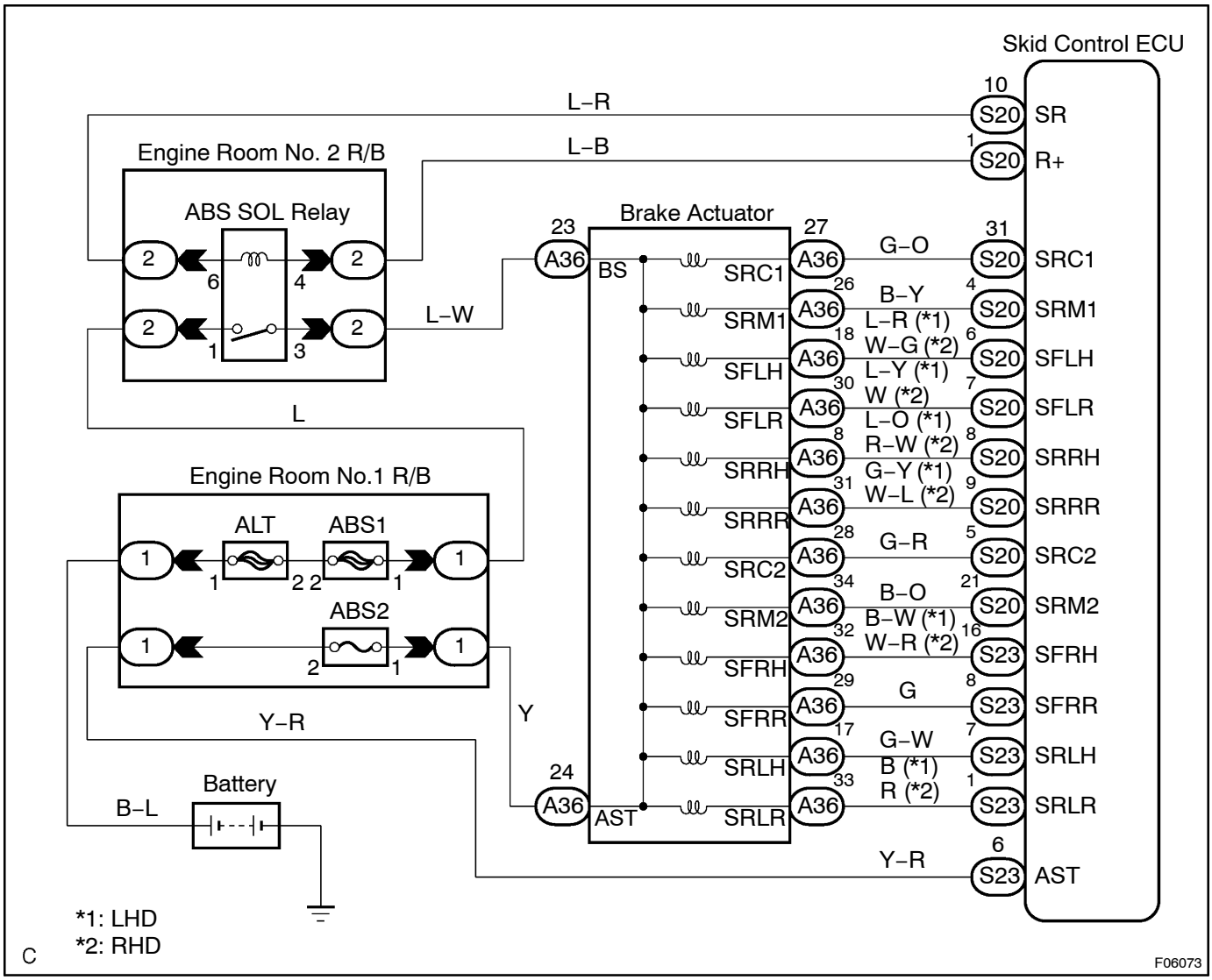
DTC	C0278 / 11, C0279 / 12	ABS Solenoid Relay Circuit

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	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF. 2. With solenoid relay ON driving, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the contact point of the solenoid relay is ON continues for 0.2 sec. or more.	

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 ABS solenoid relay operation.**

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.

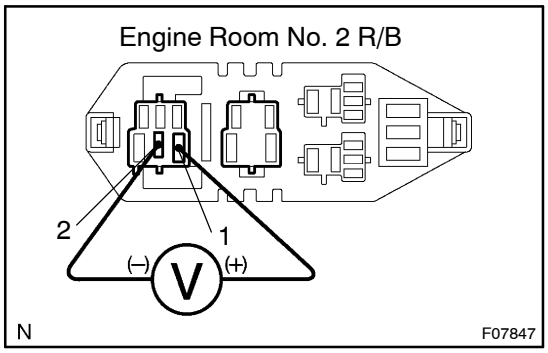
CHECK:
Check the operation sound of the ABS solenoid relay when operating it with the hand–held tester.

OK:
The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminals 1 and 2 of engine room No. 2 R/B (for ABS solenoid relay).**



PREPARATION:
Remove the ABS solenoid relay from the engine room No. 2 R/B.

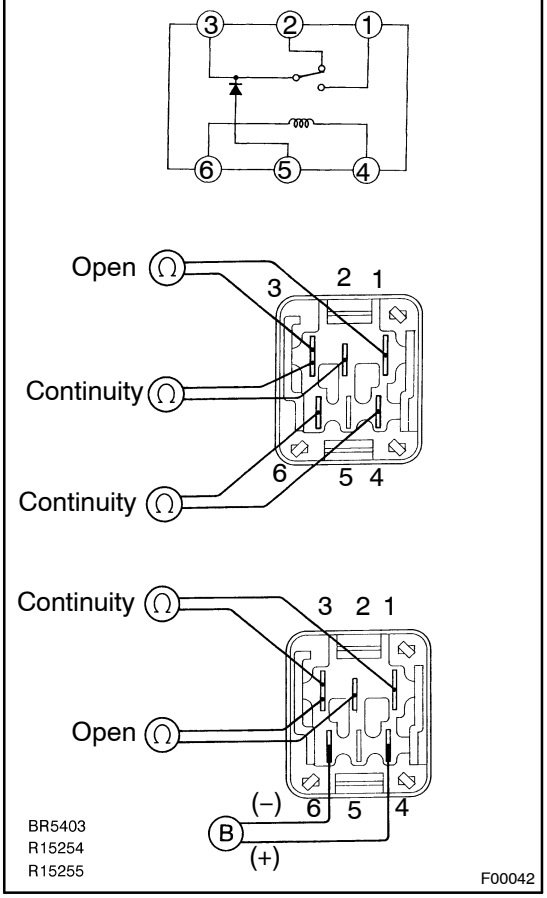
CHECK:
Measure the voltage between terminals 1 and 2 of engine room No. 2 R/B (for ABS solenoid relay).

OK:
Voltage: 10 – 14 V

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

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

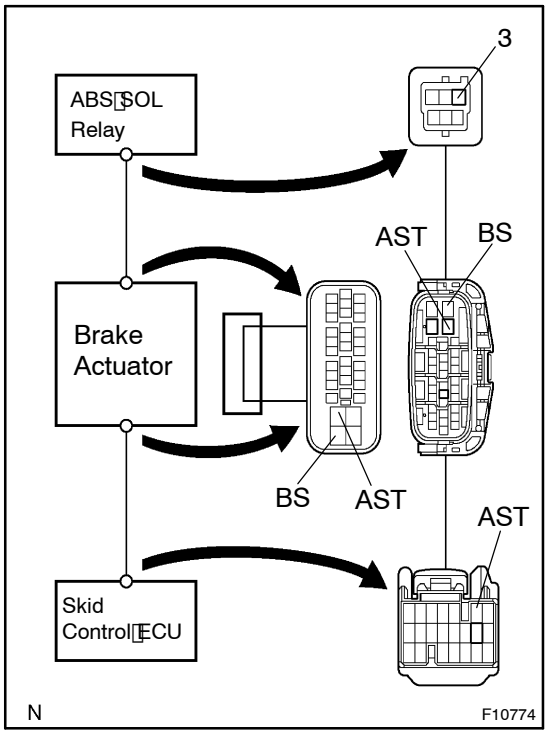
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	**Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.**



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN–34).**

NG → **Repair or replace 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.

DI1GY–15

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	• Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page 1G–FE: DI–4 of Pub. No. RM684E, 2JZ–GE: DI–4).**

***1** → **Repair engine control system according to the code output.**

***2**

Check for engine ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI1GZ–17

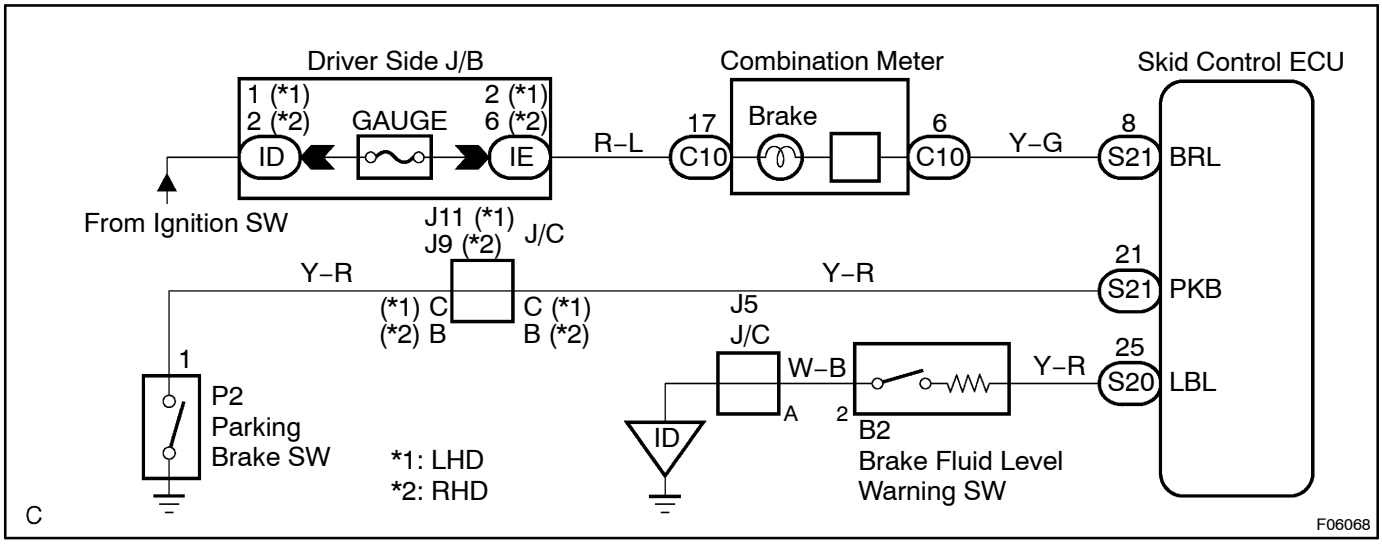
DTC	C1202 / 52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.
HINT:
Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202 / 52	When any of the following 1. or 2. is detected: 1. Low fluid level condition in the brake master cylinder reservoir tank continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving. 2. With ECU terminal IG1 voltage is 9.5 V to 17.2 V and open circuit for the brake fluid level warning switch circuit continues for 2 sec. or more.	• Brake fluid level • Brake fluid level warning switch • Brake fluid level warning switch circuit • Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:
Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch.

NG → Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to brake fluid level warning light (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU.

DI1H0–17

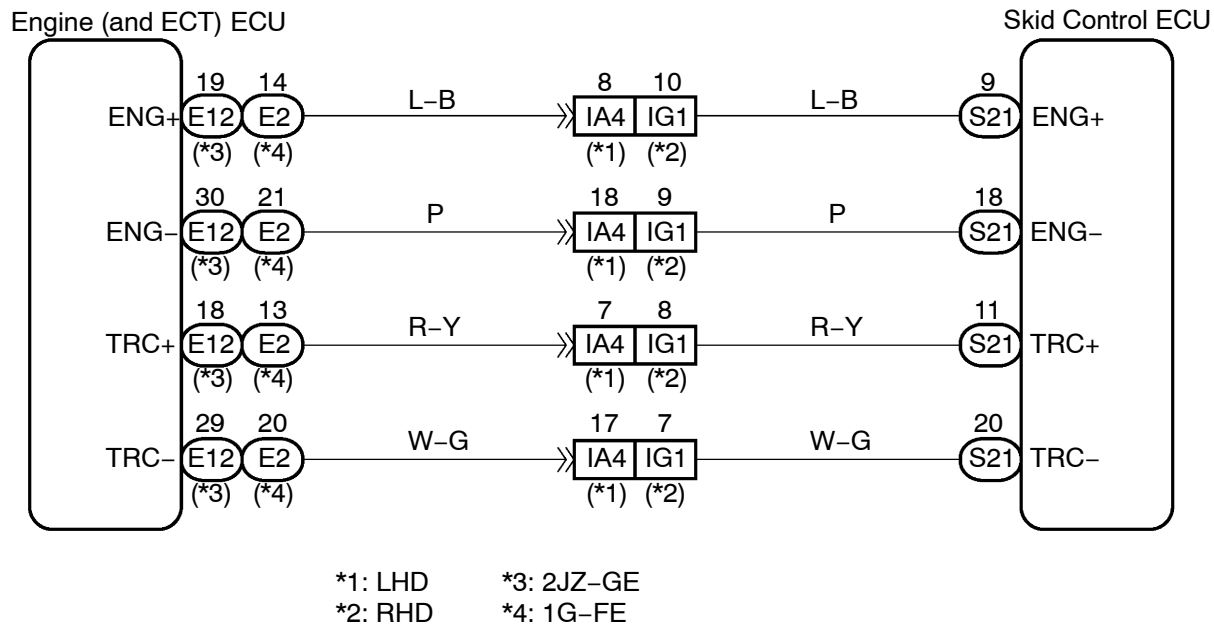
DTC	C1203 / 53	Engine ECU Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRC and VSC control information from the skid control ECU to the engine and ECT ECU (TRC+, TRC–), and engine control information from the engine and ECT ECU to the skid control ECU (ENG+, ENG–).

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	1. Either of the following (a),or (b) continues for 5 sec.: (a) When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to engine ECU continues for more than 5 sec. (b) When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from engine ECU is impossible. 2. The condition that the data sent from engine ECU becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec. 3. The condition that TRC ± communication is normal ↔ abnormal has been repeated more than 10 times in 60 sec.	• TRC+ or TRC– circuit • ENG+ or ENG– circuit • Engine ECU • Skid control ECU

WIRING DIAGRAM



C

F06075

INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG–, TRC+, TRC– of skid control ECU and engine ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace engine ECU or skid control ECU.

DI1H3-13

DTC	C1223/43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	• ABS control system

INSPECTION PROCEDURE

1	Check the DTC for the ABS (See page DI–318).

*1 → Repair ABS control system according to the code output.

*2 →

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

DI9IE–01

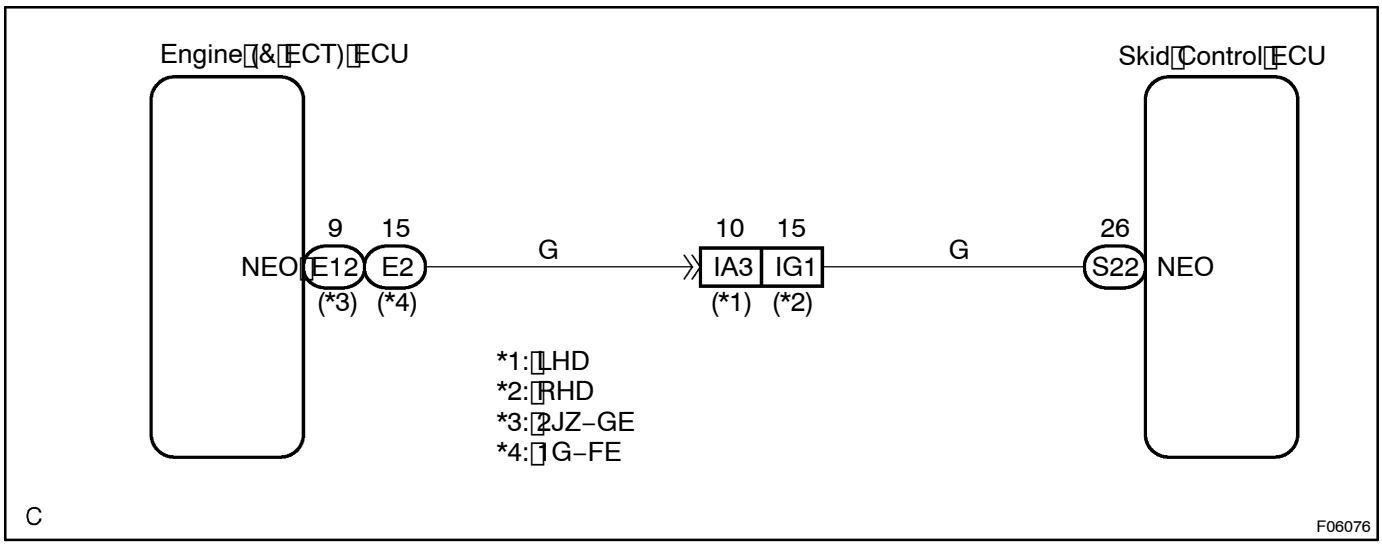
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the engine ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the engine ECU is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	• NEO circuit • Engine ECU • Skid control ECU

WIRING DIAGRAM



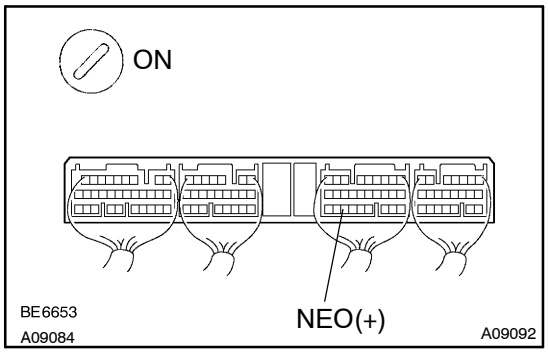
INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of engine ECU (See page IN–34).

NG → Repair or replace harness and connector.

OK

2	Check voltage between terminals NEO of skid control ECU and body ground.



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Turn the ignition switch ON.

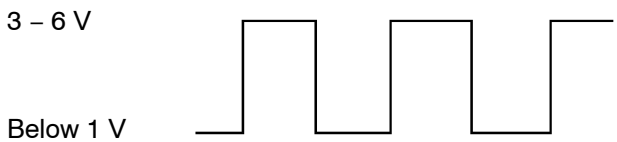
CHECK:

Measure voltage between terminal NEO of skid control 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 skid control ECU or engine ECU.**

OK

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

DI9IF–01

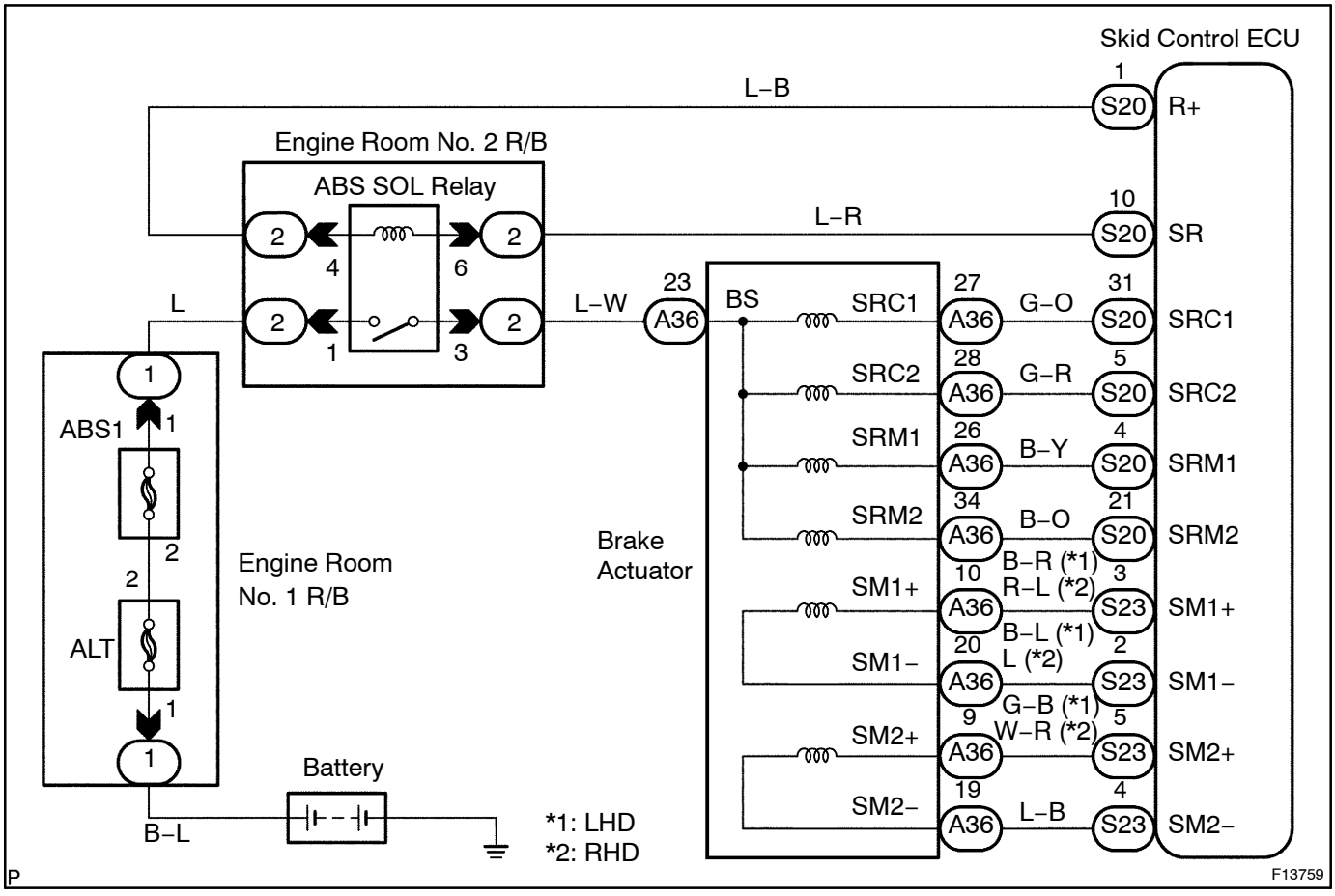
DTC	C1225 / 25 – C1227 / 27	TRC & VSC–Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRC & VSC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

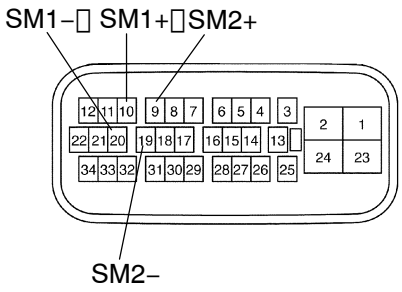
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 4.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 sec. or more. 2. When SM1 or SM2 is OFF, open circuit of SM1 or SM2 continues for 0.05 sec. or more. 3. When SM1 or SM2 is ON, open circuit of SM1 or SM2 continues for 0.1 sec. or more. 4. When SM1 or SM2 is OFF, electric current application on SM1 or SM2 continues for 0.1 sec. or more.	• Brake actuator • SM1 or SM2 circuit
C1226 / 26	Open or short circuit of SRM1 or SRM2 continues for 0.05 sec. or more.	• Brake actuator • SRM1 or SRM2 circuit
C1227 / 27	Open or short circuit of SRC1 or SRC2 continues for 0.05 sec. or more.	• Brake actuator • SRC1 or SRC2 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



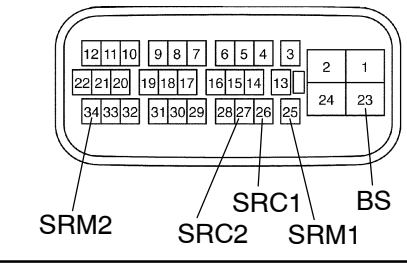
PREPARATION:
Disconnect the brake actuator connector.
CHECK:
Check continuity between terminals SM1+ – SM1–, and terminals SM2+ – SM2– of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid: 8.1 – 9.1 Ω at 25°C
CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid at 25°C
SRC1, SRC2: 8.1 – 9.1 Ω
SRM1, SRM2: 4.9 – 5.5 Ω



NG → **Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN–34).**

NG → **Repair or replace 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.

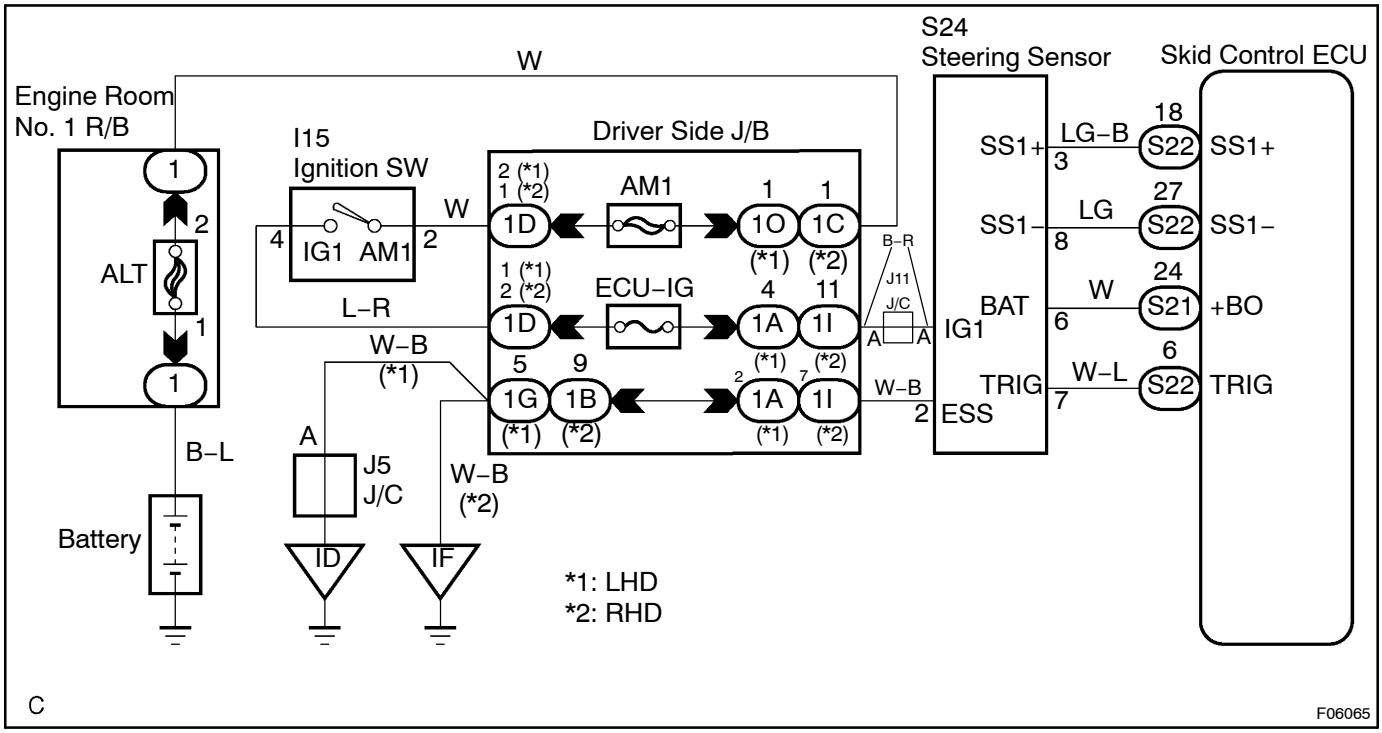
DI1H5–11

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	When detecting the abnormality.	• Steering angle sensor • Steering angle sensor circuit • +BI circuit
C1335 / 35	Detection of either condition 1. or 2.: 1. When the ECU IG1 terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more. 2. Immediately after the terminal BAT is connected and when IG1 terminal voltage is 9.5 V or more, open circuit of terminal TRIG continues for 15 sec. or more.	

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 turn the hand–held tester main switch ON.
(c) Select the DATALIST mode on the hand–held tester.

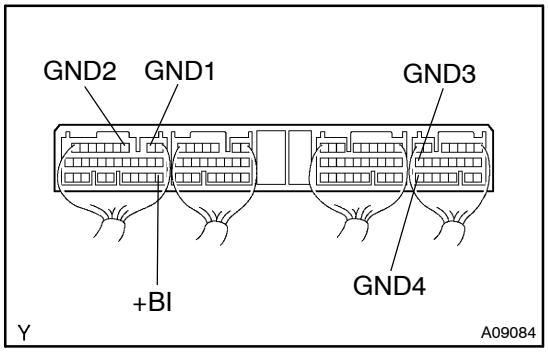
CHECK:
Check that the steering wheel turning angle value of the steering angle sensor observed in the hand–held tester is changing as the steering wheel is turned.

OK:
Steering wheel turning angle value must be changing.

OK → **Go to step 5.**

NG

2	**Check voltage between terminals +BI and GND of skid control ECU.**



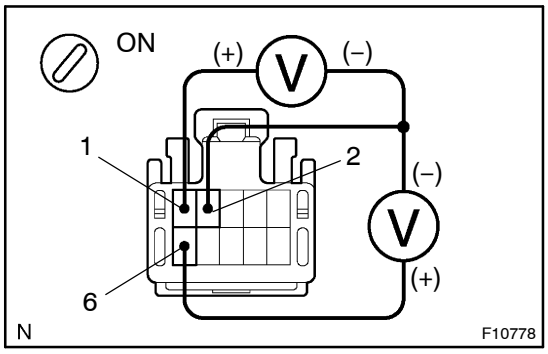
PREPARATION:
(a) Remove the skid control ECU with the connector still connected.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminal +BI and GND of skid control ECU.

OK:
Voltage: 10 – 14 V

NG → **Check and replace harness and connector.**

OK

3	Check input voltage of the steering angle sensor.



PREPARATION:

(a) Remove the steering wheel and column lower cover.
(b) Disconnect the steering angle sensor connector.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor harness side connector.

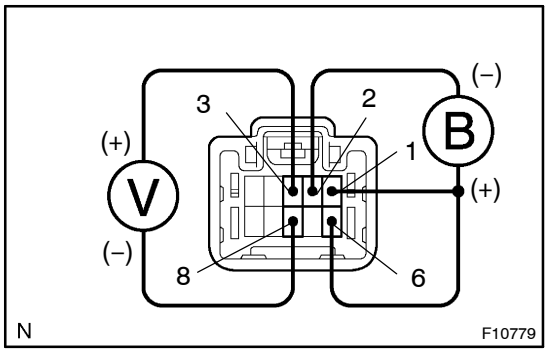
OK:

Voltage: 10 – 14 V

NG	Check and replace harness and connector.

OK

4	Check steering angle sensor.



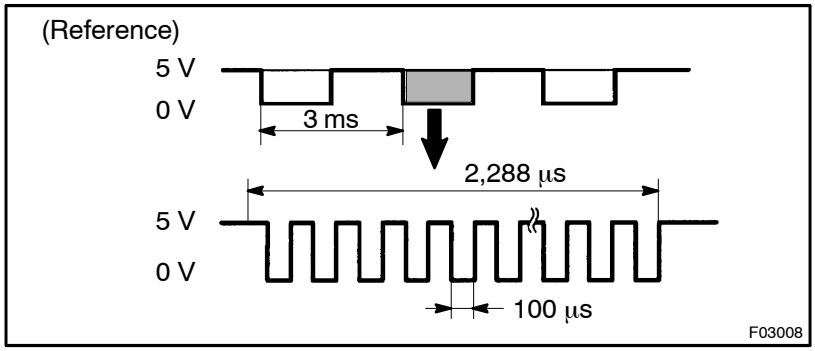
PREPARATION:

(a) Apply battery voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor.
(b) Connect the oscilloscope to the terminals 3 and 8 of the steering angle sensor.

CHECK:

Turn the steering wheel slowly and check the signal waveform.

OK:



HINT:

The above signal wave form does not repeat ON and OFF regularly and this ON–OFF interval changes case by case according to the data.

NG → Replace steering angle sensor.

OK

Check and replace skid control ECU.

5	Check DTC for ABS.

NG → Check and replace skid control ECU.

OK

No problem.

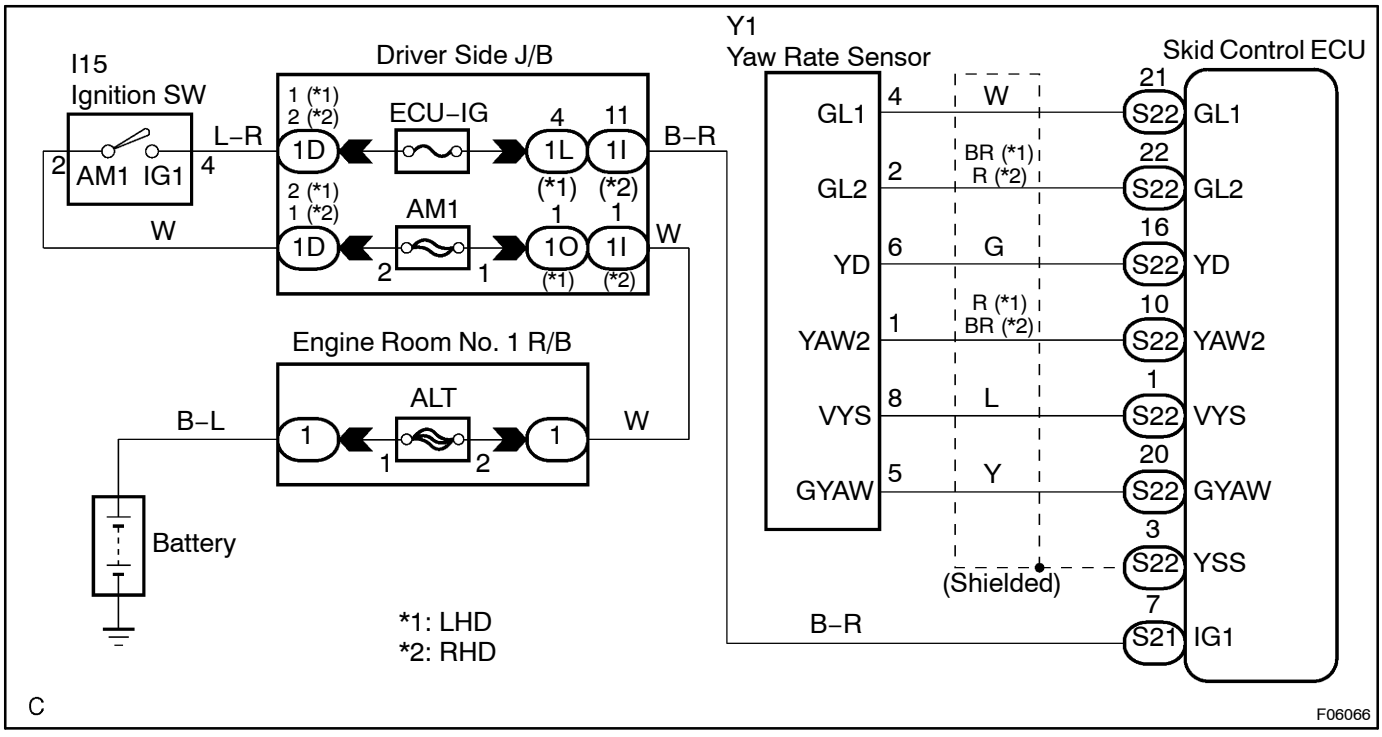
DI8DW–03

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	Detection of any of conditions 1. through 4.: 1. When the ECU IG1 terminal voltage is 9.5 to 17.2 V, the yaw rate sensor voltage is out of the range from 0.25 to 4.75 V for 1 sec. or more. 2. The yaw rate sensor open circuit detect signal is ON for 1 sec. or more. 3. The yaw rate sensor power source voltage is out of the range from 4.4 to 5.6 V for 1 sec. or more. 4. Momentary open circuit of the yaw rate sensor signal occurs 10 times or more.	• Yaw rate sensor • Yaw rate sensor circuit
C1234 / 34	When the yaw rate sensor VYS terminal voltage is 4.4 to 5.6 V, YD malfunction signal of the yaw rate sensor is ON for 5 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Perform zero point calibration of the yaw rate sensor (See page DI–318).

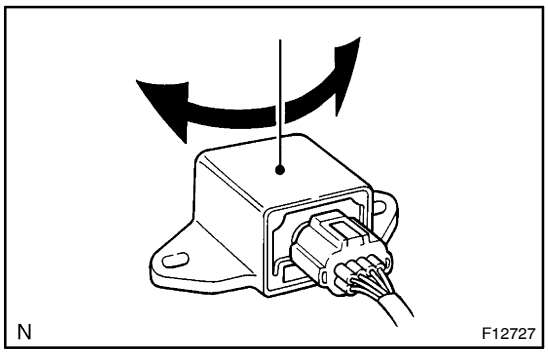
2	Is DTC still output?

Check DTC on page DI–318.

NO → No problem.

YES

3	Check output value of the yaw rate sensor.



In case of using the hand–held tester:

PREPARATION:

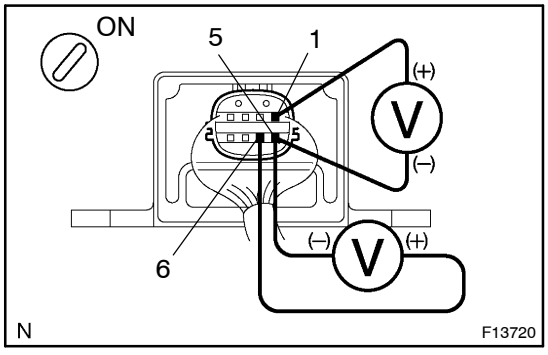
(a) Remove the consol box.
(b) Remove the 2 nuts and the yaw rate sensor with the connector still connected to it.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON and push the hand–held tester main switch ON.
(e) Select the DATALIST mode on the hand–held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor observed in 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.
(Reference)
When the yaw rate sensor is stationary
output value: ± 4 deg/s



In case of not using the hand–held tester:

PREPARATION:

(a) Remove the consol box then remove the yaw rate sensor with the connector still connected to it.
(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals YAW (1) – GYAW (5), and terminals YD (6) – GYAW (5) of the yaw rate sensor.

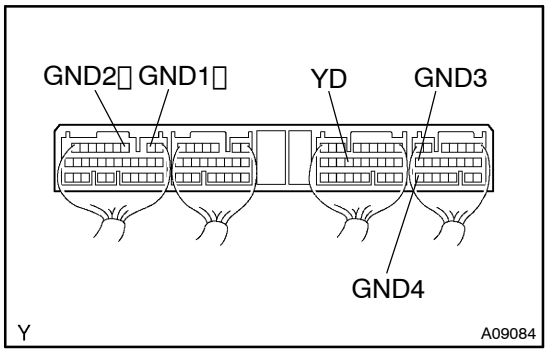
OK:

Terminals 1 and 5 (YAW – GYAW)	About 2.42 – 2.58 V
Terminals 6 and 5 (YD – GYAW)	About 4.5 V – 5.3 V

NG → **Replace yaw rate sensor.**

OK

4 **Check voltage between terminals YD and GND of skid control ECU.**



PREPARATION:

Remove the skid control ECU with the connector still connected to it.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals YD and GND of skid control ECU.

OK:

Voltage: 4.5 – 5.3 V

OK → **Check and replace skid control ECU.**

NG

5 **Check for open and short circuit in harness and connector between yaw rate sensor and skid contorl ECU (See page IN–34).**

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

OK

Check and replace skid control ECU.

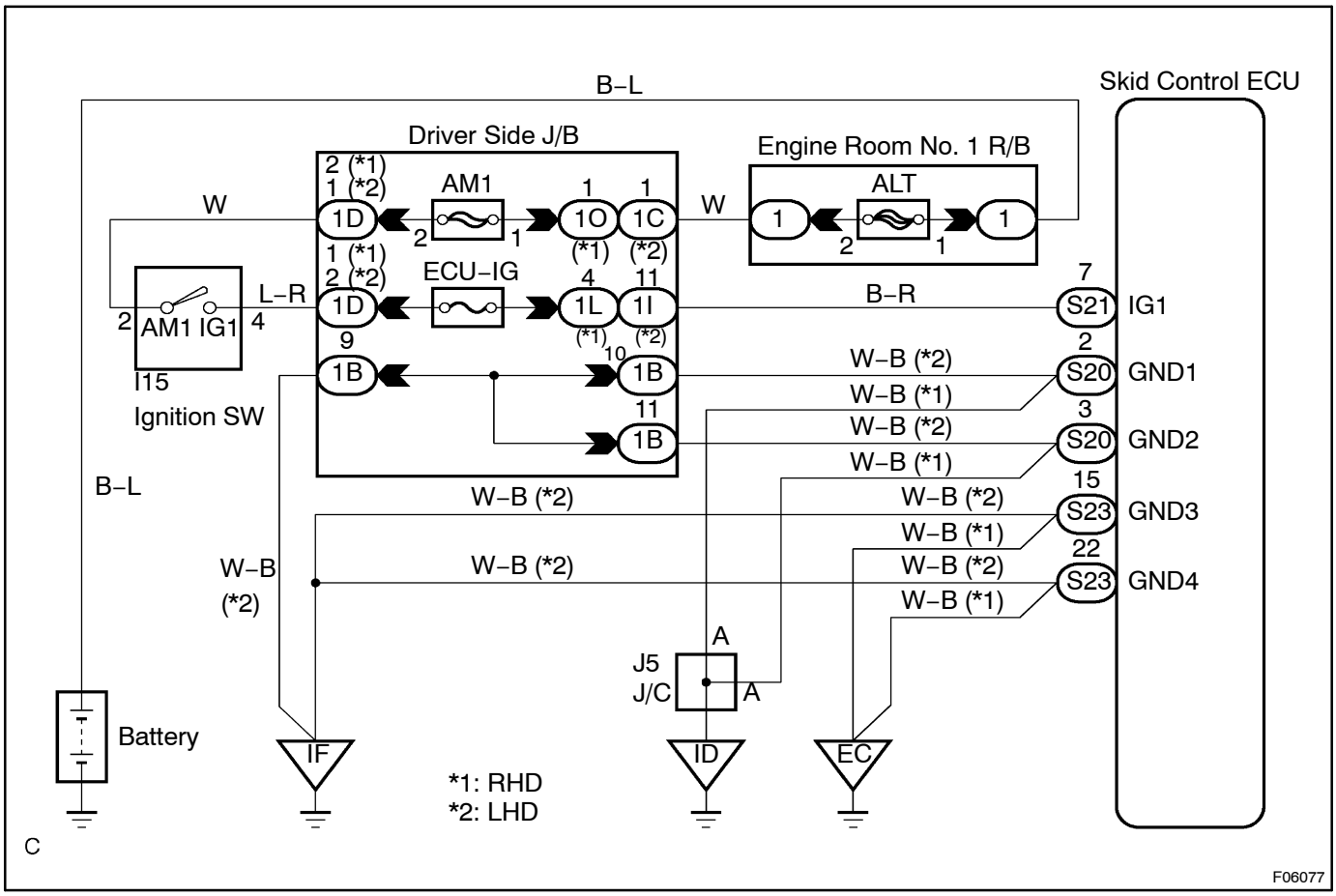
DI9IG–01

DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any of conditions 1. through 2.: 1. Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG remains at below 9.5 V for more than 10 sec. 2. While the condition that the solenoid relay is ON continues, ECU terminal IG1 voltage becomes 9.5 V or less, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more.	• Battery • Charging system • Power source circuit • Skid Control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**

PREPARATION:
Remove ECU–IG fuse from driver side 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

2	**Check battery voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair the charging system (See page 1G–FE: CH–1 of Pub. No. RM684E, 2JZ–GE: CH–1).**

OK

3	**Check voltage of the ECU IG power souce.**

In case of using the hand–held tester.

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.

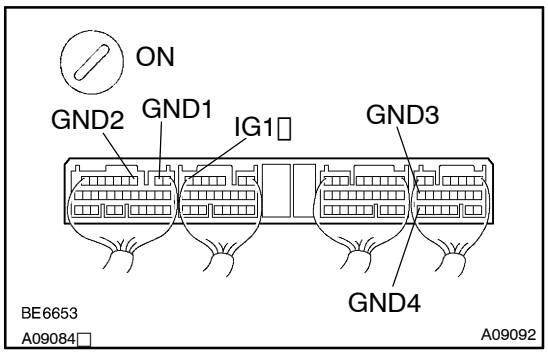
CHECK:

Check the voltage condition output from the ECU displayed by the hand–held tester.

OK:

"Normal" is displayed.

In case of not using the hand–held tester.



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of skid control ECU.

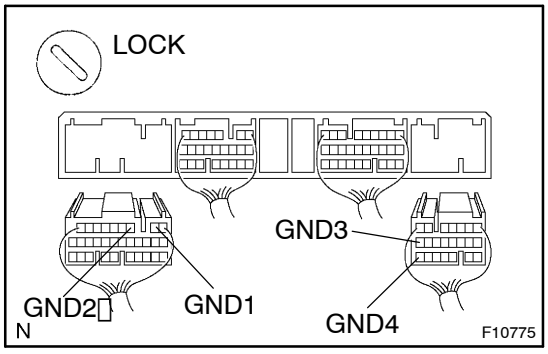
OK:

Voltage: 10 – 14 V

OK	**Ignition switch OFF, check and replace skid control ECU.**

NG

4	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

(a) Disconnect the 2 connector from the skid control ECU.

(b) Measure resistance between terminal GND of skid control ECU 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 skid control ECU and battery (See page IN–34).

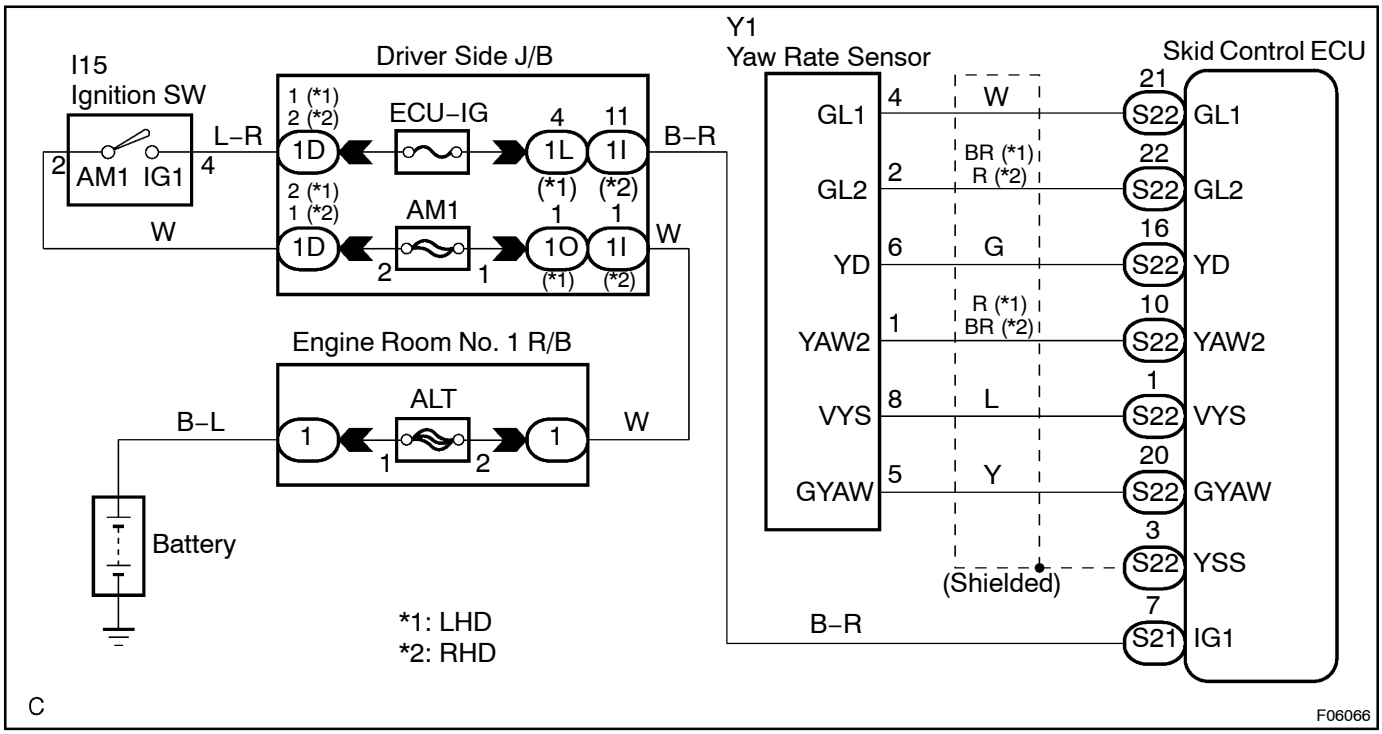
DI8DX–03

DTC	C1243 / 43 – C1245 / 45	Malfunction in Deceleration Sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1243 / 43	While vehicle speed becomes 0 km/h (0 mph) from 30 km/h (18 mph) or more, the condition that both GL1 and GL2 signals of ECU terminals do not change 10 mV or more occurs 16 times continuously.	• Deceleration sensor • Wire harness for deceleration sensor system
C1245 / 45	At the vehicle speed of 30 km/h (18 mph), the acceleration and deceleration values calculated from the deceleration sensor values and from vehicle speed are different, and the condition that the difference exceeds 0.35 G continues for 60 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
After step 1 and 2, go to step 3 in case of using the hand–held tester, and go to step 5 in case of not using the hand–held tester.

1	**Perform zero point calibration of the Deceleration sensor (See page DI–318).**

2	**Is DTC still output?**

Check DTC on page DI–318.

NO → **No problem.**

YES

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

PREPARATION:

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

CHECK:

Check that the deceleration value of the deceleration sensor observed in the hand–held tester is changing when the vehicle is tilted.

OK:

Deceleration value must be changing.

OK → **Go to step 5.**

NG

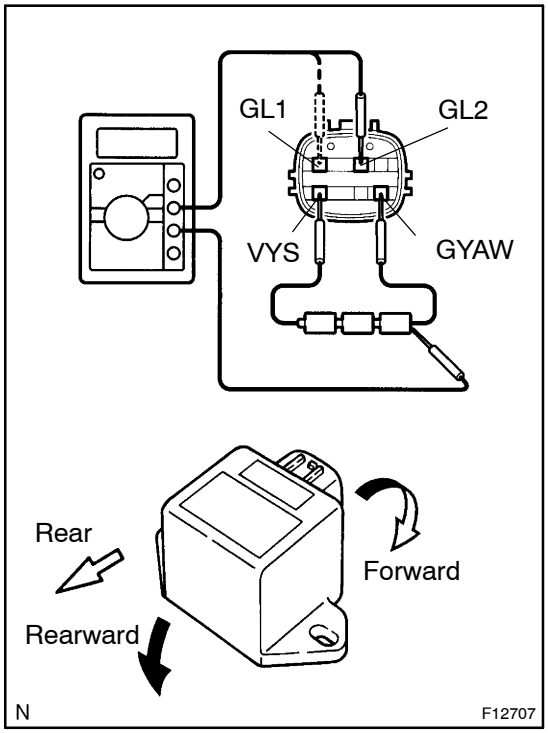
4	Check for open or short circuit in harness and connector between deceleration sensor and skid control ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

Replace deceleration sensor.

5	Check deceleration sensor.



PREPARATION:

(a) Remove the consol box.

(b) Connect 3 dry batteries of 1.5 V in series.

(c) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (–) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	0.4 V – about 2.3 V
GL1	Lean forrward	About 2.3 V – 4.1 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V – 4.1 V
GL2	Lean forward	0.4 V – about 2.3 V

HINT:

- If the sensor is tilted too much it may show the wrong value.
- If dropped, the sensor should be replaced with a new one.
- The sensor removed from the vehicle should not be placed upside down.

NG → Replace deceleration sensor.

OK

6	Check for open or short circuit in harness and connector between deceleration sensor and skid control ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace skid control ECU.

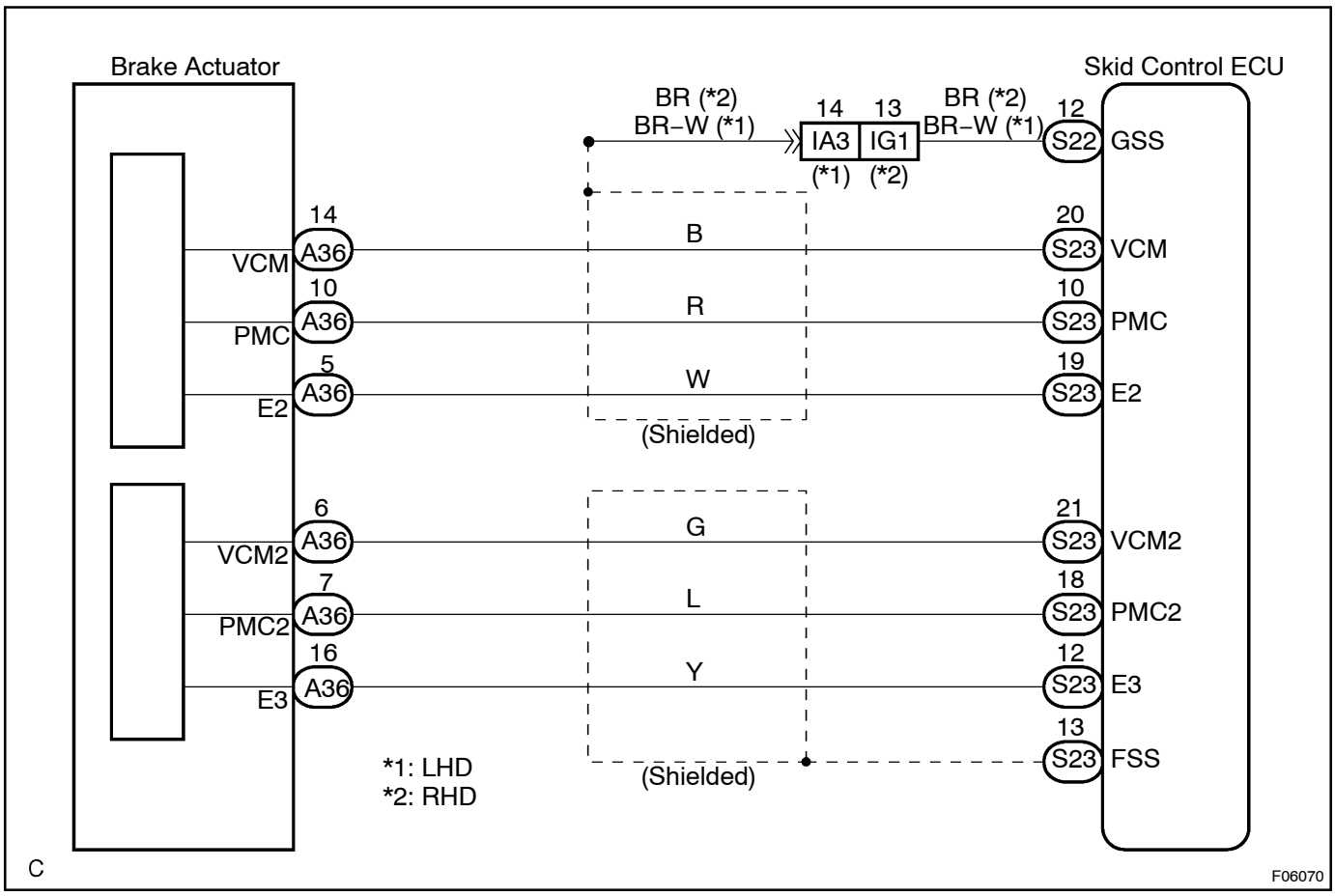
DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

DTC	C1360 / 61	Malfunction in comparative master cylinder pressure sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Detection of any of conditions 1. through 5.: 1. When the vehicle speed is 7 km/h (4 mph) or more and ECU PMC terminal voltage exceeds 0.86 V, the condition that the voltage does not change 0.005 V or more continues for 30 sec. 2. Noise in ECU PMC terminal occurs 7 times or more in 5 sec. 3. When the ECU STP terminal is OFF, the condition that ECU PMC terminal voltage is 0.86 V or more, or less than 0.3 V continues for 5 sec. or more. 4. When IG1 terminal voltage is 9.5 to 17.2 V, the condition that ECU VCM terminal voltage is out of the range from 4.4 to 5.6 V continues for 1.2 sec. or more. 5. When ECU VCM terminal voltage is 4.4 to 5.6 V, the condition that the ECU PMC terminal voltage is out of the range from 0.14 to 4.85 V continues for 1.2 sec. or more.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1360 / 61	Condition that the vehicle is driving 5 km/h (3 mph) or more and that the difference between terminal PMC and PMC2 voltage becomes at least 0.37 V continues for 1.2 sec. or more.	
	Condition that VCM terminal voltage is 4.4 – 5.6 V and that PMC terminal voltage is out of the range of 0.14 – 4.85 V continues for more than 1.2 sec.	

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 master cylinder pressure sensor.**

PREPARATION:

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

(b) Turn the ignition switch ON and turn 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 observed in the hand–held tester is changing when the brake pedal is being depressed.

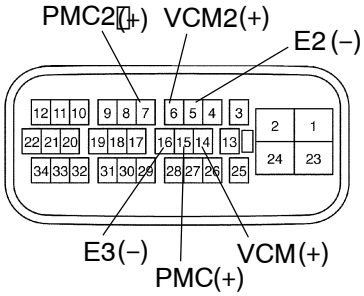
OK:

Brake fluid pressure value must be changing.

OK	**Go to step 4.**

NG

2	Check master cylinder pressure sensor.



PREPARATION:

Install LSPV gauge to the front caliper bleeder plug portion, and bleed air from LSPV gauge.

SST 09709–29018

CHECK:

Start the engine and depress the brake pedal, then check how the fluid pressure affects voltage of PMC and E2, PMC2 and E3 terminals of the master cylinder pressure sensor with the connector still connected to it.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 kgf/cm², 0 psi)	0.37 – 0.63 V
5,883 kPa (60 kgf/cm², 853 psi)	1.57 – 1.83 V
11,768 kPa (120 kgf/cm², 1,706 psi)	2.77 – 3.03 V

HINT:

Voltage of between terminals VCM and E2, VCM2 and E3: 4.7 – 5.3 V

NG → **Replace brake actuator.**

OK

3	Check for open and short circuit in harness and connector between each master cylinder pressure sensor and skid control ECU (See page IN–34).

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

OK

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

NO → **Check stop light switch circuit.**

YES

Check and replace skid control ECU.

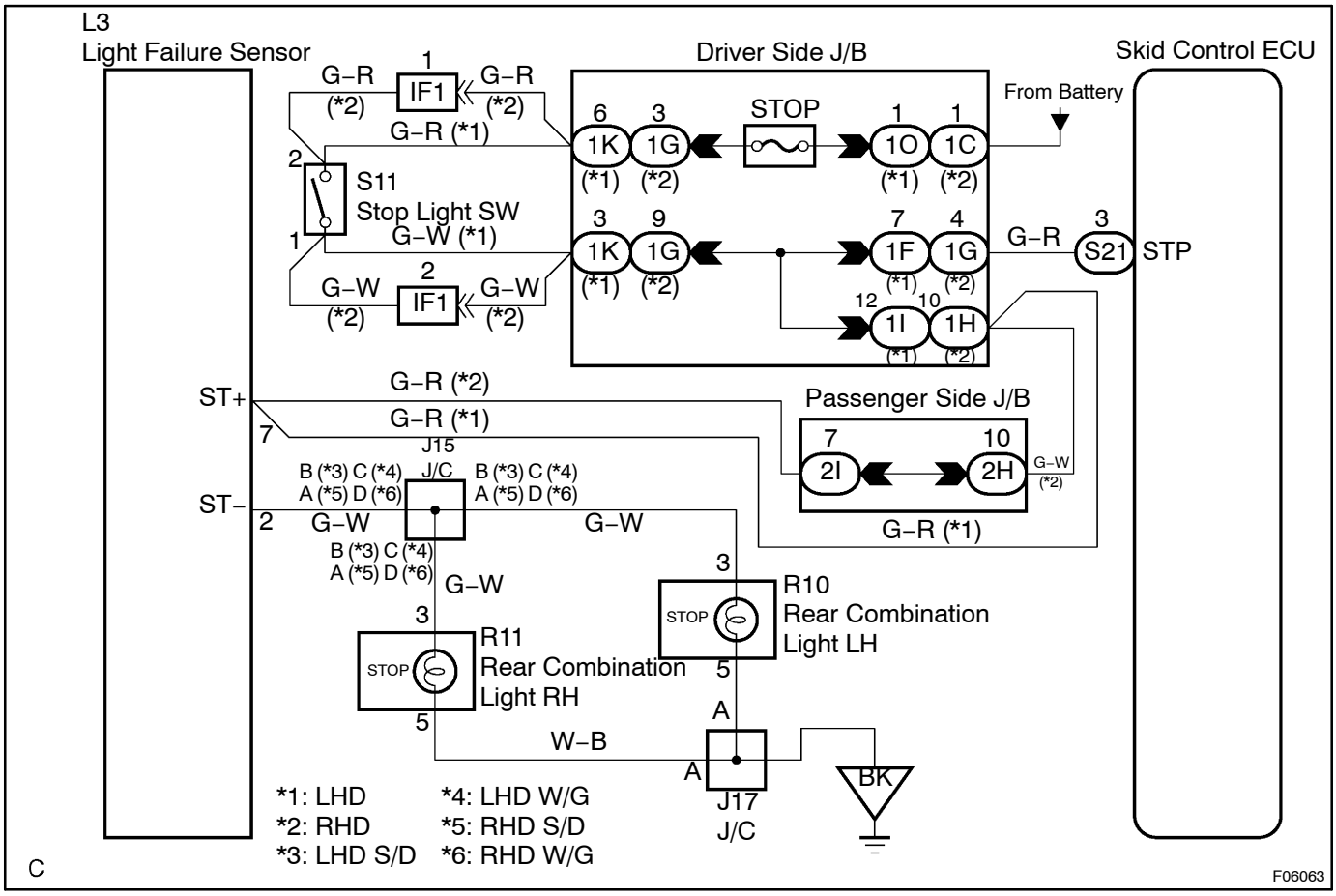
DI0WX–17

DTC	C1249 / 49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	ECU terminal IG1 voltage is 9.5 to 17.2 V and ABS is in non–operation, the open circuit of stop light switch circuit continues for 0.3 sec. or more.	• Stop light switch • Stop light switch circuit • Skid Control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

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

OK → **Go to step 3.**

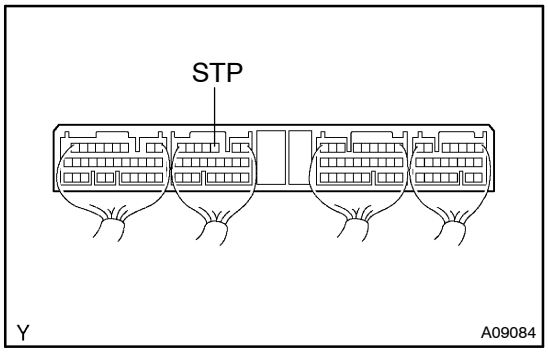
NG

2	**Check stop light circuit.**

NG → **Repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of skid control ECU and body ground.**



PREPARATION:
Remove skid control ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of skid control ECU and body ground when brake pedal is depressed.
OK:
Voltage: 8 – 14 V

OK → **Check and replace skid control ECU.**

NG

4	Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN–34).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–335).

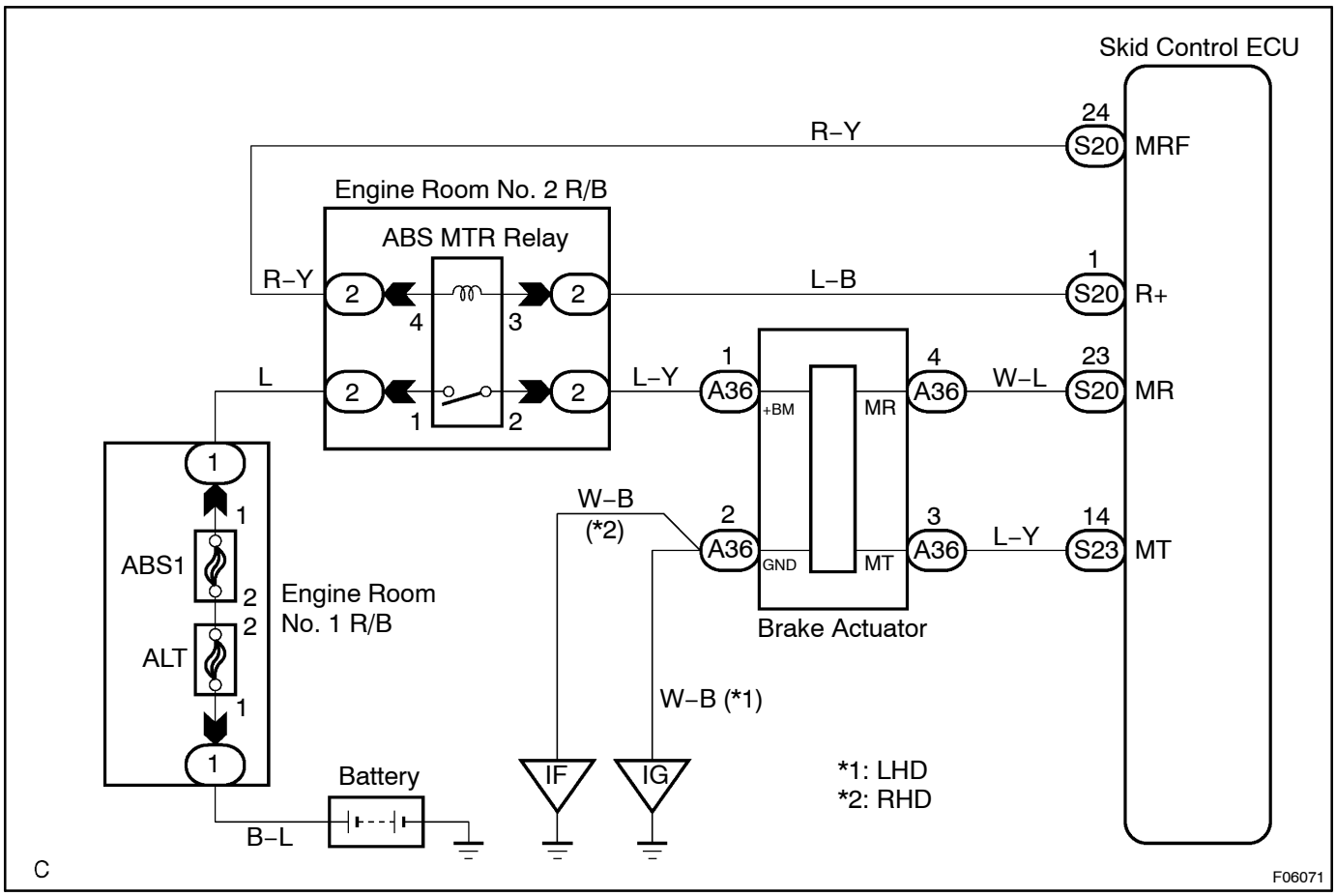
DI9IH–01

DTC	C1251 / 51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Either of the following 1. or 2. is detected: 1. Actuator drive motor is not operating normally. 2. Open circuit condition of actuator drive motor continues for 2 sec. or more.	• Brake Actuator • Brake Actuator 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 hand–held tester.

1	**Check ABS motor operation.**

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 the operation sound of the ABS motor when operating it with the hand–held tester.

OK:

The operation sound of the ABS motor should be heard.

NG → **Replace brake actuator.**

OK ↓

2	**Is there DTC C1251/51 being output again?**

YES → **Check and replace skid control ECU (See page IN–30).**

NO ↓

No problem.

DI8E1–03

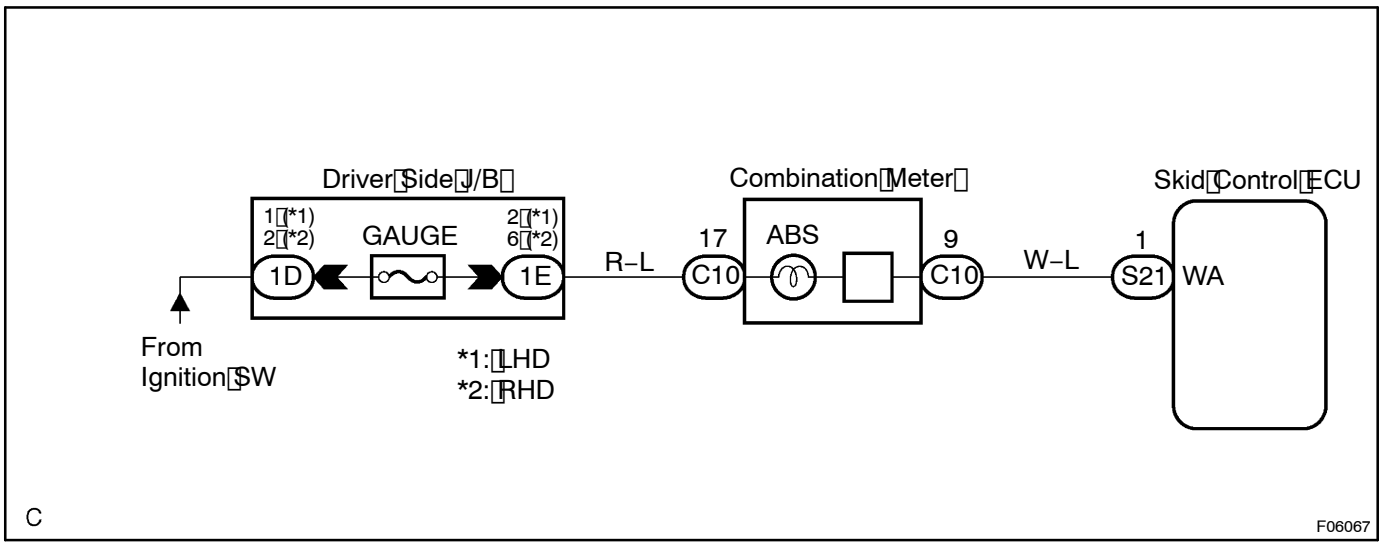
DTC	Always ON	Malfunction in ECU ABS Warning Light Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Malfunction in skid control ECU	• Power source circuit • ABS warming light circuit • Multiplex communication circuit • Skid control ECU

HINT:
In some cases the hand–held tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI–318.

YES → Repair circuit indicated by the code output.

NO

2	**Check that the skid control ECU connectors are securely connected to the skid control ECU.**

NO → **Connect the connector to the skid control ECU.**

YES

3	**Check voltage of the ECU IG power source.**

In case of using the hand–held tester:

PREPARATION:

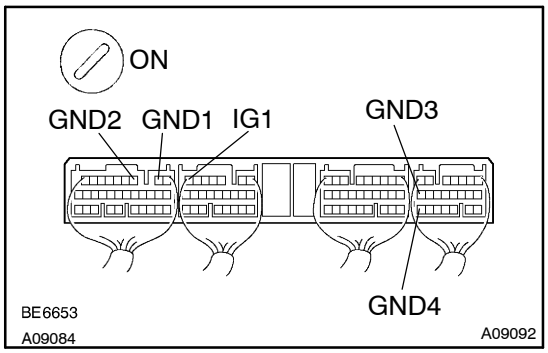
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand–held tester main switch ON.
(c) Select the DATALIST mode on the hand–held tester.

CHECK:

Check the voltage condition output from the ECU observed in the hand–held tester.

OK:

"Normal" is displayed.



In case of not using the hand–held tester:

PREPARATION:

Remove the skid control ECU with the connectors still connected to it.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals IG1 and GND of the skid control ECU.

OK:

Voltage: 10 – 14 V

OK → **Check and replace skid control ECU.**

NG

4	**Check battery voltage.**

CHECK:

Check the battery voltage.

OK:

Voltage: 10 – 14 V

NG → Check and repair the charging system.

OK

5	Check for open and short circuit in harness and connector between terminals Tc of DLC3 to skid control ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

6	Check operation of the ABS warning light.

In case of using the hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and turn 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 by the hand–held tester.

In case of not using the hand–held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch ON.

CHECK:

Check that the ABS warning light lights up.

OK → Check and replace skid control ECU.

NG

7	Check for short circuit in harness and connector between skid control ECU and combination meter (See page IN–34).

NG → Repair or replace harness or connector.

OK

Repair or replace combination meter.

DI9II–01

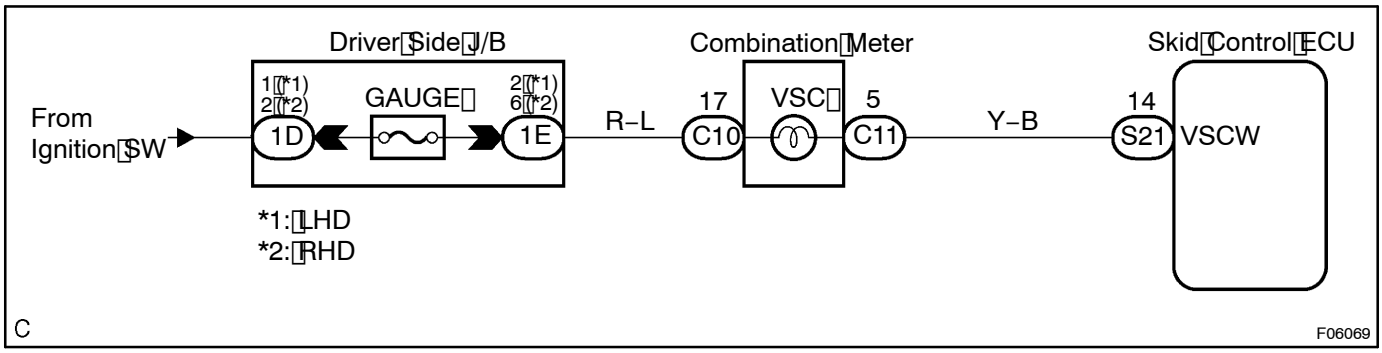
DTC	Always ON	Malfunction in ECU VSC Warning Light Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	There is a malfunction in the ECU internal circuit.	• Power source circuit • VSC warning light circuit • Skid control ECU

HINT:
If fail safe function is activated in VSC system, "TRC OFF" indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC output for VSC?

Check DTC on page DI–318.

YES	Repair circuit indicated by the output code.

NO

2	Is normal code displayed?

YES → Check for short circuit in harness and connector between engine & ECT ECU and DLC3 (See page IN–34).

NO

3	Does VSC warning light go off?

YES → Check for open or short circuit in harness and connector between ECU–IG fuse and ECU (See page IN–34).

NO

4	Check battery voltage.

PREPARATION:

Start the engine.

CHECK:

Check the battery voltage.

OK:

Voltage: 10 – 16 V

NG → Check and repair the charging system.

OK

5	**Check operation of the VSC warning light.**

In case of using the hand–held tester.

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.

In case of not using the hand–held tester.

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the connector from the skid control ECU.

(c) Turn the ignition switch ON.

CHECK:

Check the VSC warning light goes off.

OK → **Check and replace skid control ECU.**

NG

Check for short circuit in harness and connector between combination meter and skid control ECU, combination meter and DLC3 (See page IN–34).

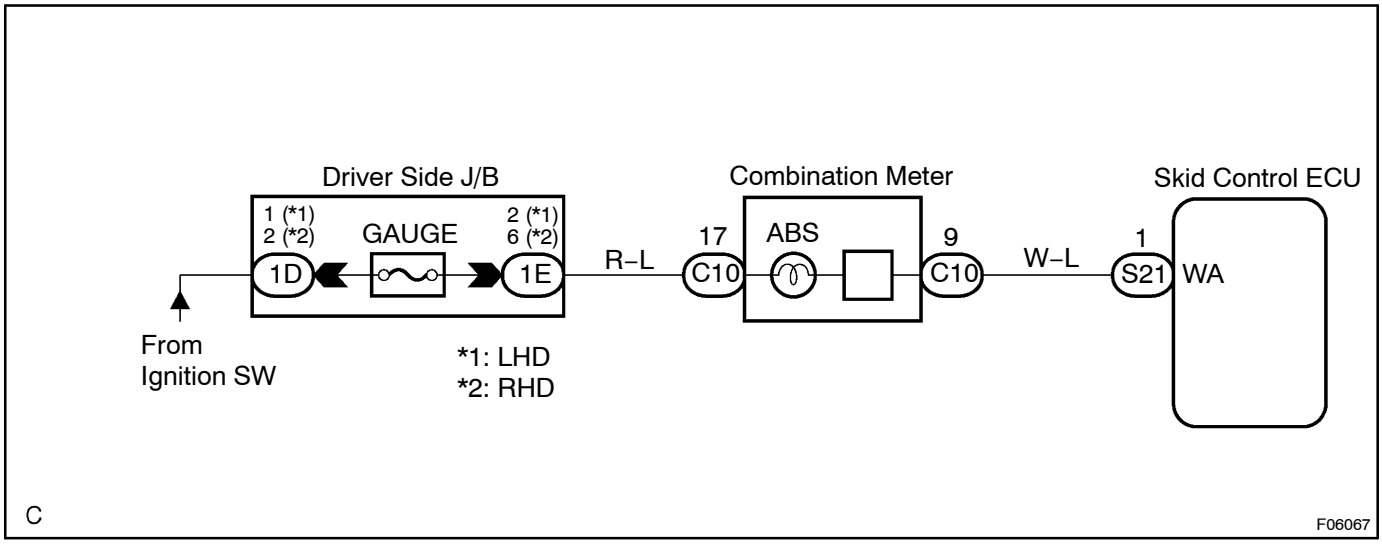
DI9IJ–01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a 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.
Connect terminals Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using hand–held tester.
*2: After inspection with step 3, start the inspection from step 4 in case of using the hand–held tester and start from step 5 in case of not using 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 by the hand–held tester.
HINT:
ABS warning light turns ”OFF” automatically 2 sec. after is turned ”ON”.

OK → Check and replace skid control ECU.

NG

2	Check ABS warning light.

See combination meter troubleshooting.

NG → Repair bulb or combination meter assembly.

OK

Repair or replace and check for open circuit in harness and connector between combination meter and skid control ECU (See page IN–34).

3	Check that the skid control ECU connectors are securely connected to the skid control ECU.

NO → Connect the connector to the skid control ECU.

YES

4	Check operation of the ABS warning light (See step 1).

OK → Check and replace skid control ECU.

NG

5	**Is DTC output?**

Check DTC on page DI–318.

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

NO

Check for short circuit in harness and connector between check connector and ABS solenoid relay (See page IN–34).

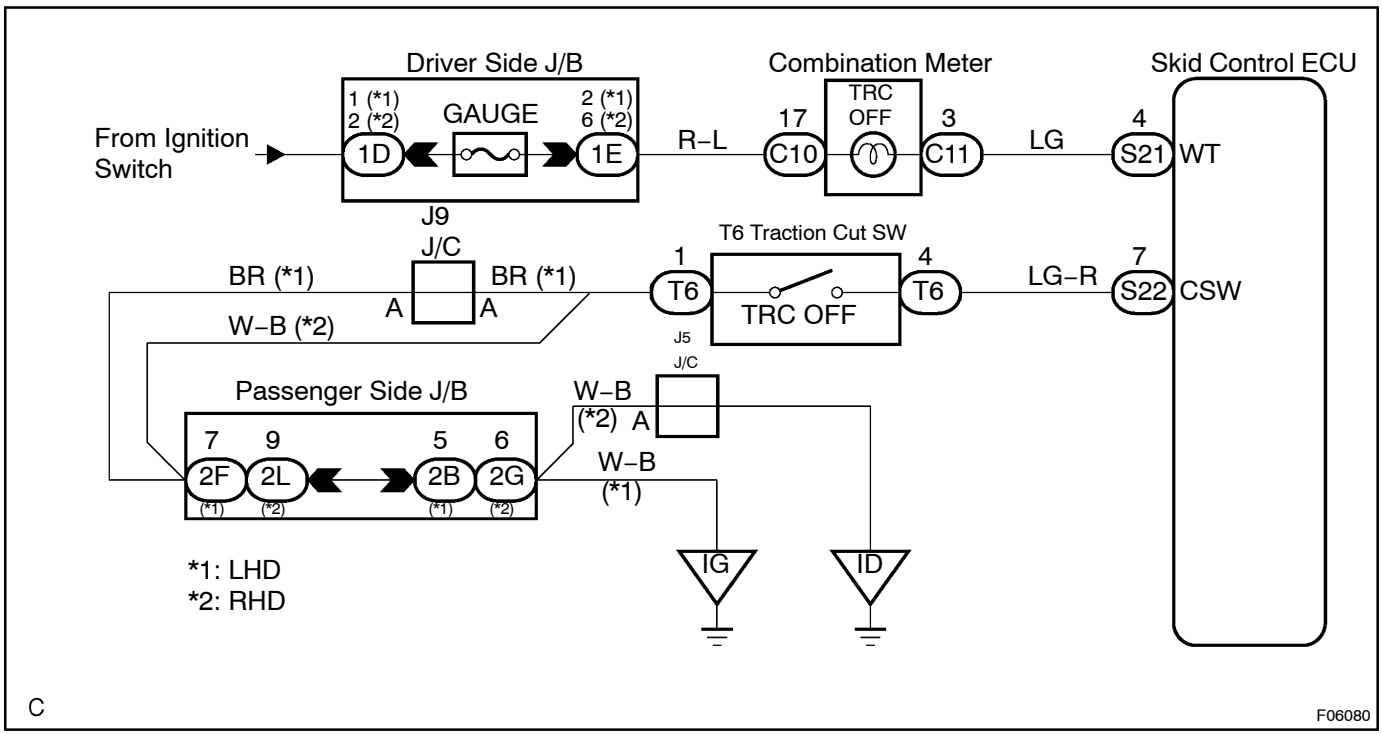
DI559–08

TRC OFF Indicator, TRC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRC control main switch. When the TRC cut switch is pushed on, TRC control goes off and the TRC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

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 TRC OFF indicator light.**

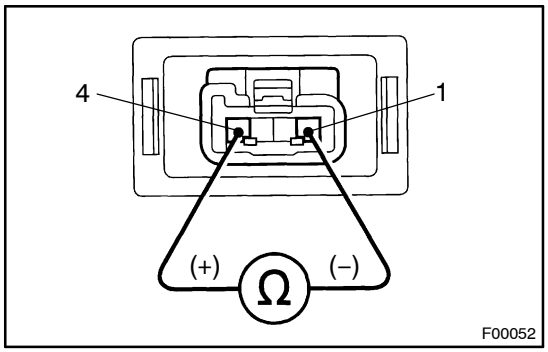
PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:
Check that ”ON” and ”OFF” of the TRC OFF indicator light can be shown on the combination meter by the hand–held tester.

NG → **Go to step 4.**

OK

2	**Check TRC OFF switch.**



PREPARATION:
Remove the TRC OFF switch and disconnect the connector from the TRC OFF switch.

CHECK:
Measure resistance between terminals 1 and 4 TRC OFF switch when TRC OFF switch is on and off.

OK:

TRC OFF switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRC OFF switch.**

OK

3	Check for open and short circuit in harness and connector between terminal CSW of skid control ECU and TRC OFF switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check TRC OFF indicator light.

See combination meter troubleshooting.

NG → Repair bulb or combination meter assembly.

OK

5	Check for open and short circuit in harness and connector between terminal WT of skid control ECU and TRC OFF indicator light (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU.

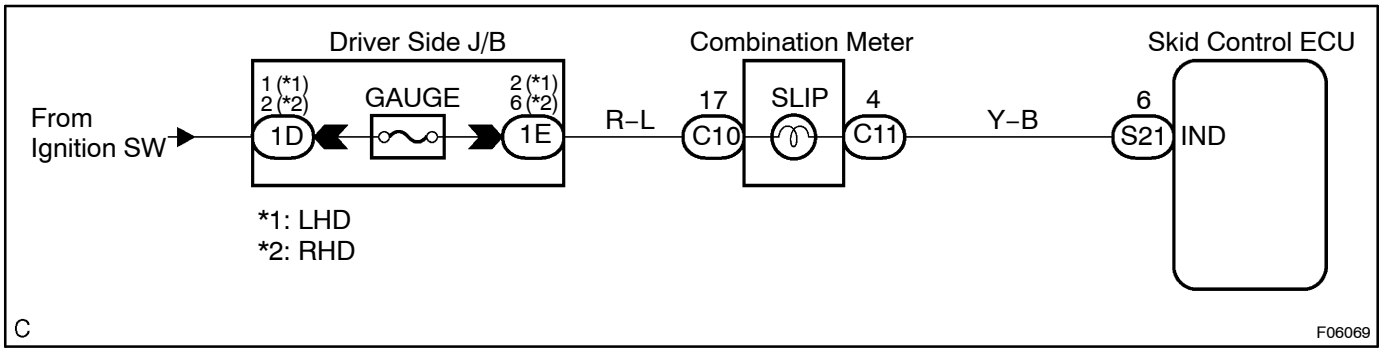
DI55A–05

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRC 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 by the hand–held tester.

OK → **Go to step 4.**

NG

2	**Check that the SLIP indicator light is ON for 3 seconds soon after ignition switch is turned ON.**

OK → **Check and replace skid control ECU.**

NG

3	**Check SLIP indicator light.**

See combination meter troubleshooting.

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

OK

4	**Check for open and short circuit in harness and connector between skid control ECU and SLIP indicator light (See page IN–34).**

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

OK

Check and replace skid control ECU.

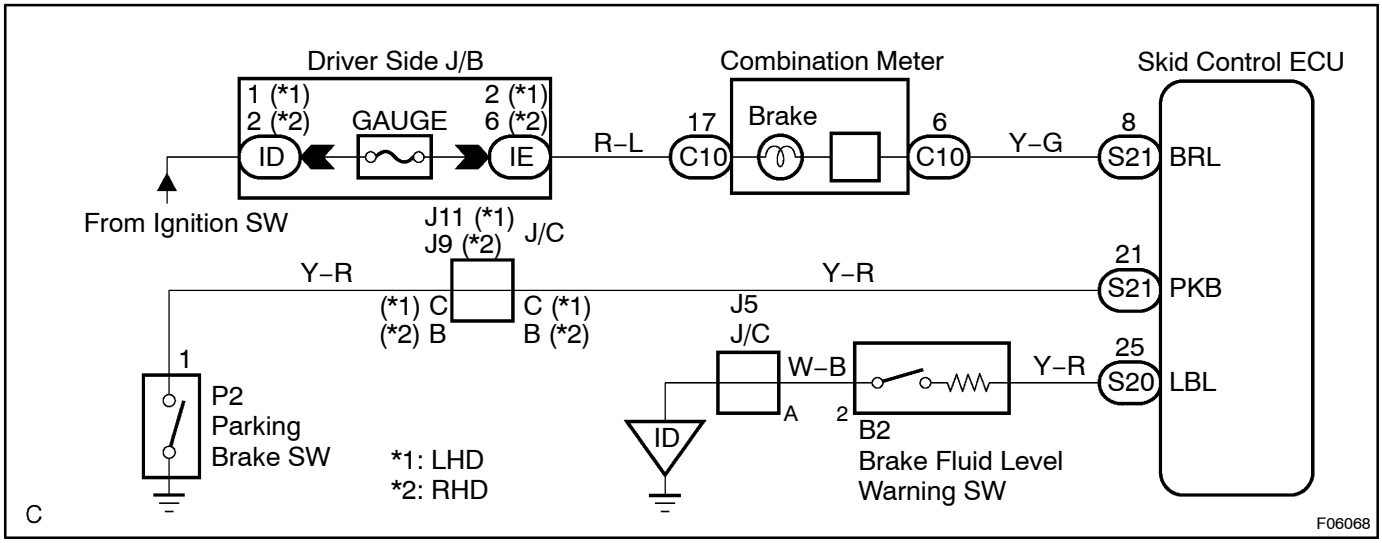
DI6QP–10

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check parking brake switch circuit.**

NG → **Repair or replace parking brake switch circuit.**

OK

2	**Check brake fluid level warning switch circuit.**

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

OK

3	**Is DTC output for ABS?**

Check DTC on page DI–318.

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

NO

4	**Check the brake warning light.**

See combination meter troubleshooting.

NG → **Repair or replace combination meter.**

OK

Check and replace skid control ECU.

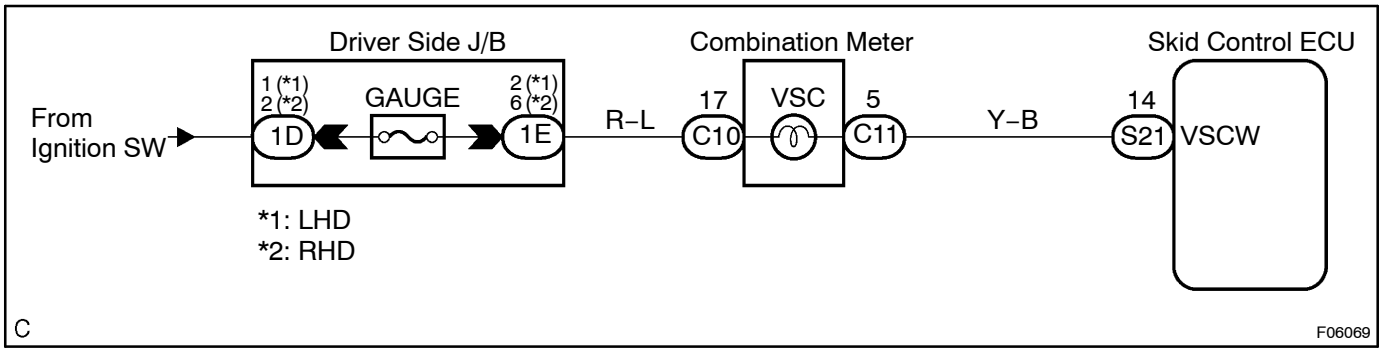
DI28M–06

VSC Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU stores DTC, 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 indicator.**

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 skid control ECU.**

NG

2	**Is DTC output for VSC?**

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

NO

3	Check for open and short circuit in harness and connector between skid control ECU and VSC warning light (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check VSC warning light.

See combination meter troubleshooting.

NG → Repair or replace combination meter.

OK

Check and replace skid control ECU.

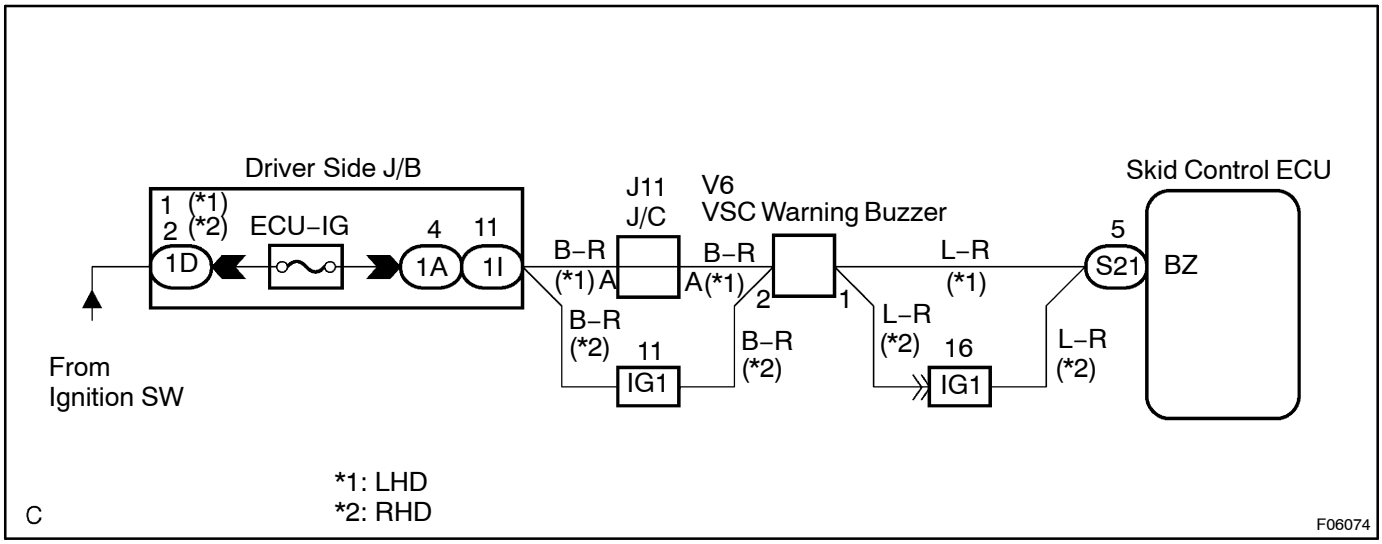
DI1HB–11

VSC Warning Buzzer Circuit

CIRCUIT DESCRIPTION

The VSC warning buzzer sounds during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start 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 buzzer.**

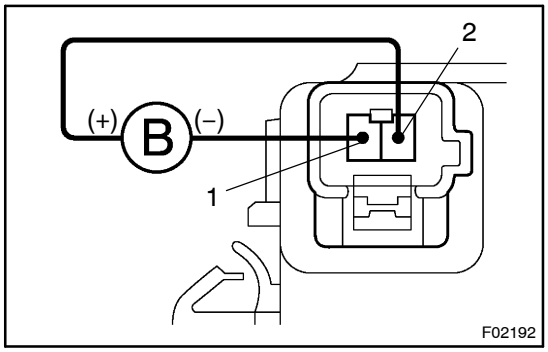
PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:
Check ”beep, beep” sound of the VSC warning buzzer by the hand–held tester.

OK → **Check and replace skid control ECU.**

NG

2	**Check VSC warning buzzer.**



PREPARATION:
Disconnect the VSC warning buzzer connector.

CHECK:
Apply battery voltage to the terminals 1 and 2 of VSC warning buzzer connector. Check that the VSC warning buzzer sound.

NG → **Replace the VSC warning buzzer.**

OK

3	Check for open and short circuit in harness and connector between skid control ECU and the VSC warning buzzer (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace skid control ECU.

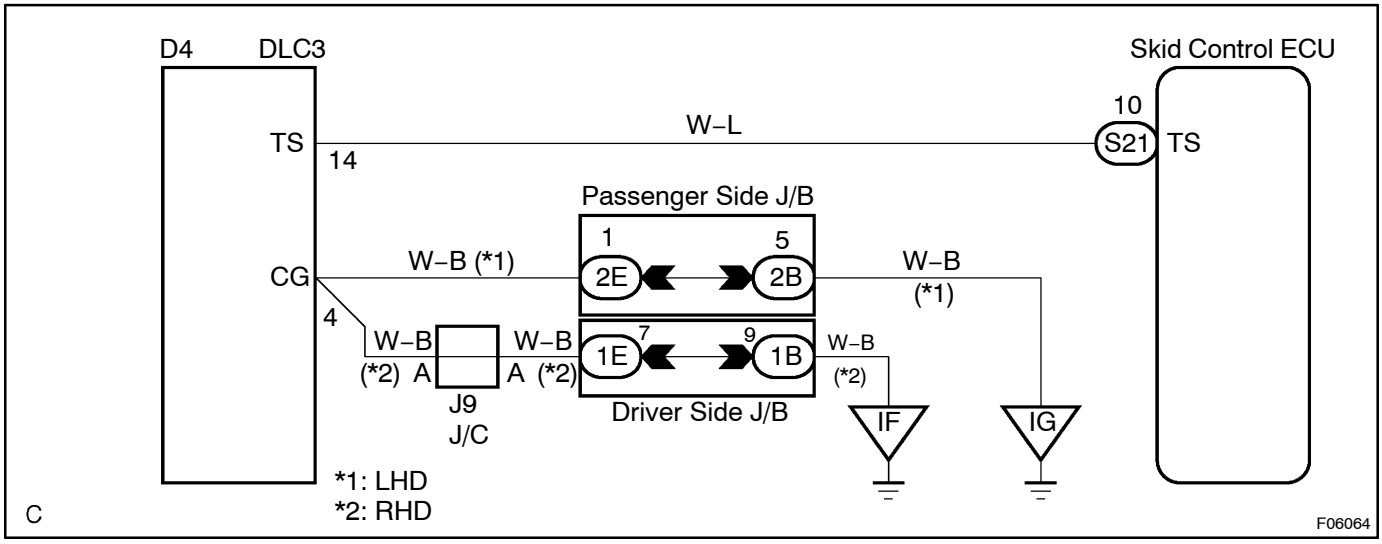
DI0CM–10

Ts Terminal Circuit

CIRCUIT DESCRIPTION

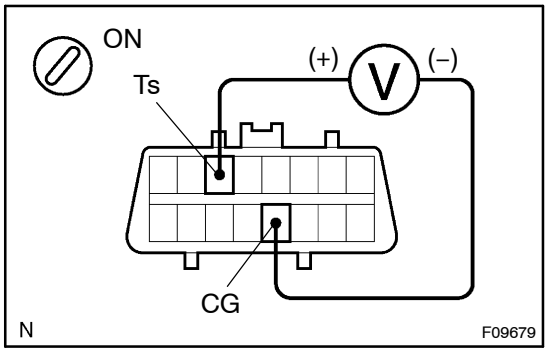
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check. Connecting terminals Ts and CG of the DLC3 starts the check.

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: 10 – 14 V

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

NG

2	Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN–34).

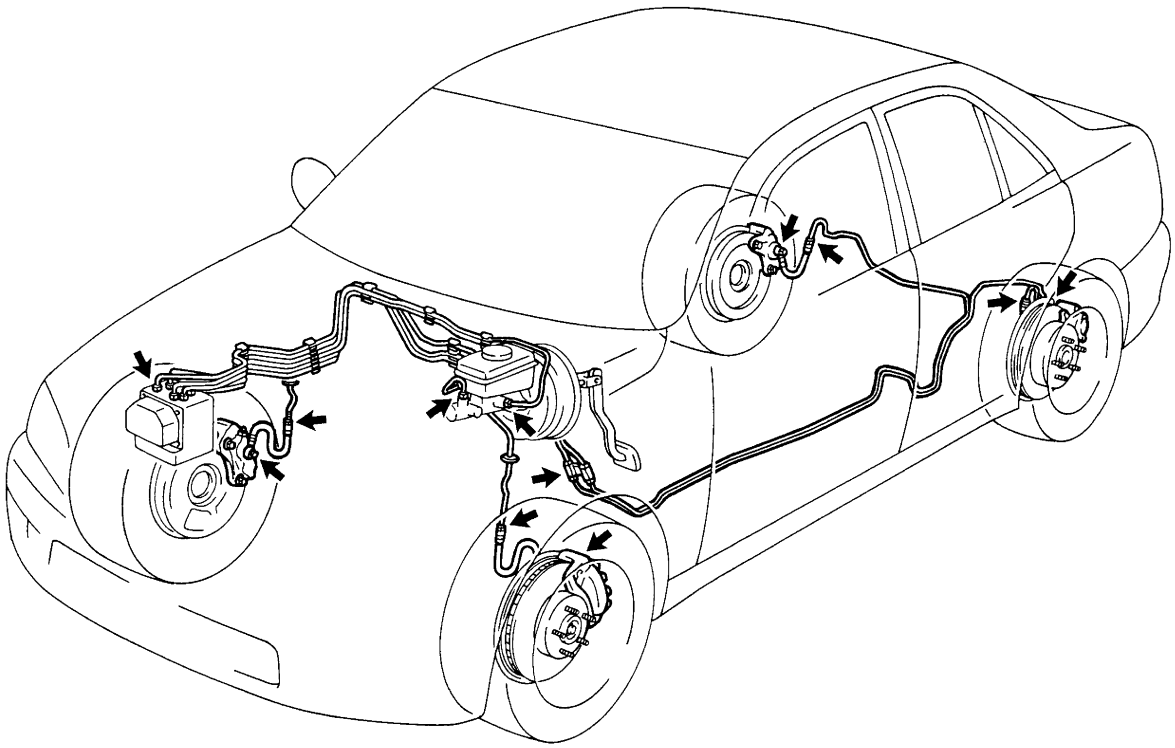
NG	Repair or replace harness or connector.

OK

Check and replace skid control ECU.

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



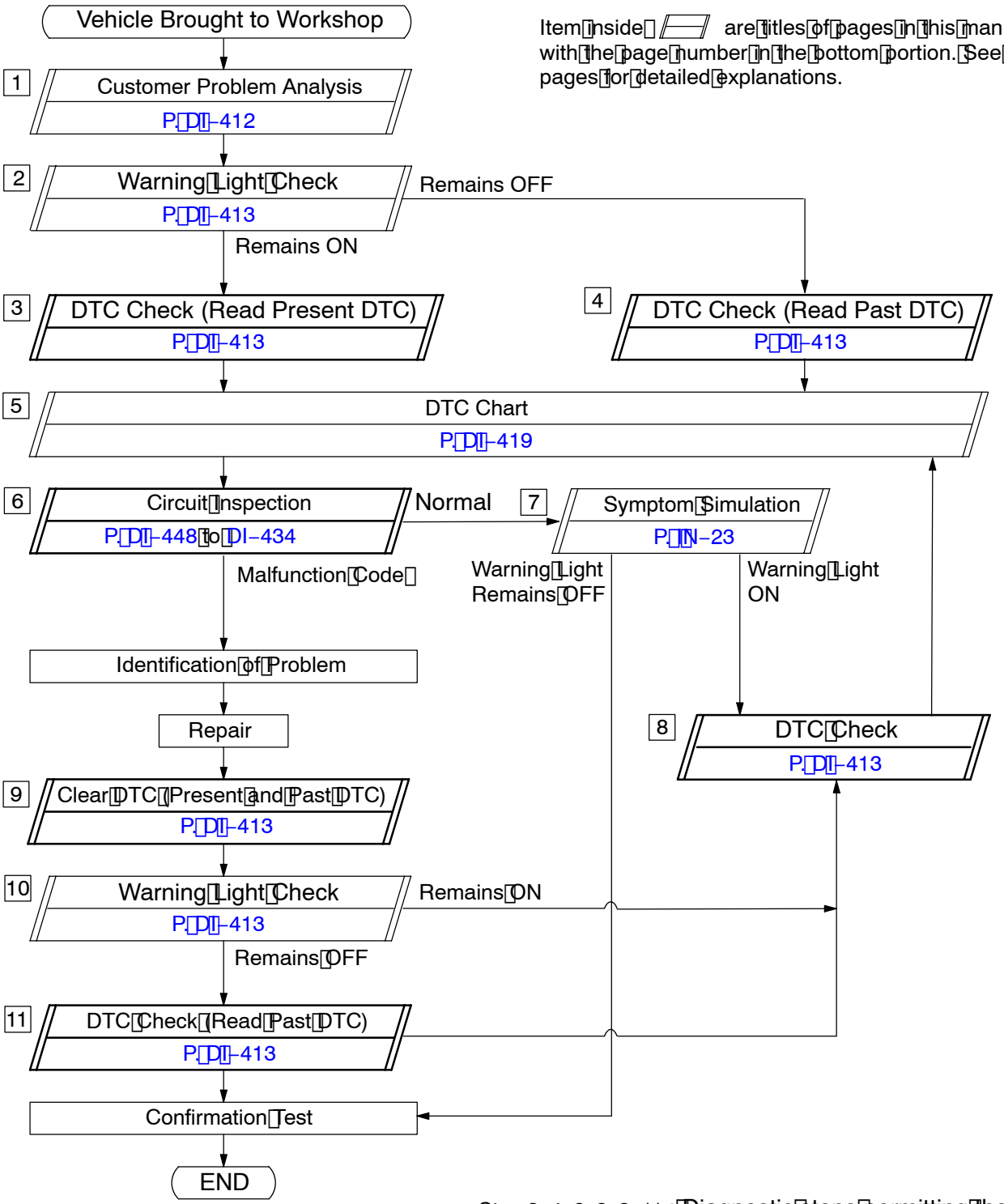
N

F12314

SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI4Z2–05



Step 3, 4, 6, 8, 9, 11 : Diagnostic steps permitting the use of the hand–held tester.

DI15Z–12

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet

Inspector's Name _____

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

Date Problem Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	**Approx.**

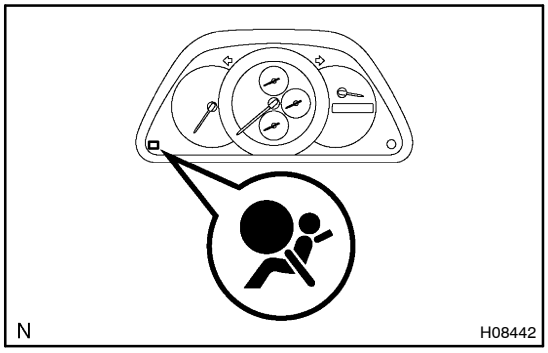
Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details Of Problem	

Vehicle Inspection, Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnosis System Inspection

SRS Warning Light Inspection	**1st Time**	☐ Remains ON ☐ Sometimes Light Up ☐ Does Not Light Up
	2nd Time	☐ Remains ON ☐ Sometimes Light Up ☐ Does Not Light Up
DTC Inspection	**1st Time**	☐ Normal Code ☐ Malfunction Code [Code.]
	2nd Time	☐ Normal Code ☐ Malfunction Code [Code.]

DI4L1–15



PRE–CHECK

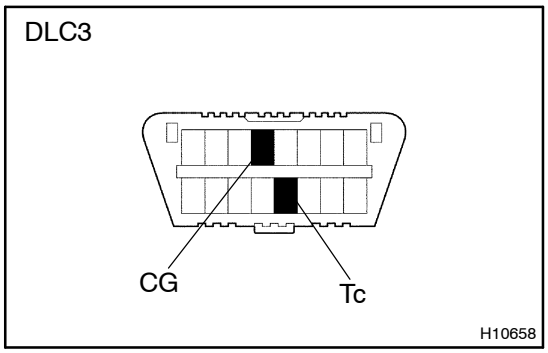
1. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch to the ON position and check that the SRS warning light lights up.

(b) Check that the SRS warning light goes out after approx. 6 seconds.

HINT:

- When the ignition switch is at ON and the SRS warning light remains on or flashes, the airbag sensor assembly has detected a malfunction code.
- If, after approx. 6 seconds have elapsed, the SRS warning light sometimes lights up or the SRS warning light lights up even when the ignition switch is OFF, a short in the SRS warning light circuit can be considered likely. Proceed to "SRS warning light circuit malfunction" (See Pub. No. RM776E on page DI–43).



2. DTC CHECK (Using diagnosis check wire)

(a) Present troubles codes:
Output the DTC.
(1) Turn the ignition switch to the ON position and wait for approx. 20 seconds.
(2) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843–18040

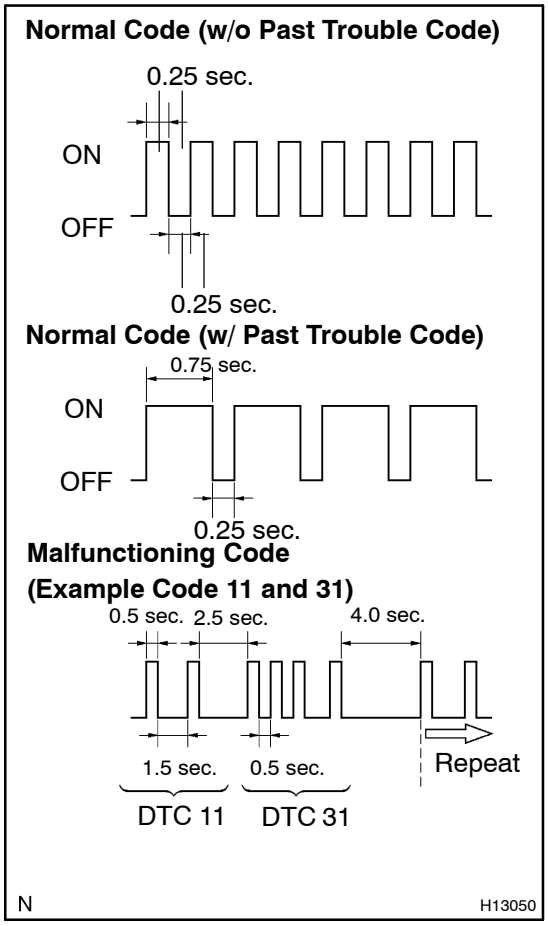
NOTICE:

Pay due attention to the terminal connecting position to avoid a malfunction.

(b) Past troubles codes:
Output the DTC.
(1) Using a service wire, connect Terminals Tc and CG of the DLC3.
SST 09843–18040
(2) Turn the ignition switch to the ON position and wait for approx. 20 seconds.

NOTICE:

Pay due attention to the terminal connecting position to avoid a malfunction.

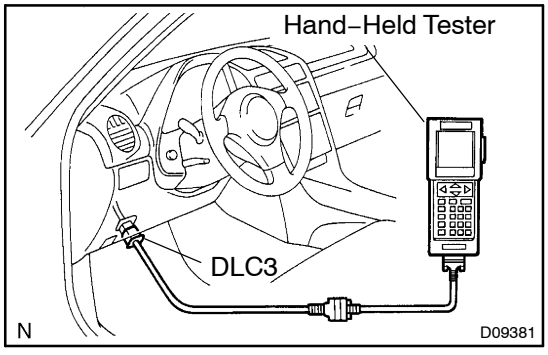


(c) Read the DTC.
Read the 2–digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are shown in the illustration.

- Normal code indication (w/o past trouble code)
  The light will blink 2 times per second.
- Normal code indication (w/ past trouble code)
  When the past troubles code is stored in the airbag sensor assy, the light blinks only ones a second.
- Malfunction code indication
  The first blinking output indicates the first digit of a 2–digit DTC. After a 1.5–second pause, the second blinking output will indicate the second digit.

If there are 2 or more codes, there will be a 2.5–second pause between each code. After all the codes have been output, there will be a 4.0–second pause and they will all be repeated.
HINT:

- In the event of a number of trouble codes, indication will start from the smallest numbered code.
- If a DTC is not output or a DTC is output without terminal connecting, proceed to "Tc terminal circuit" (See Pub. No. RM776E on page DI–48).



3. DTC CHECK (Using hand–held tester)

(a) Hook up the hand–held tester to the DLC3.
(b) Read the DTCs by following the prompts on the tester screen.

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

4. DTC CLEARANCE (Not using diagnosis check wire)

When the ignition switch is turned off, the diagnostic trouble code is cleared.
HINT:
DTC might not be cleared by turning the ignition switch OFF. In this case, proceed to the next step.

5. DTC CLEARANCE (Using diagnosis check wire)

(a) Using SST, connect the terminals Tc and CG of the DLC3.
SST 09843–18040
(b) Turn the ignition switch to ON and wait for approx. 6 seconds.

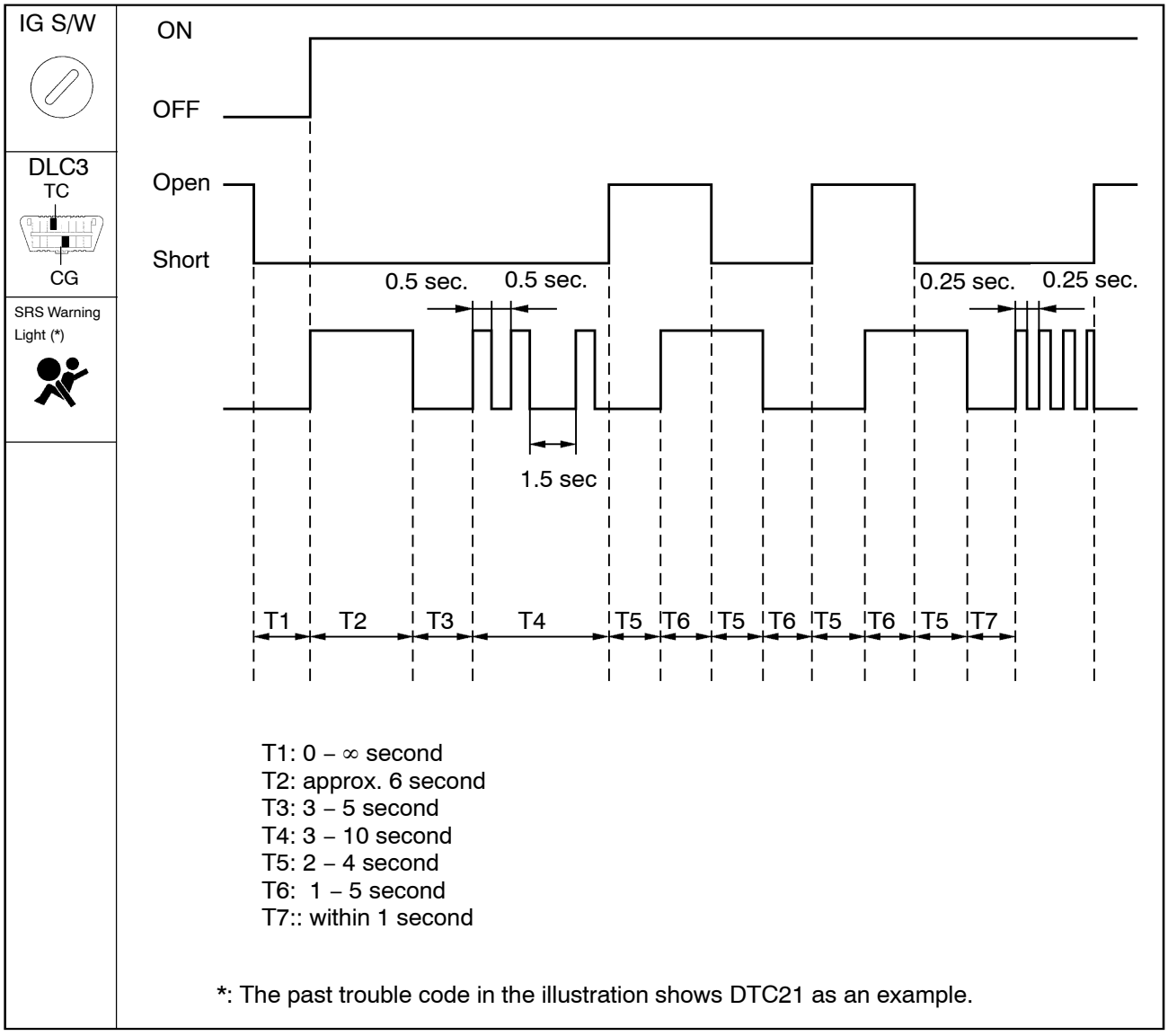
(c) The SRS warning light lights up 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal Tc of the DLC3.

(d) The SRS warning light goes off 2 to 4 sec. after grounding terminal Tc. Within 1 to 5 sec. after that, release ground from terminal Tc again.

(e) The SRS warning light lights up again 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal Tc of the DLC3 again.

(f) The SRS warning light goes off 2 to 4 sec. later. Within 1 sec. after that, normal code is output indicating that DTC deletion is completed.

If DTCs are to cleared, repeat the above procedure until the codes are cleared.

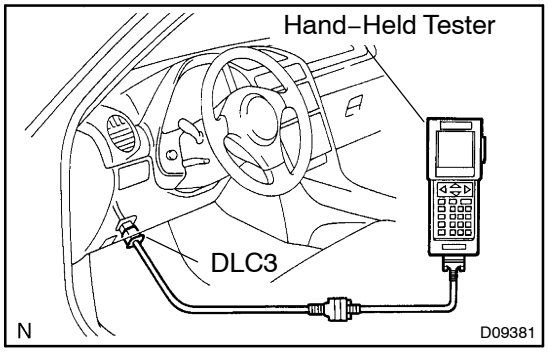


T1: 0 – ∞ second
T2: approx. 6 second
T3: 3 – 5 second
T4: 3 – 10 second
T5: 2 – 4 second
T6: 1 – 5 second
T7:: within 1 second

*: The past trouble code in the illustration shows DTC21 as an example.

N

H13049



6. DTC CLEARANCE (Using hand–held tester)

(a) Hook up the hand–held tester to the DLC3.

(b) Clear the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the hand–held tester operation's manual for further details.

7. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

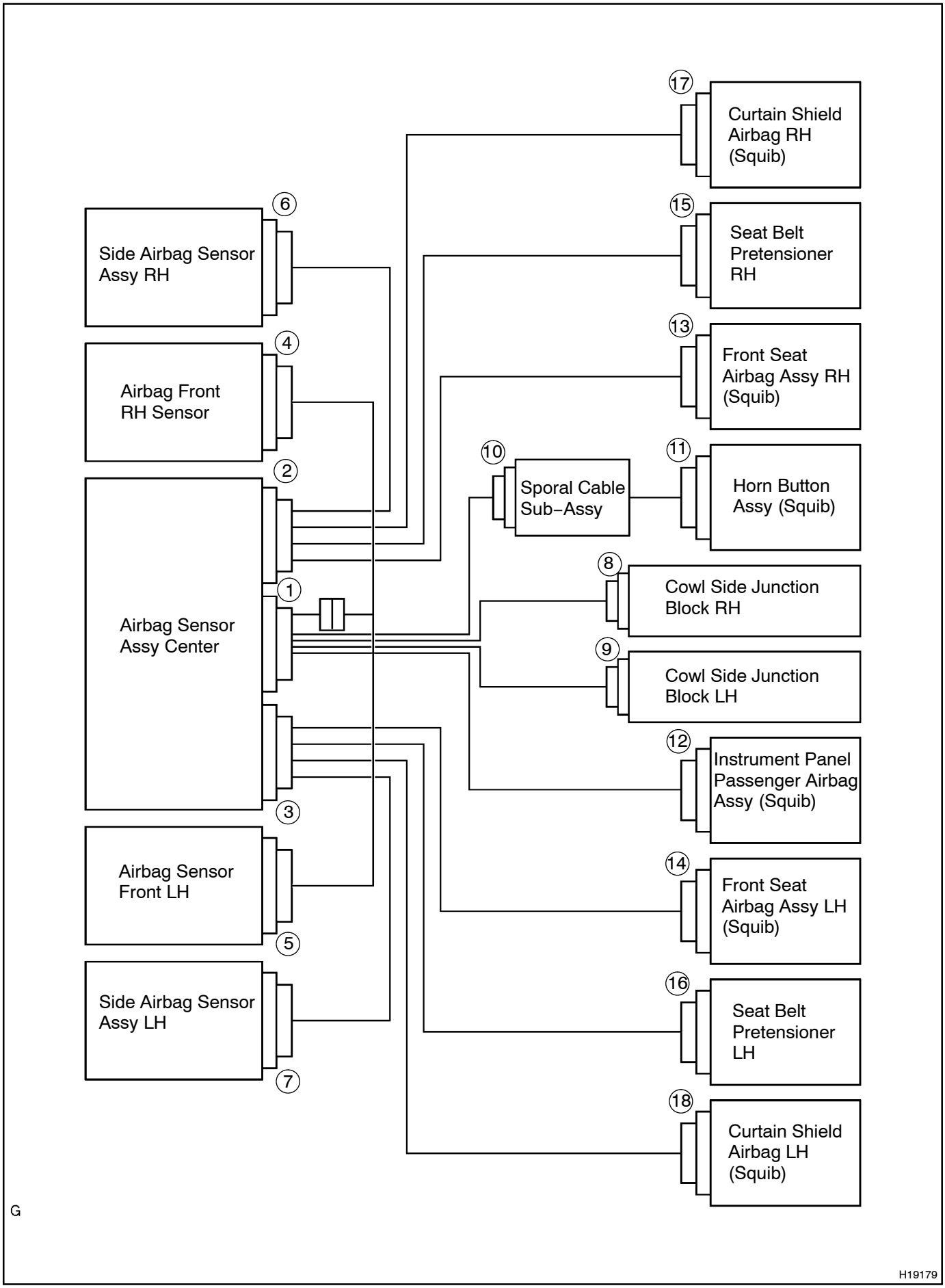
When release of the airbag activation prevention mechanism is directed in the troubleshooting procedure as shown in the illustration of the connectors on the next pages, insert paper which has the same thickness as the male terminal between the terminal and the short spring.

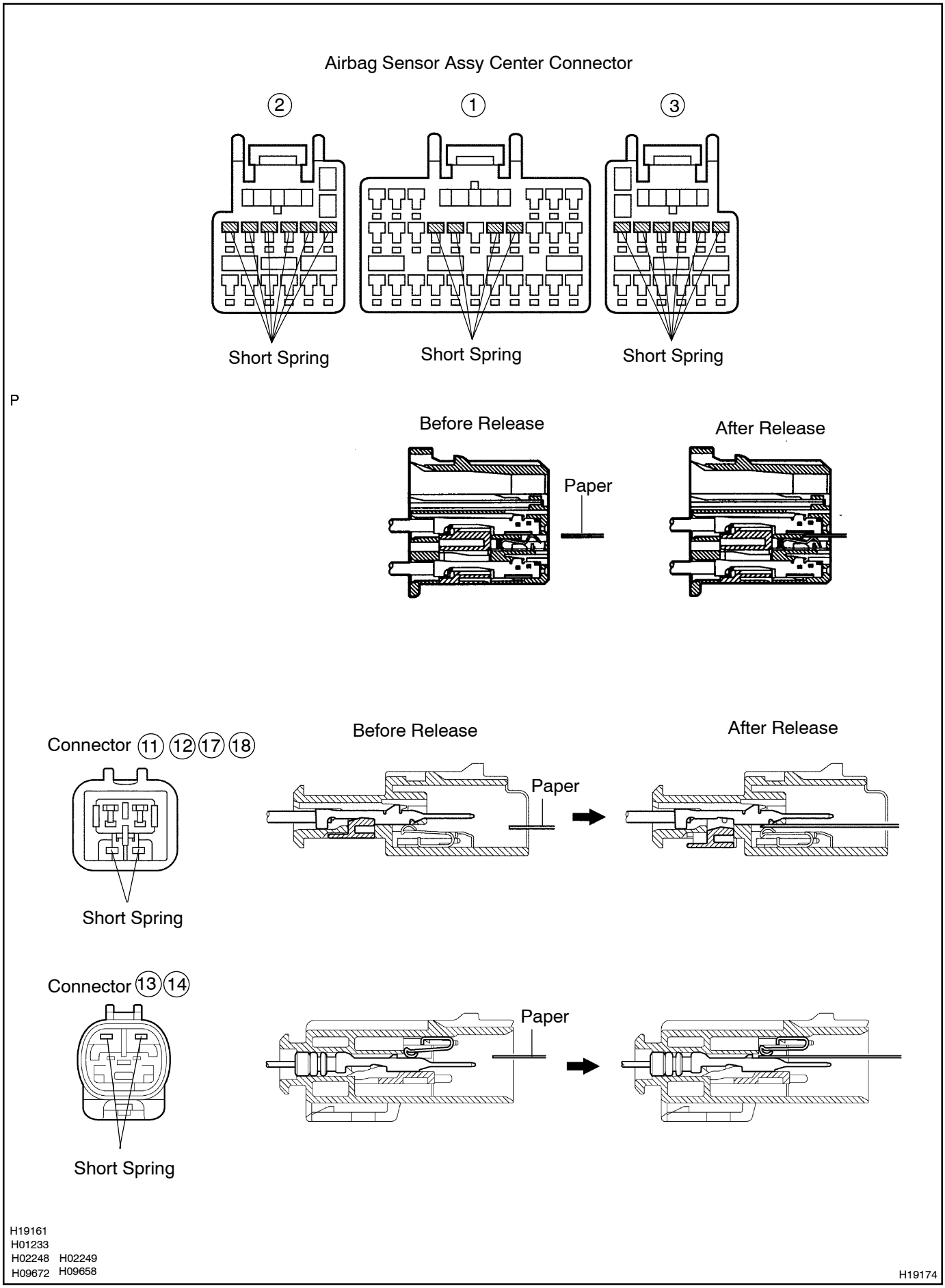
CAUTION:

Never release the airbag activation prevention mechanism on the squib connector.

NOTICE:

- **Do not release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.**
- **If the inserted paper is too thick the terminal and short spring may be damaged, so always use paper with the same thickness as the male terminal.**


17
Curtain Shield Airbag RH (Squib)
6
Side Airbag Sensor Assy RH
15
Seat Belt Pretensioner RH
4
Airbag Front RH Sensor
13
Front Seat Airbag Assy RH (Squib)
10
Sporal Cable Sub–Assy
11
Horn Button Assy (Squib)
2
Airbag Sensor Assy Center
8
Cowl Side Junction Block RH
1
9
Cowl Side Junction Block LH
12
Instrument Panel Passenger Airbag Assy (Squib)
3
Airbag Sensor Front LH
14
Front Seat Airbag Assy LH (Squib)
5
Side Airbag Sensor Assy LH
16
Seat Belt Pretensioner LH
7
18
Curtain Shield Airbag LH (Squib)
G
H19179



H19161
H01233
H02248 H02249
H09672 H09658

H19174

DI1AZ-20

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below. (Proceed to the page given for that circuit.).

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B1135/24 (DI–424)	• Half connection in airbag sensor assy center malfunction	• Airbag sensor assy center • Wire harness	Blink
B1140/32 (DI–428)	• Side airbag sensor assy (RH) malfunction	• Side airbag sensor assy (RH) • Airbag sensor assy center • Wire harness	Blink
B1141/33 (DI–434)	• Side airbag sensor assy (LH) malfunction	• Side airbag sensor assy (LH) • Airbag sensor assy center • Wire harness	Blink
B1160/83 (DI–448)	• Short in curtain shield airbag (RH) squib circuit	• Curtain shield airbag assy RH (squib) • Airbag sensor assy center • Floor wire	Blink
B1161/84 (DI–452)	• Open in curtain shield airbag (RH) squib circuit	• Curtain shield airbag assy RH (squib) • Airbag sensor assy center • Floor wire	Blink
B1162/81 (DI–455)	• Short in curtain shield airbag (RH) circuit (to ground)	• Curtain shield airbag assy RH (squib) • Airbag sensor assy center • Floor wire	Blink
B1163/82 (DI–458)	• Short in curtain shield airbag (RH) circuit (to B+)	• Curtain shield airbag assy RH (squib) • Airbag sensor assy center • Floor wire	Blink
B1165/87 (DI–461)	• Short in curtain shield airbag (LH) squib circuit	• Curtain shield airbag assy LH (squib) • Airbag sensor assy center • Floor wire No. 2	Blink
B1166/88 (DI–465)	• Open in curtain shield airbag (LH) squib circuit	• Curtain shield airbag assy LH (squib) • Airbag sensor assy center • Floor wire No. 2	Blink
B1167/85 (DI–468)	• Short in curtain shield airbag (LH) circuit (to ground)	• Curtain shield airbag assy LH (squib) • Airbag sensor assy center • Floor wire No. 2	Blink
B1168/86 (DI–471)	• Short in curtain shield airbag (LH) circuit (to B+)	• Curtain shield airbag assy LH (squib) • Airbag sensor assy center • Floor wire No. 2	Blink

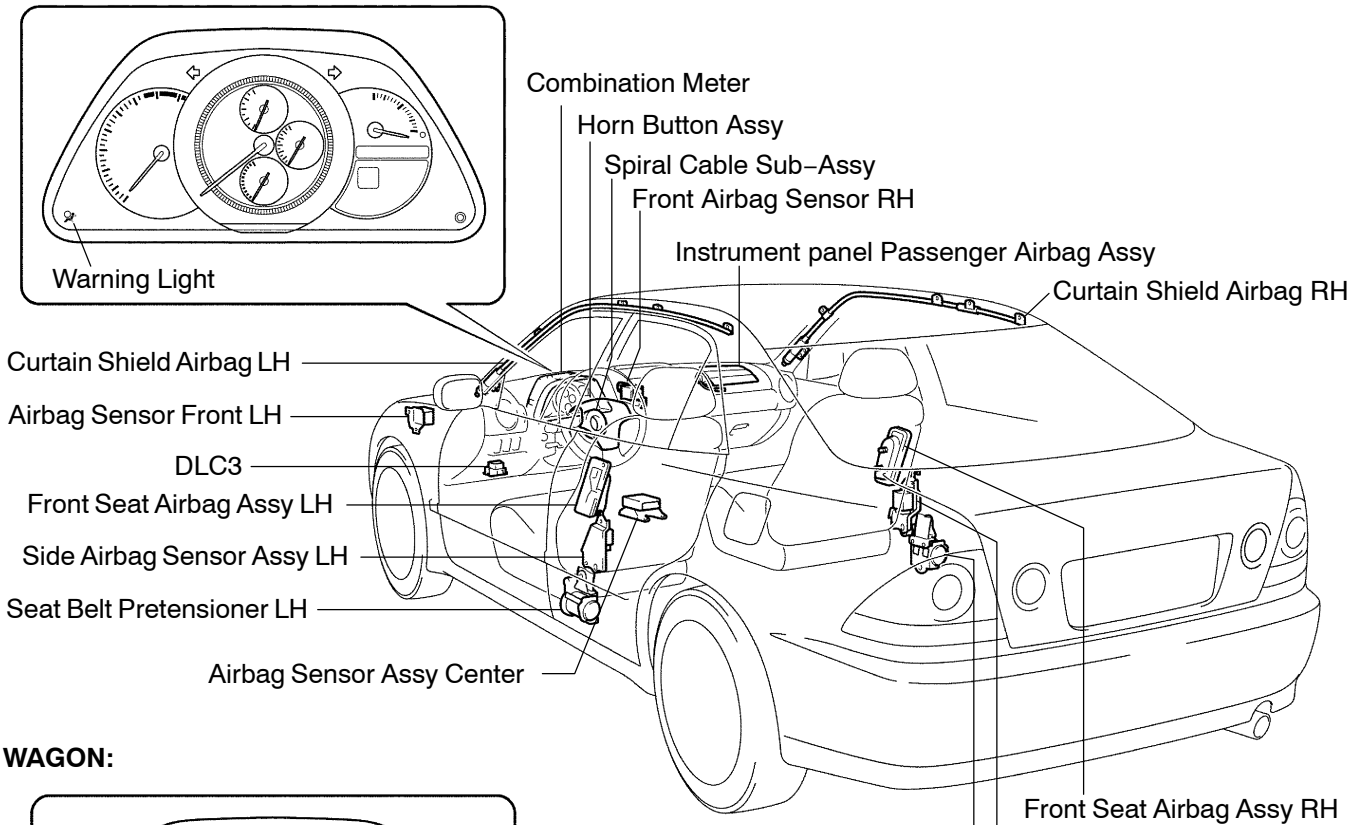
HINT:

- When the SRS warning light remains lit up and the DTC is the normal code, this means a voltage source drops.
  This malfunction is not stored in memory by the airbag sensor assembly and if the power source voltage returns to normal, the SRS warning light will automatically go out.
- When 2 or more codes are indicated, the codes will be displayed in numeral order starting from the lowest numbered code.
- If a code not listed on the chart is displayed, the airbag sensor assembly is faulty.

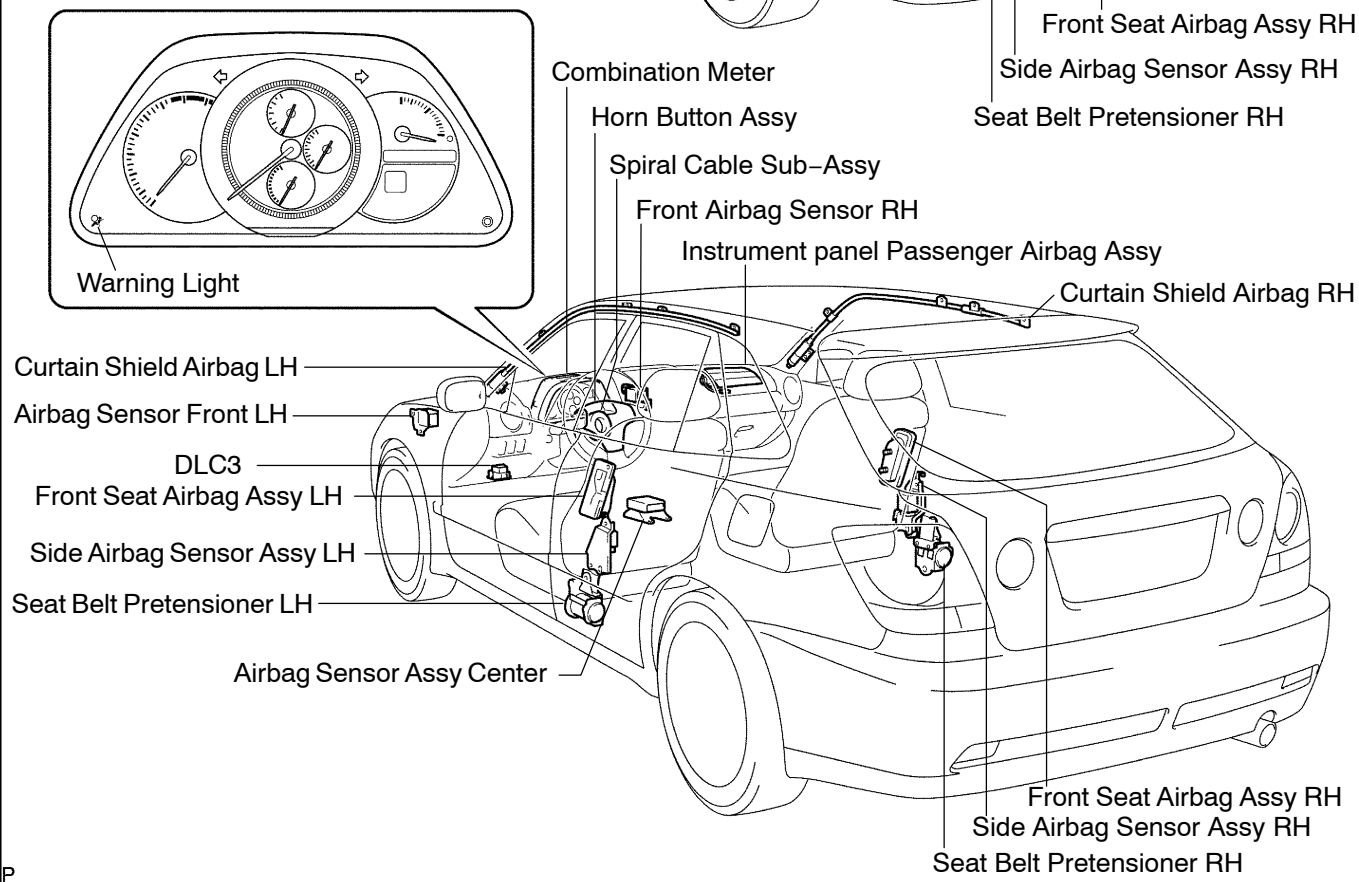
DI1B0–21

PARTS LOCATION

SEDAN:



WAGON:

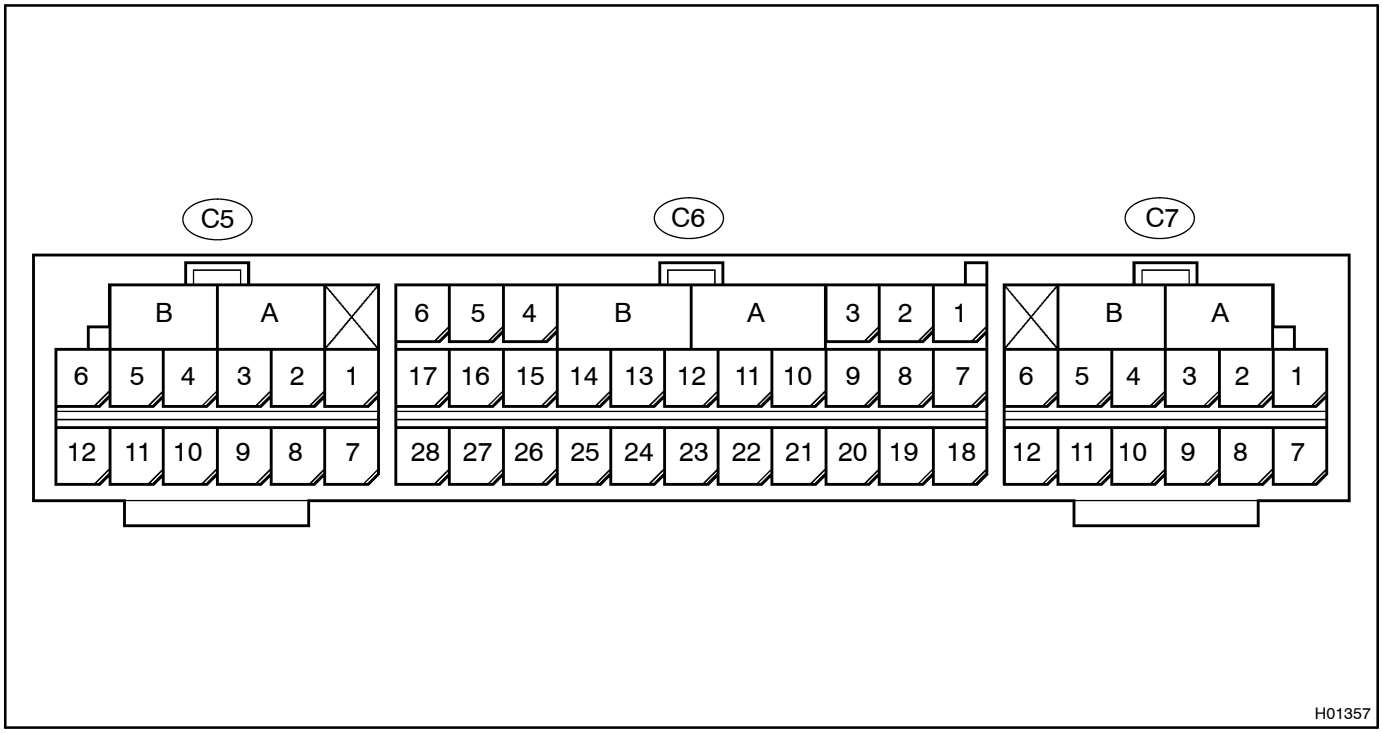


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DI1B1–29

TERMINALS OF ECU



No.	Symbol	Terminal Name
A	–	Electrical Connector Check Mechanism
B	–	Electrical Connector Check Mechanism
C6 – 3	LA	SRS Warning Light
C6 – 5	IG2	Power Source (IGN Fuse)
C6 – 6	ACC	Power Source (CIG Fuse)
C6 – 9	+SR	Front Airbag Sensor (RH)
C6 – 10	P+	Squib (Instrument Panel Passenger Airbag Assy)
C6 – 11	P–	Squib (Instrument Panel Passenger Airbag Assy)
C6 – 12	SIL	Diagnosis
C6 – 13	D–	Squib (Horn Button Assy)
C6 – 14	D+	Squib (Horn Button Assy)
C6 – 15	+SL	Front Airbag Sensor (LH)
C6 – 19	Tc	Diagnosis
C6 – 20	–SR	Front Airbag Sensor (RH)
C6 – 23	GSW2	ECM
C6 – 26	–SL	Front Airbag Sensor (LH)
C6 – 27	E1	Ground
C6 – 28	E2	Ground
C5 – 1	PL–	Squib (Seat Belt Pretensioner, LH)
C5 – 2	PL+	Squib (Seat Belt Pretensioner, LH)
C5 – 3	ICL+	Squib (Curtain Shield Airbag Assy (LH))
C5 – 4	ICL–	Squib (Curtain Shield Airbag Assy (LH))
C5 – 5	SFL–	Squib (Front seat Airbag Assy LH)
C5 – 6	SFL+	Squib (Front seat Airbag Assy LH)
C5 – 7	VUPL	Side Airbag Sensor Assy (LH)

No.	Symbol	Terminal Name
C5 – 9	ESL	Side Airbag Sensor Assy (LH)
C5 – 10	SSL+	Side Airbag Sensor Assy (LH)
C5 – 12	SSL–	Side Airbag Sensor Assy (LH)
C7 – 1	SFR+	Squib (Front Seat Airbag Assy RH)
C7 – 2	SFR–	Squib (Front Seat Airbag Assy RH)
C7 – 3	ICR–	Squib (Curtain Shield Airbag Assy (RH))
C7 – 4	ICR+	Squib (Curtain Shield Airbag Assy (RH))
C7 – 5	PR+	Squib (Pretensioner, RH)
C7 – 6	PR–	Squib (Pretensioner, RH)
C7 – 7	SSR–	Side Airbag Sensor Assy (RH)
C7 – 9	SSR+	Side Airbag Sensor Assy (RH)
C7 – 10	ESR	Side Airbag Sensor Assy (RH)
C7 – 12	VUPR	Side Airbag Sensor Assy (RH)

DI164–37

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
• With the ignition switch in ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.	• SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	*1DI–43
• SRS warning light is always lit up even when ignition switch is in the LOCK position.		
• With the ignition switch in ON position, the SRS warning light does not light up.	• SRS warning light circuit (Does not light up when ignition switch is turned to ON.)	*1DI–43
• DTC is not displayed.	• Tc terminal circuit	*1DI–48
• SRS warning light is always lit up at the time of DTC check procedure.		
• DTC is displayed without Tc and CG terminal connection.		

*1 See Pub. No. RM776E

DI7IA–07

CIRCUIT INSPECTION

DTC	B1135/24	Harf Connection in Airbag Sensor Assy Center Connector

CIRCUIT DESCRIPTION

The airbag sensor assy center detects partial connection of connector.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1135/24 is recorded when the airbag sensor assy center detects an open in the electrical connection chech mechanism of the airbag sensor connector or in the airbag sensor assy center circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1135/24	• Malfunction of electrical connection check mechanism of airbag sensor assy center connector • Airbag sensor assy center malfunction	• Electrical connection check mechanism • Airbag sensor assy center

INSPECTION PROCEDURE

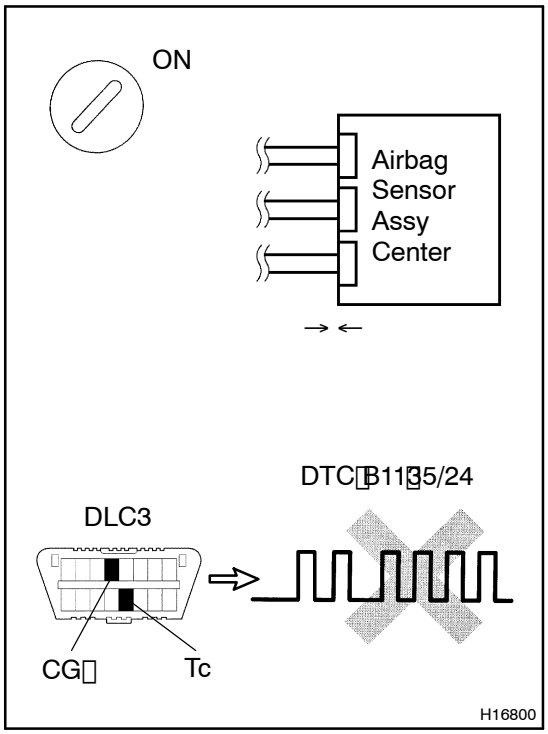
1	Are connector of the airbag sensor assy center properly connected?

NG → Connect connectors.

OK ↓

2	Prepare for inspection (See Pub. No. RM776E on page DI–40).

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connectors to the airbag sensor assy center.
(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(b) Turn the ignition switch to ON, and wait at least for 20 seconds.
(c) Clear the DTC stored in memory (See page DI–413).
(d) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn the ignition switch to ON, and wait at least for 20 seconds.
(f) Check the DTC (See page DI–413).

OK:

DTC B1135/24 is not output.

HINT:

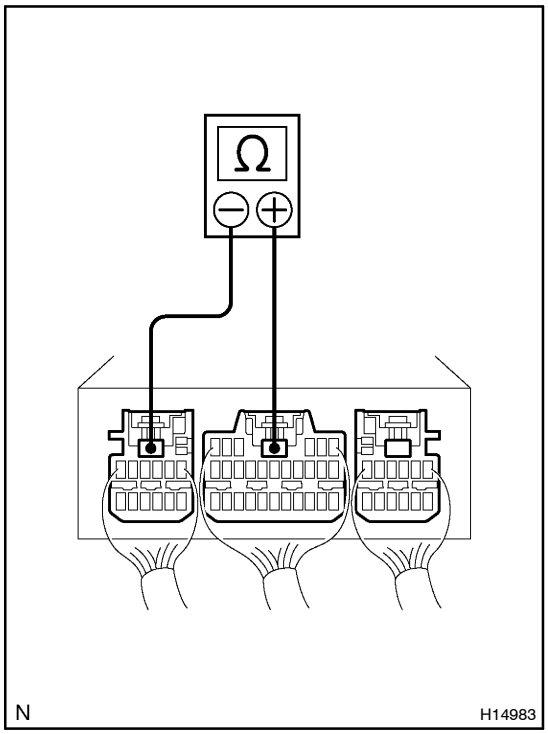
Codes other than code B1135/24 may be output at this time, but they are not relevant to this check.

NG	Go to the next step.

OK

From the results of the inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

4	Check disconnection detection pin in the airbag sensor assy center connector.



CHECK:

With 3 connectors connected to the airbag sensor assy center, place tester leads onto any 2 of 3 disconnection detection pins and check for continuity.

OK:

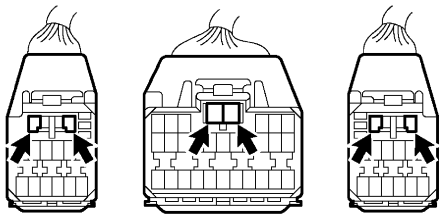
Continuity

NG → **Go to the next step.**

OK

From the results of the inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	**Perform a visual check of the disconnection detection pin.**


H15243

OK:
No deformation is identified.
HINT:
Compare it with the other 2 connector pins.

NG → **Repair or replace airbag sensor assy center connector.**

OK

Replace airbag sensor assy center.

DI9HU–01

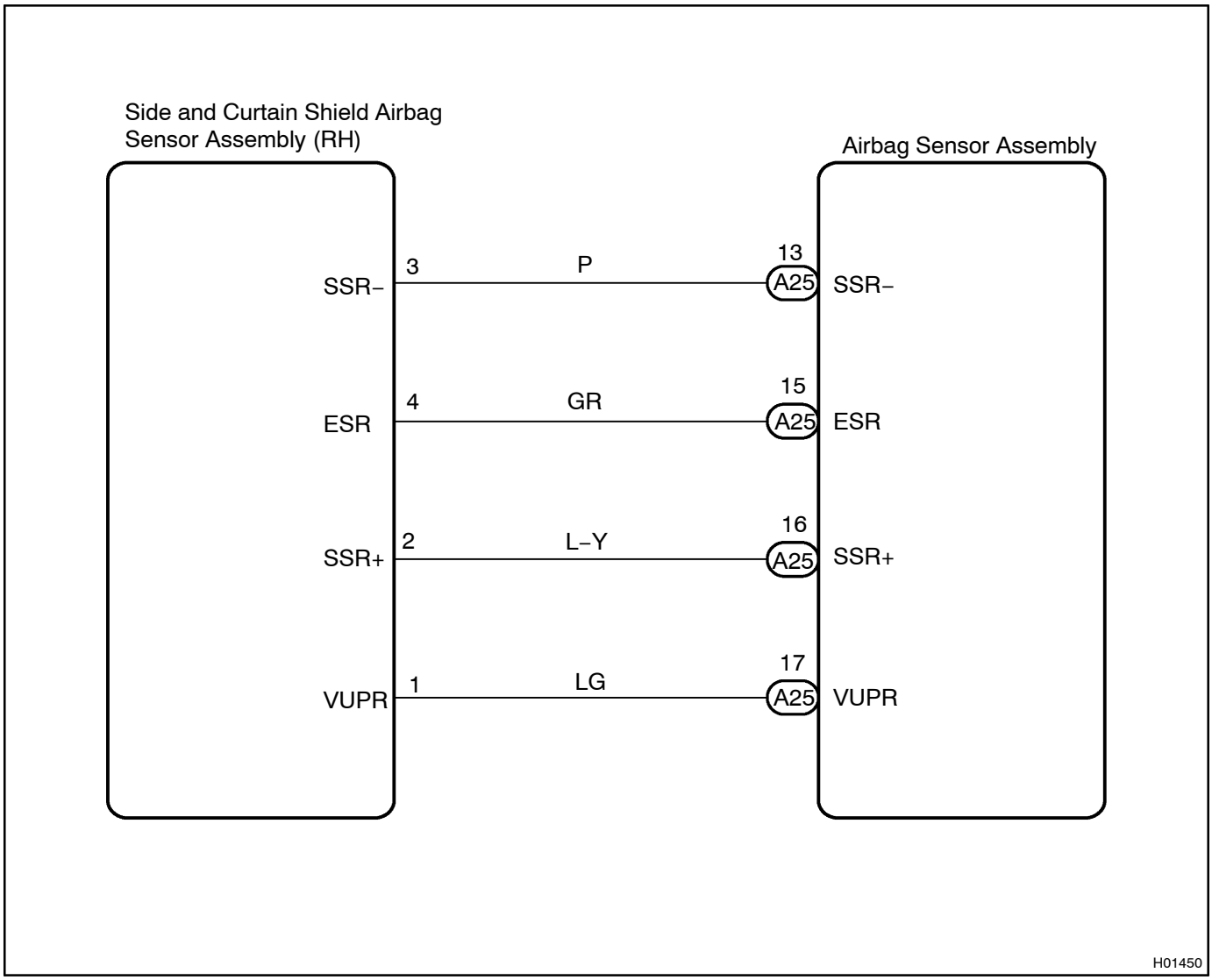
DTC	B1140/32	Side Airbag Sensor Assy (RH) Malfunction

CIRCUIT DESCRIPTION

The side airbag sensor assy (RH) consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side airbag sensor assy (RH) is detected.

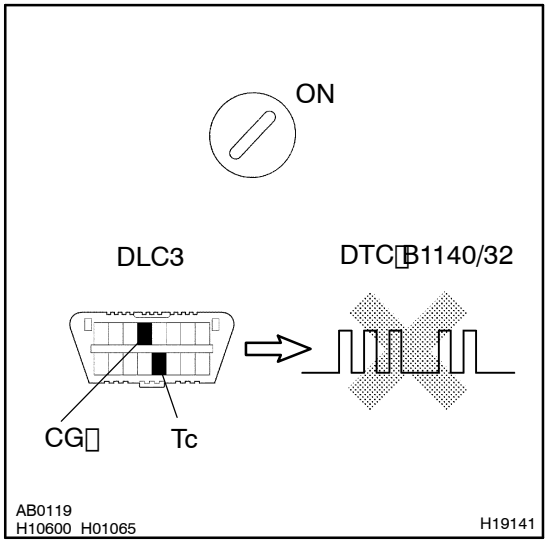
DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	• Side airbag sensor assy (RH) malfunction	• Side airbag sensor assy (RH) • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1140/32 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1140/32 is not output.

HINT:

Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

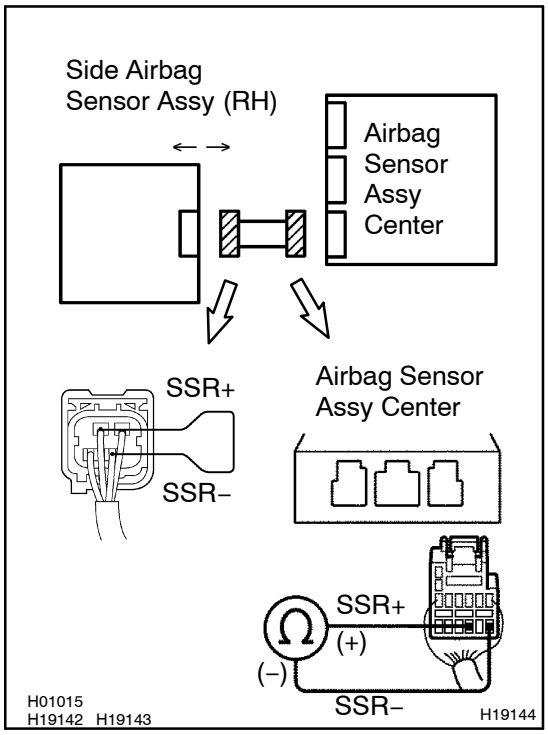
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	Is connector of side airbag sensor assy (RH) properly connected?

3	Prepare for inspection (See Pub. No. RM776E on page DI–40).

4	**Check wire harness.**



PREPARATION:

(a) Disconnect the side airbag sensor assy (RH) connector.

(b) Using a service wire, connect SSR+ and SSR– of the connector (on the side airbag sensor assy side) between the side airbag sensor assy (RH) and airbag sensor assy center.

CHECK:

For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (RH) and the airbag sensor assy center, measure the resistance between SSR+ and SSR–.

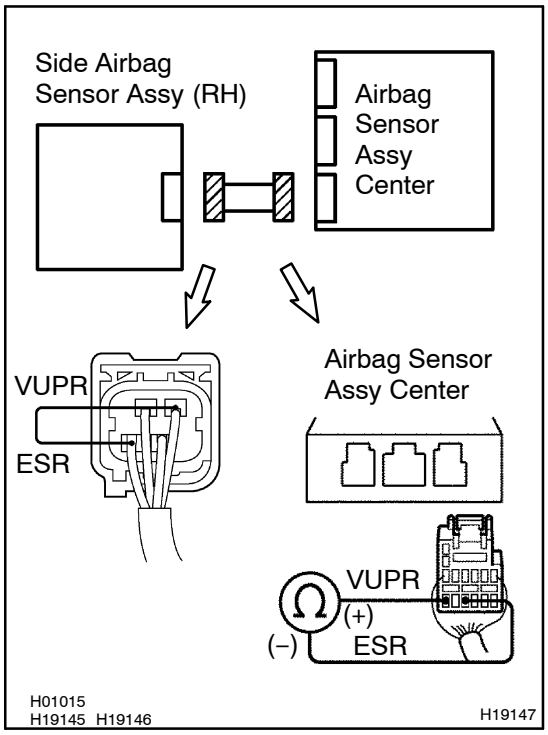
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assy (RH) and airbag sensor assy center.**

OK

5	**Check wire harness.**



PREPARATION:

Using a service wire, connect VUPR and ESR of the connector (on the side airbag sensor assy side) between the side airbag sensor assy (RH) and airbag sensor assy center.

CHECK:

For the connector (on the airbag sensor assy center side) between the airbag sensor assy (RH) and the airbag sensor assy center, measure the resistance between VUPR and ESR.

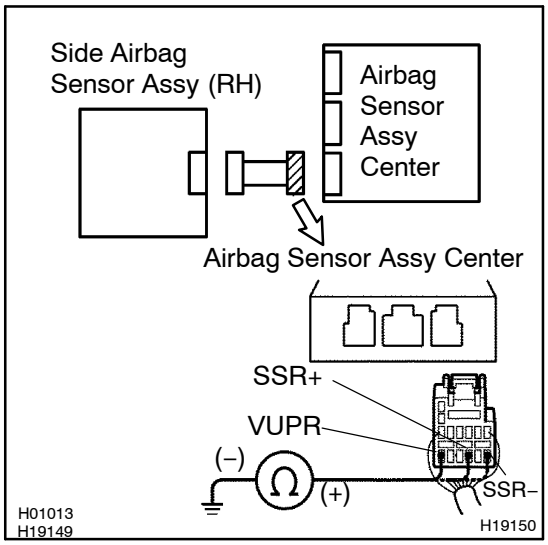
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assy (RH) and airbag sensor assy center.**

OK

6	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (RH) and the airbag sensor assy center, measure the resistance between body ground and each of SSR+, VUPR and SSR–.

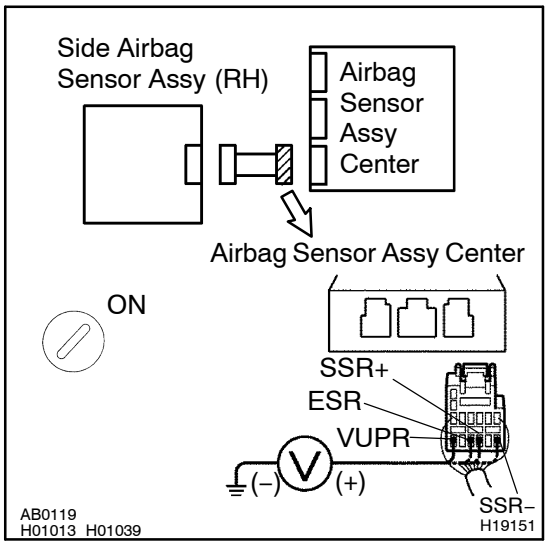
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag sensor assy (RH) and airbag sensor assy center.**

OK

7	Check wire harness (to B+).



CHECK:

(a) Turn the ignition switch to ON.

(b) For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (RH) and the airbag sensor assy center, measure the voltage between the body ground and each of SSR+, VUPR, SSR– and ESR.

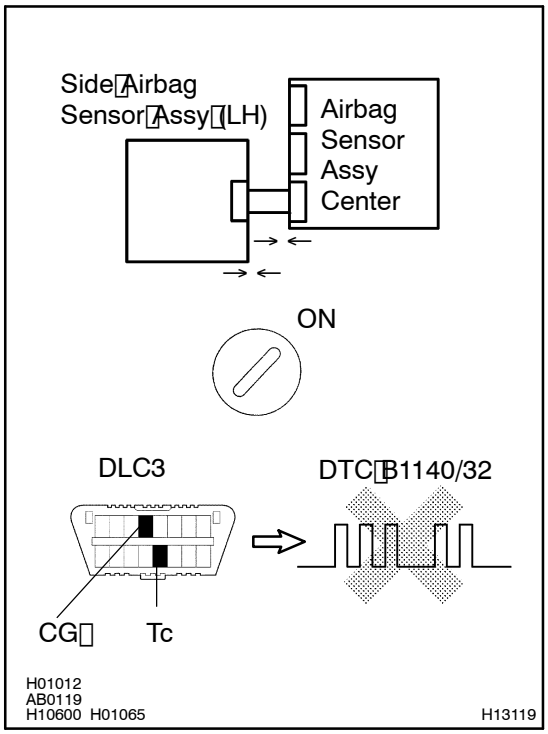
OK:

Voltage: Below 1 V

NG → **Repair or replace harness or connector between side airbag sensor assy (RH) and airbag sensor assy center.**

OK

8	Check side airbag sensor assy (RH).



PREPARATION:

(a) Disconnect the negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(b) Connect the airbag sensor assy center connector.

(c) Interchange the side airbag sensor assy RH and LH and connect the connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 60 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1140/32 is not output with the right and left sides interchanged.

NG	Replace side airbag sensor assy (RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI9HV–01

DTC	B1141/33	Side Airbag Sensor Assy (LH) Malfunction

CIRCUIT DESCRIPTION

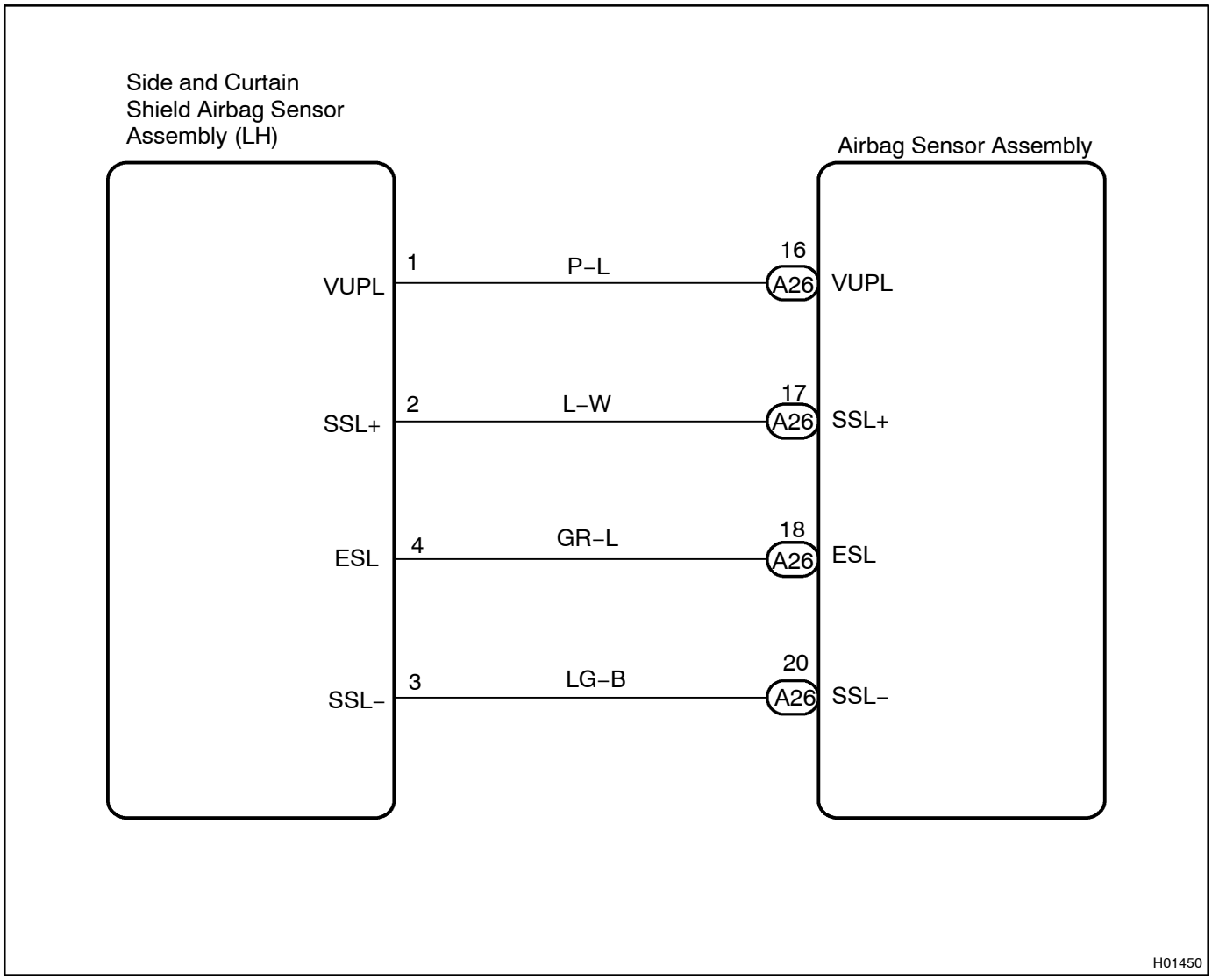
The side airbag sensor assy (LH) consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.

It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.

DTC B1141/33 is recorded when occurrence of a malfunction in the side airbag sensor assy (LH) is detected.

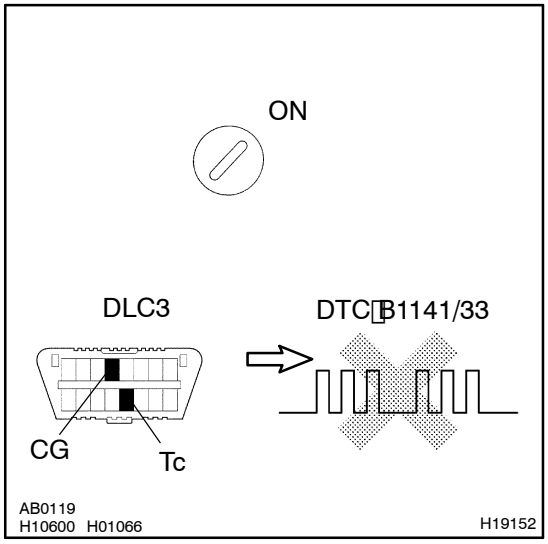
DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	• Side airbag sensor assy (LH) malfunction	• Side airbag sensor assy (LH) • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1141/33 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1141/33 is not output.

HINT:

Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

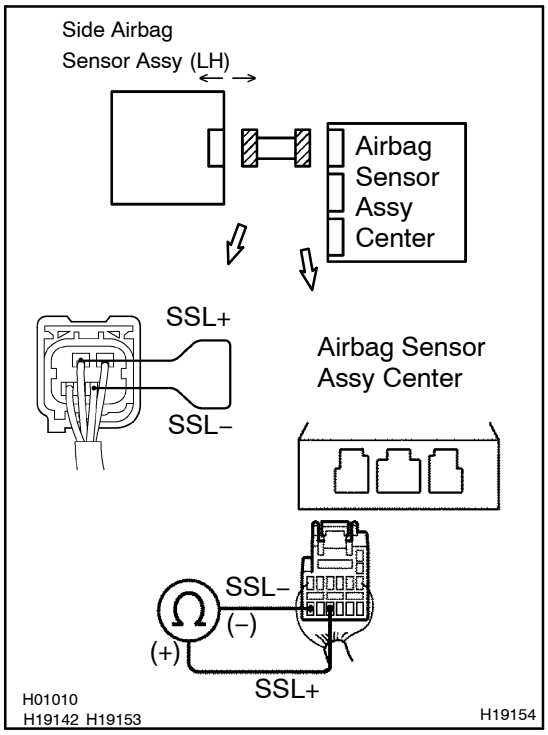
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	Is connector of side airbag sensor assy (LH) properly connected?

3	Prepare for inspection (See Pub. No. RM776E on page DI–40).

4	**Check wire harness.**



PREPARATION:

(a) Disconnect the side airbag sensor assy (LH).

(b) Using a service wire, connect SSL+ and SSL– of the connector (on the side airbag sensor assy side) between the side airbag sensor assy (LH) and the airbag sensor assy center.

CHECK:

For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (LH) and the airbag sensor assy center, measure the resistance between SSL+ and SSL–.

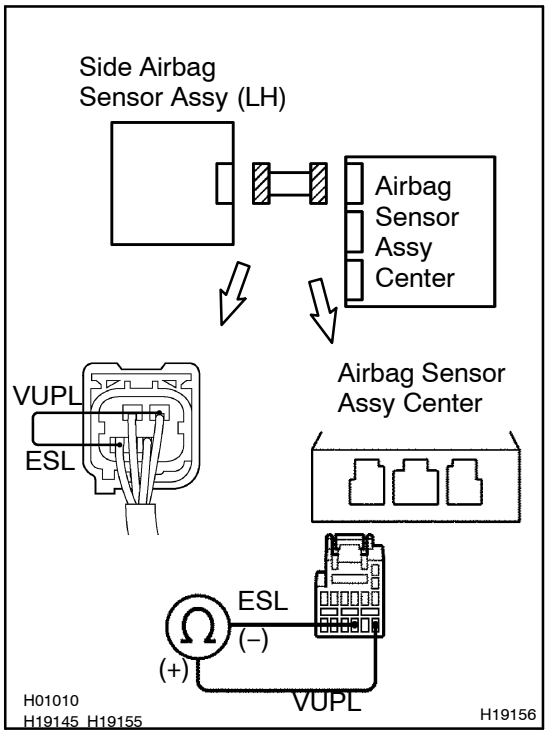
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assy (LH) and airbag sensor assy center.**

OK

5	**Check wire harness.**



PREPARATION:

Using a service wire, connect VUPL and ESL of the connector (on the side airbag sensor assy side) between the side airbag sensor assy (LH) and the airbag sensor assy center.

CHECK:

For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (LH) and the airbag sensor assy center, measure the resistance between VUPL and ESL.

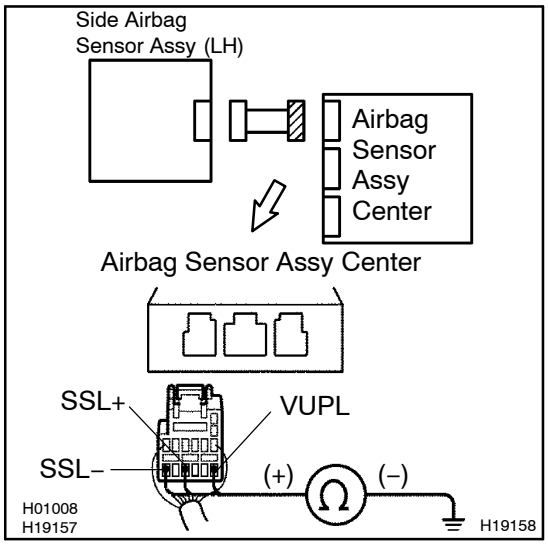
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assy (LH) and airbag sensor assy center.**

OK

6	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (LH) and the airbag sensor assy center, measure the resistance between body ground and each of SSL+, VUPL and SSL–.

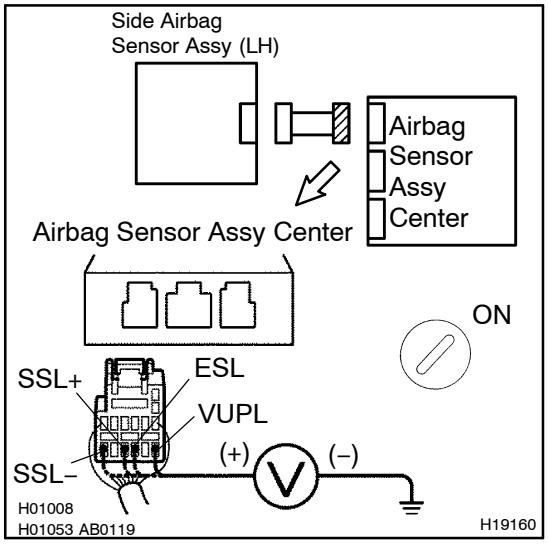
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag sensor assy (LH) and airbag sensor assy center.**

OK

7	Check wire harness (to B+).



CHECK:

(a) Turn the ignition switch to ON.

(b) For the connector (on the airbag sensor assy center side) between the side airbag sensor assy (LH) and the airbag sensor assy center, measure the voltage between body ground and each of ESL, VUPL, SSL– and SSL+.

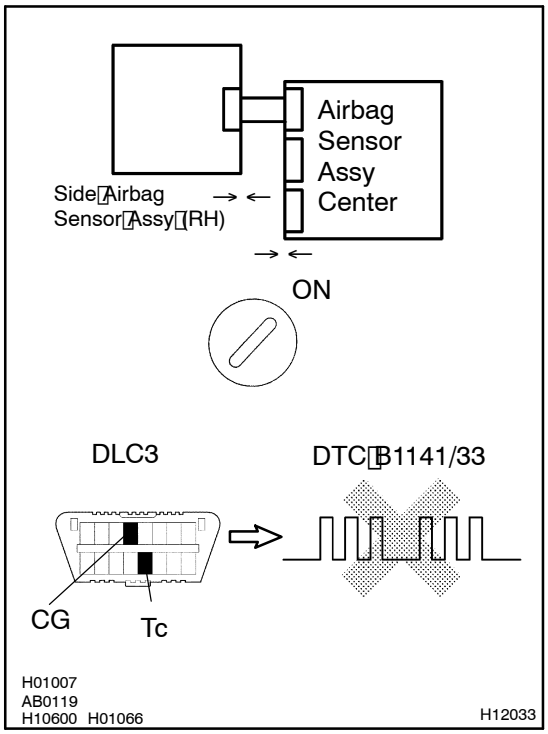
OK:

Voltage: Below 1 V

NG → **Repair or replace harness or connector between side airbag sensor assy (LH) and airbag sensor assy center.**

OK

8	Check side airbag sensor assy (LH).



PREPARATION:

(a) Disconnect the negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(b) Connect the airbag sensor assy center connector.

(c) Interchange the side airbag sensor assy LH and RH connect the connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1141/33 is not output, with the right and left sides interchanged.

NO	Replace side airbag sensor assy (LH).

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PX–11

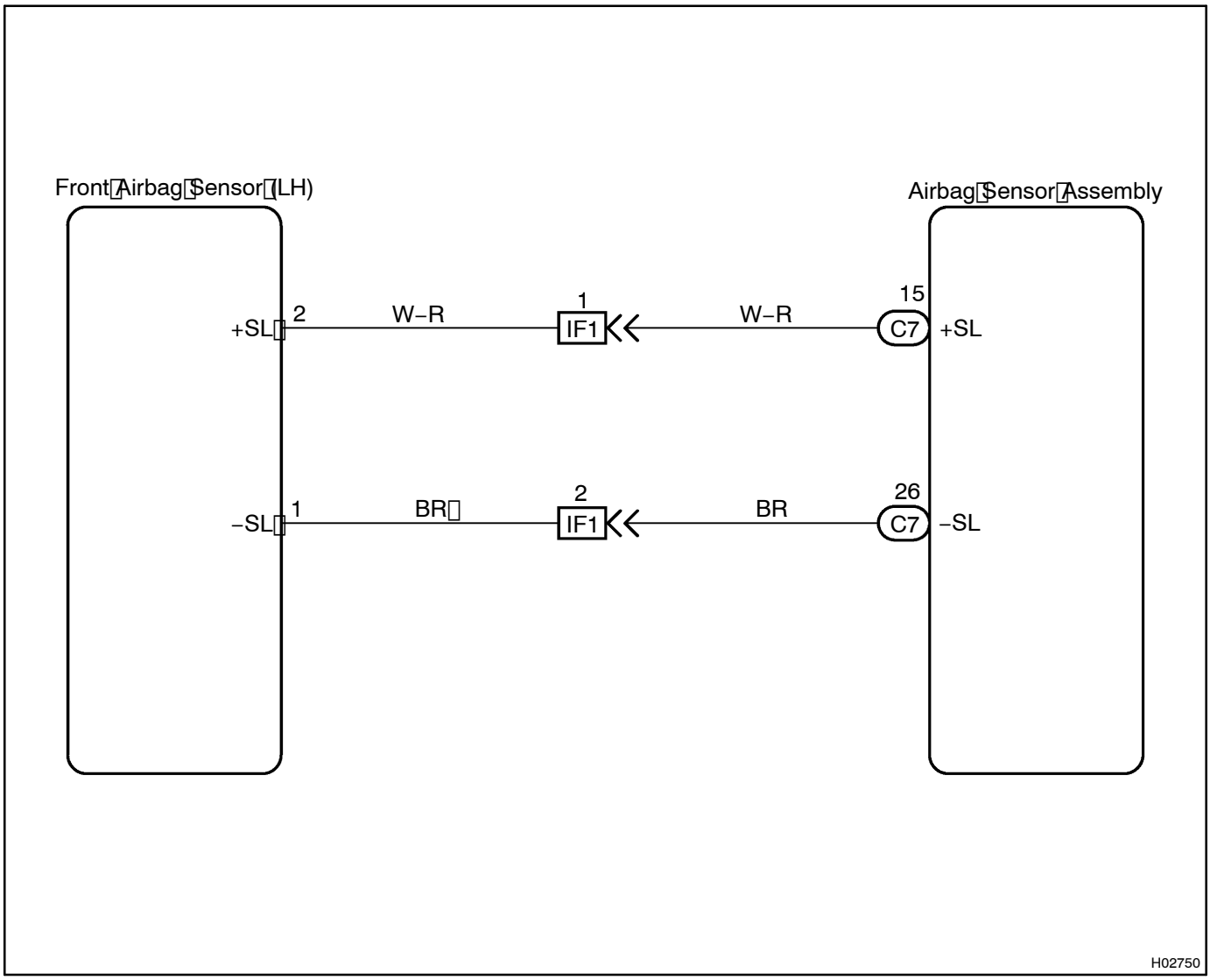
DTC	B1158/B1159/16	Front Airbag Sensor (LH) Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor (LH) circuit consists of the airbag sensor assembly and front airbag sensor (LH).
For details of the function of each component, see OPERATION on page RS–2.
DTC B1158/B1159/16 is recorded when malfunction is detected in the front airbag sensor (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1158/B1159/16	• Front airbag sensor (LH) malfunction	• Front airbag sensor (LH) • Airbag sensor assembly • Wire harness • Engine room main wire harness

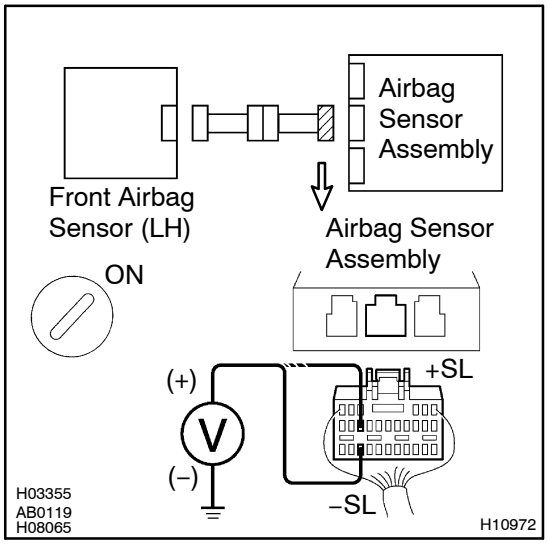
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See Pub. No. RM776E on page DI–40).**

2	**Check wire harness (to B+).**



CHECK:

(a) Turn the ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the voltage between body ground and each of +SL and –SL.

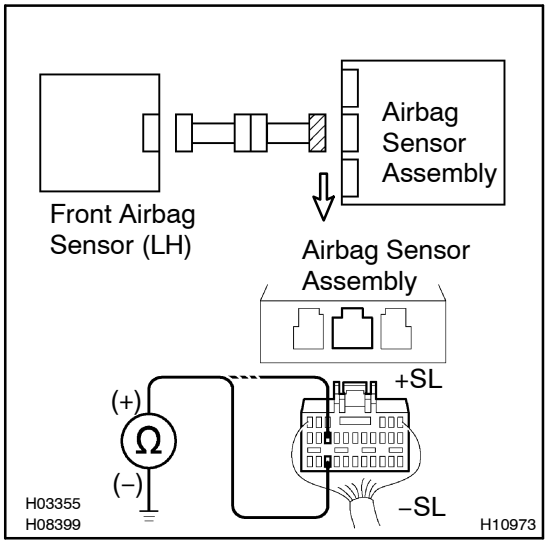
OK:

Voltage: Below 1 V

NG → **Go to step 8.**

OK

3	**Check wire harness (to ground).**



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between body ground and each of +SL and –SL.

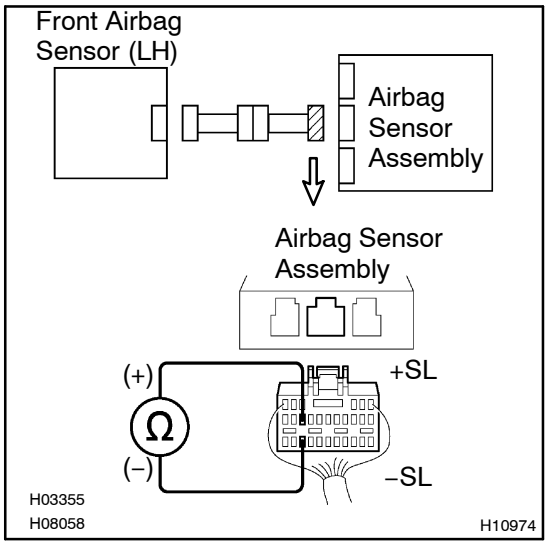
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 9.**

OK

4	Check wire harness.



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between +SL and –SL.

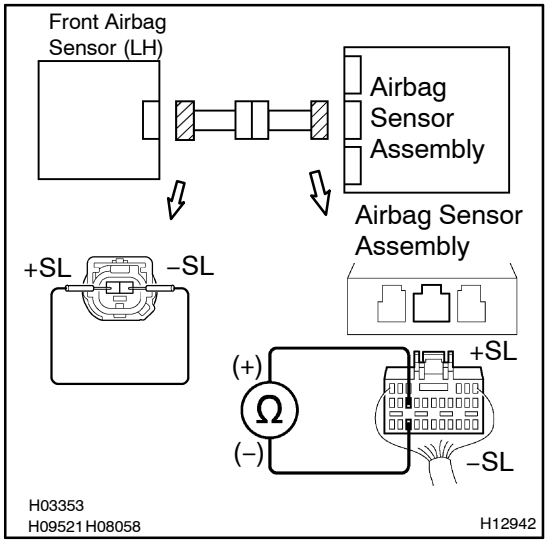
OK:

Resistance: 1 MΩ or Higher

NG	Go to step 10.

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect +SL and –SL of the connector (on the front airbag sensor (LH) side) between the airbag sensor assembly and the front airbag sensor (LH).

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between +SL and –SL.

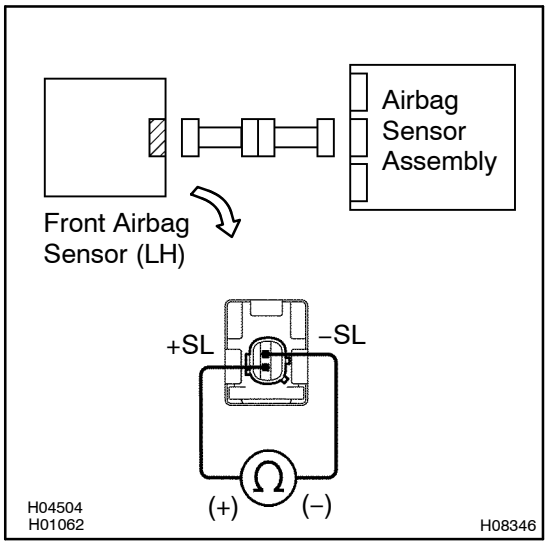
OK:

Resistance: Below 1 Ω

NG	Go to step 11.

OK

6	**Check front airbag sensor (LH).**



CHECK:

For the connector (on the front airbag sensor (LH)), measure the resistance between +SL and –SL.

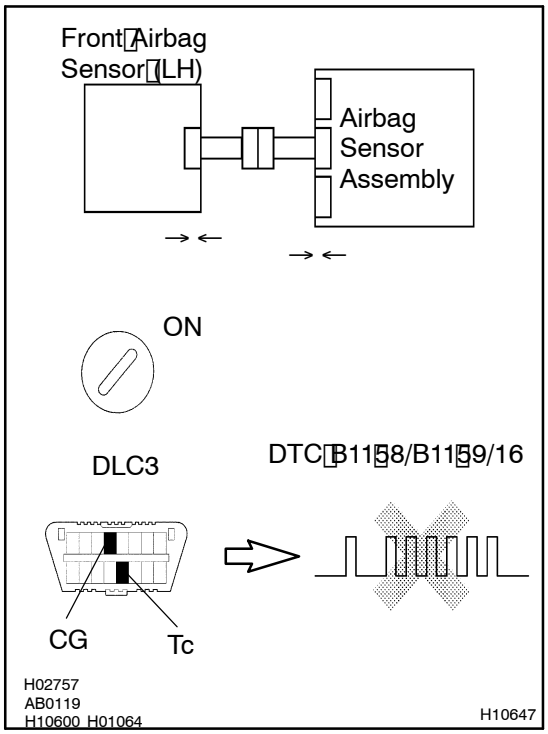
OK:

Resistance: 300 – 1500 Ω

NG → **Replace front airbag sensor (LH).**

OK

7	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front airbag sensor (LH) connector and airbag sensor assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1158/B1159/16 is not output.

HINT:

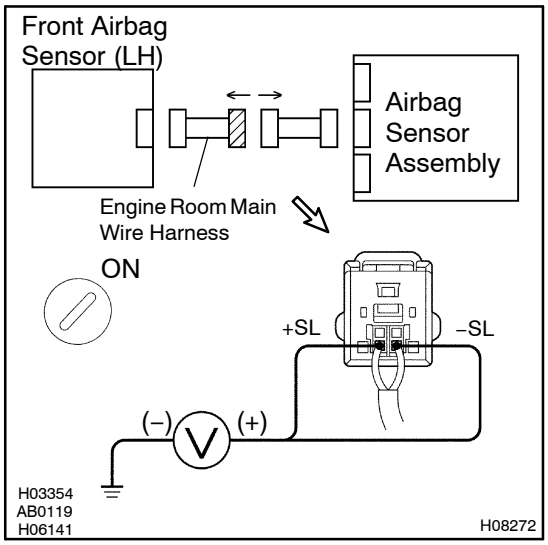
Codes other than code B1158/B1159/16 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

8	Check engine room main wire harness (to B+).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

(a) Turn the ignition switch to ON.

(b) For the connector (on the LH front door wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the voltage between body ground and each of +SL and –SL.

OK:

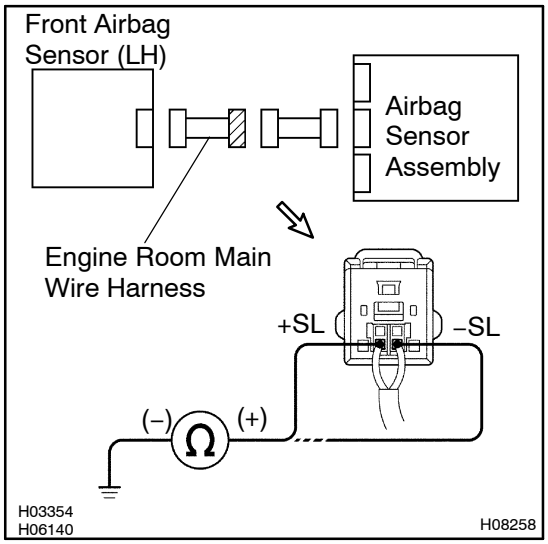
Voltage: Below 1 V

NG	Repair or replace engine room main wire harness.

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

9	Check engine room main wire harness (to ground).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between body ground and each of +SL and –SL.

OK:

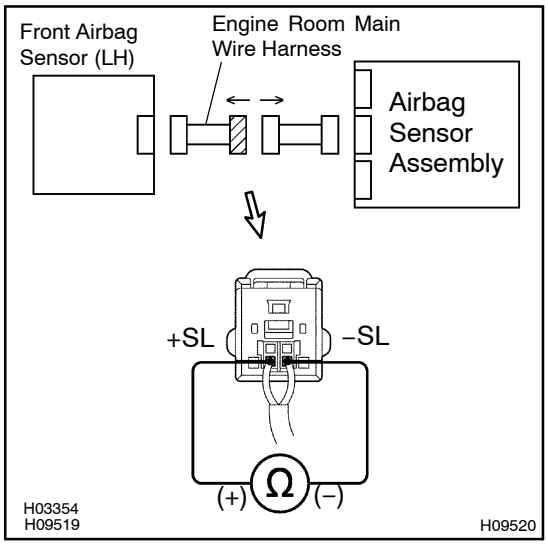
Resistance: 1 MΩ or Higher

NG	Repair or replace engine room main wire harness.

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

10	Check engine room main wire harness.



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between +SL and –SL.

OK:

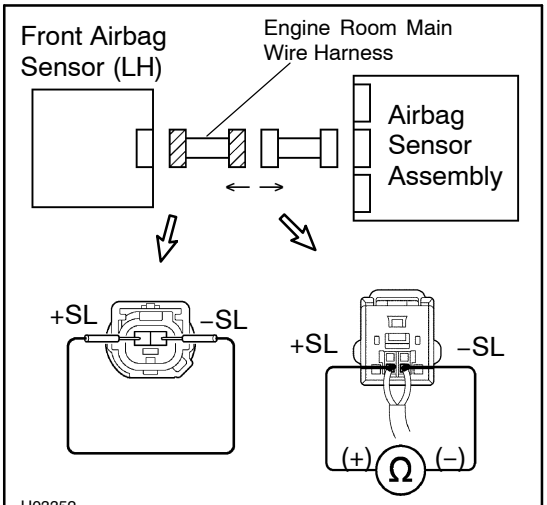
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

11	Check engine room main wire harness.



PREPARATION:

(a) Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

(b) Using a service wire, connect +SL and –SL of the connector (on the engine room main wire harness side) between the engine room main wire harness and the front airbag sensor (LH).

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between +SL and –SL.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

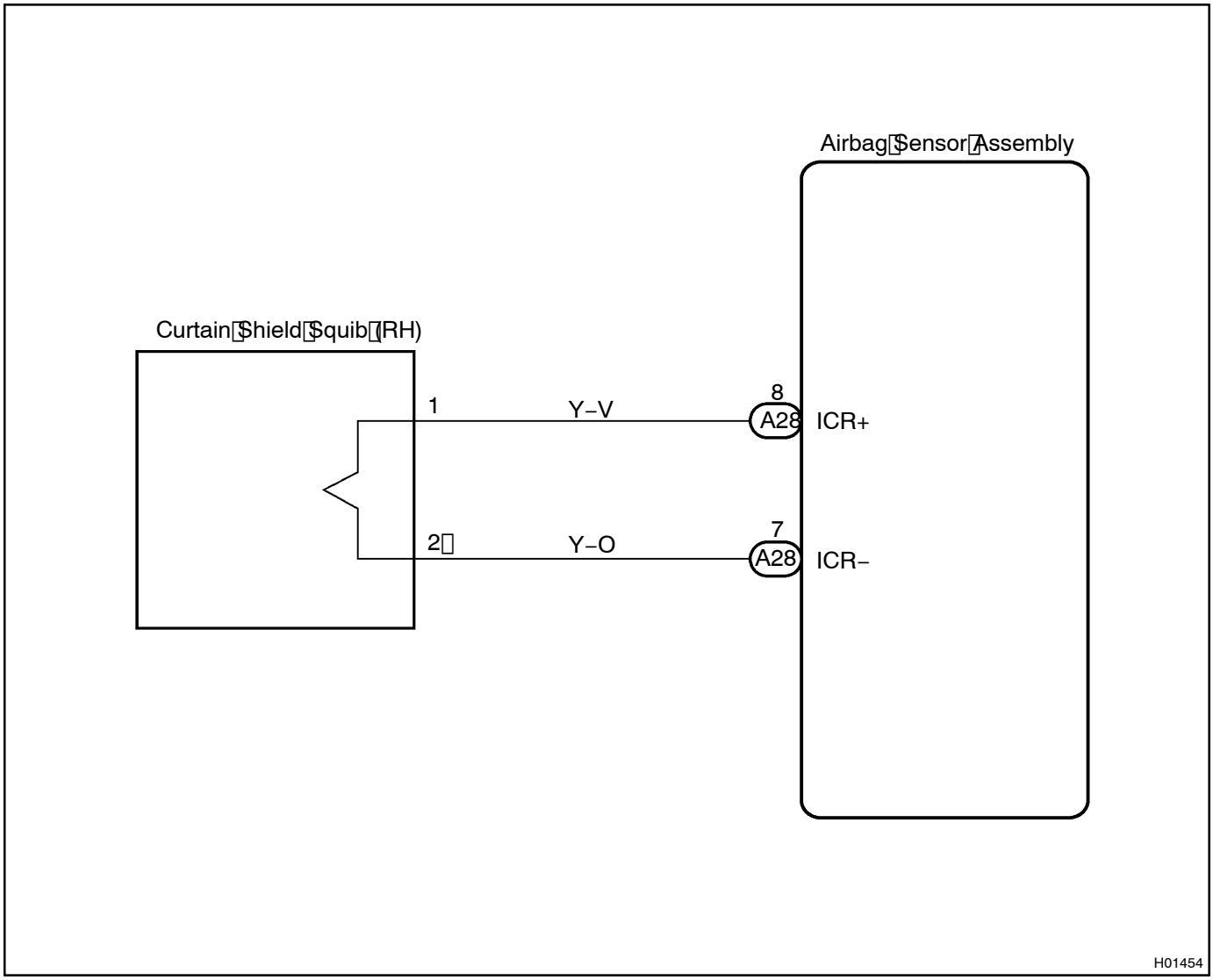
DTC	B1160/83	Short in Curtain Shield Squib (RH) Circuit

CIRCUIT DESCRIPTION

The curtain shield squib (RH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1160/83 is recorded when a short is detected in the curtain shield squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1160/83	• Short circuit between ICR+ wire harness and ICR– wire harness of squib • Curtain shield squib (RH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (RH) • Airbag sensor assy center • Wire harness

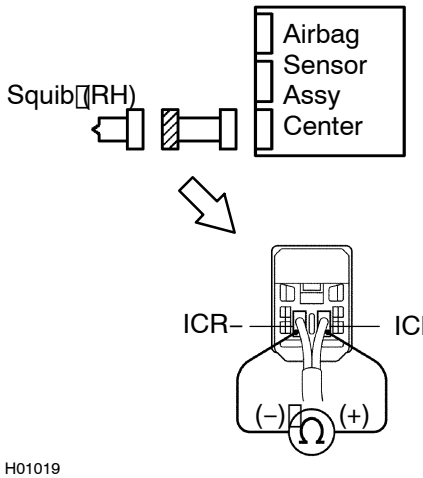
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (RH) circuit.



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assy center side) between the airbag sensor assy center and the curtain shield airbag assy (RH) (See page DI–413).

CHECK:

For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center, measure the resistance between ICR+ and ICR–.

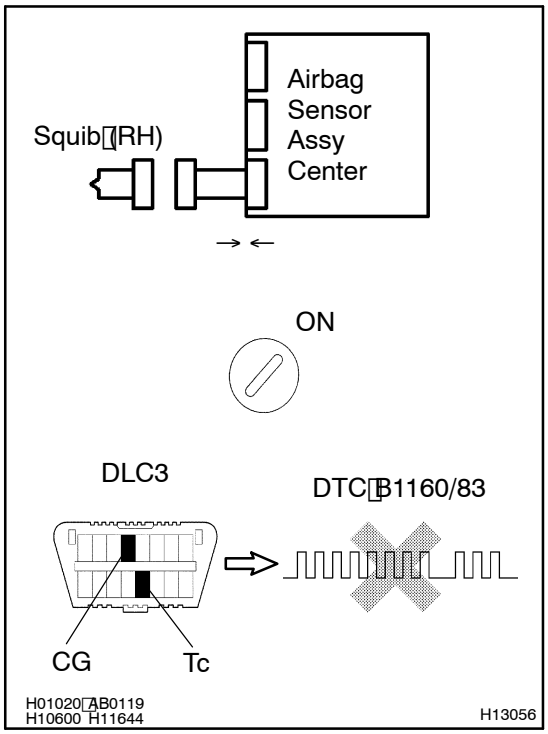
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between curtain shield airbag assy (RH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1160/83 is not output.

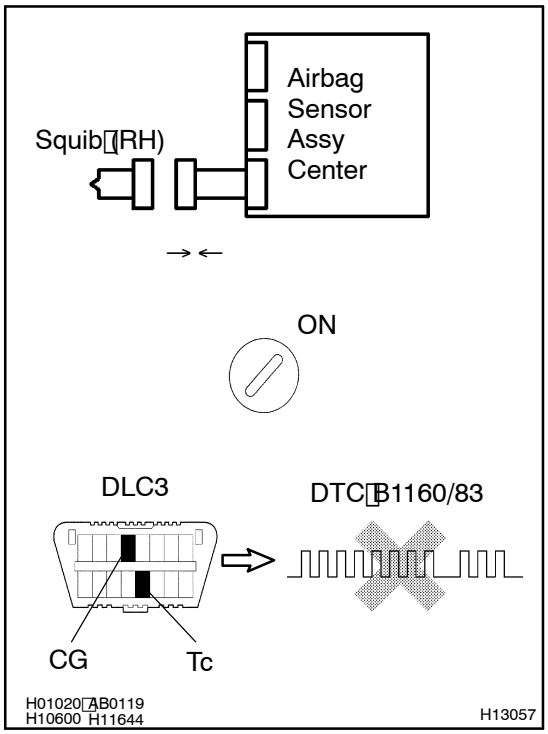
HINT:

Codes other than code B1160/83 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (RH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1160/83 is not output.

HINT:

Codes other than code B1160/83 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1161/84	Open in Curtain Shield Squib (RH) Circuit

CIRCUIT DESCRIPTION

The curtain shield squib (RH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1161/84 is recorded when an open is detected in the curtain shield squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1161/84	• Open circuit in ICR+ wire harness or ICR– wire harness of squib • Curtain shield squib (RH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (RH) • Airbag sensor assy center • Wire harness

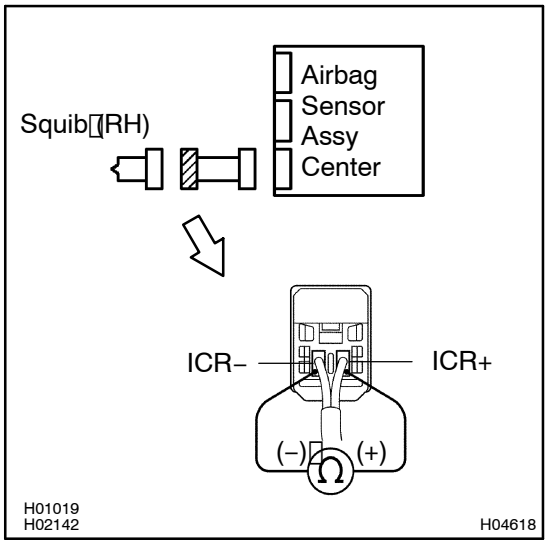
WIRING DIAGRAM

See page DI–448.

INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (RH) circuit.

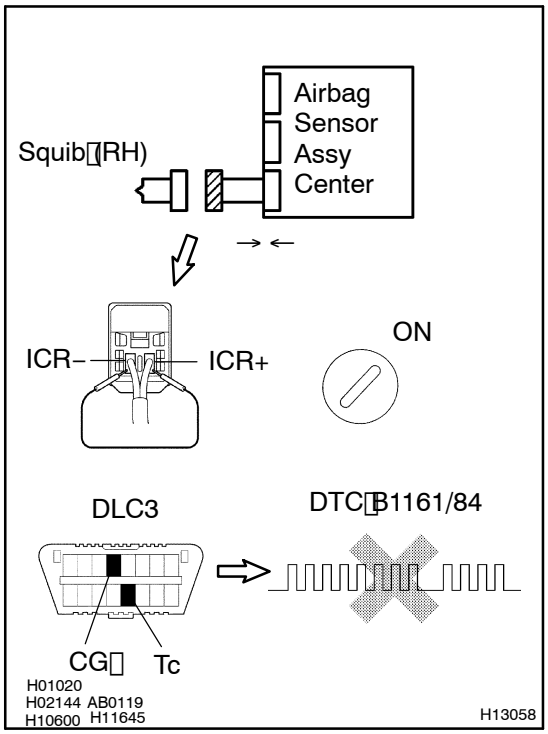


CHECK:
For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center, measure the resistance between ICR+ and ICR–.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between curtain shield airbag assy (RH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICR+ and ICR– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1161/84 is not output.

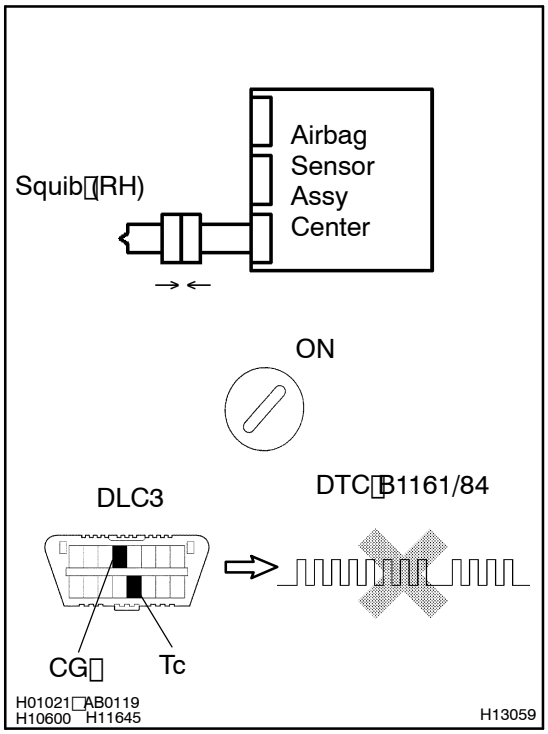
HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (RH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1161/84 is not output.

HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1162/81	Short in Curtain Shield Squib (RH) Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib (RH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1162/81 is recorded when ground short is detected in the curtain shield squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1162/81	• Short circuit in curtain shield squib (RH) wire harness (to ground) • Curtain shield squib (RH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (RH) • Airbag sensor assy center • Wire harness

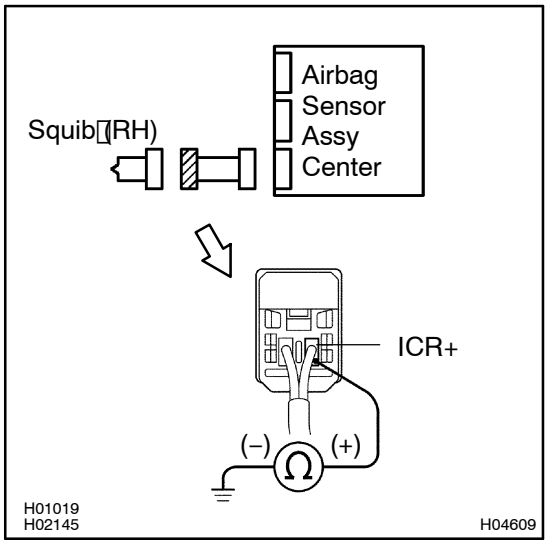
WIRING DIAGRAM

See page DI–448.

INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (RH) circuit.

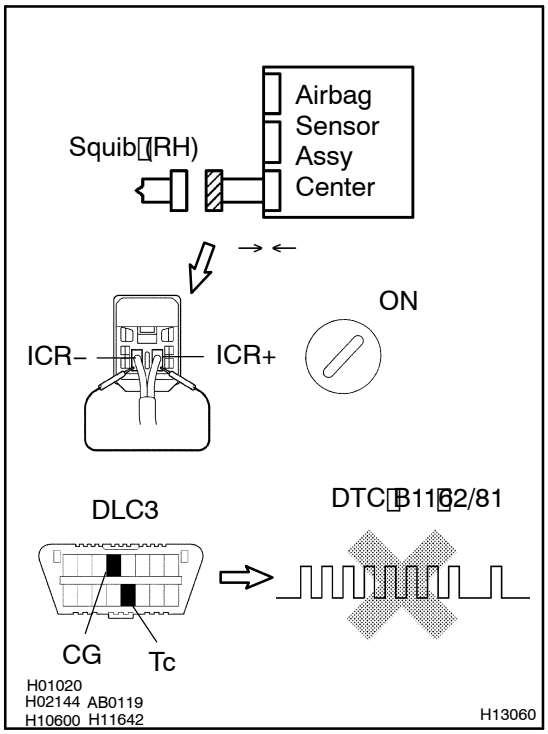


CHECK:
For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center, measure the resistance between ICR+ and body ground.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between curtain shield airbag assy (RH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICR+ and ICR– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1162/81 is not output.

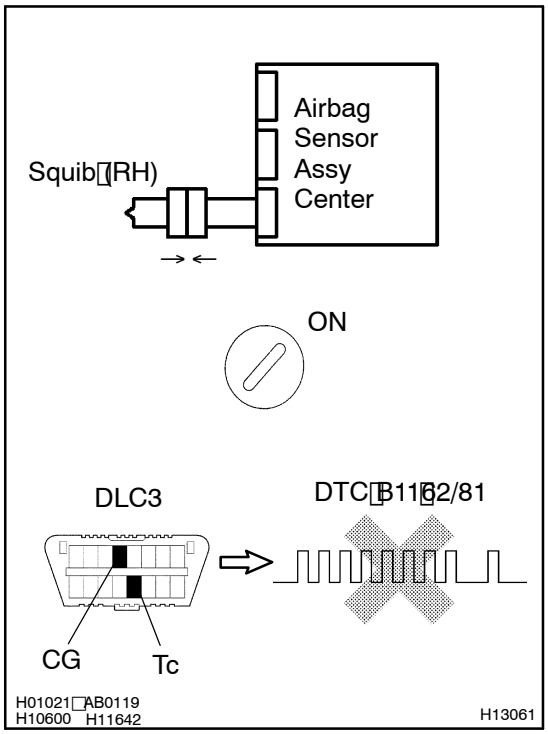
HINT:

Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (RH).



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assy (RH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1162/81 is not output.

HINT:

Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DTC	B1163/82	Short in curtain shield Squib (RH) Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib (RH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1163/82 is recorded when a B+ short is detected in the curtain shield squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1163/82	• Short circuit in curtain shield squib (RH) wire harness (to B+) • Curtain shield squib (RH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (RH) • Airbag sensor assy center • Wire harness

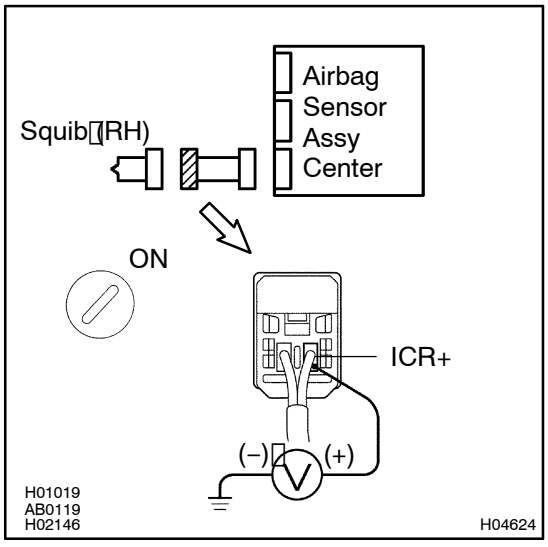
WIRING DIAGRAM

See page DI–448.

INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (RH) circuit.



CHECK:

(a) Turn the ignition switch to ON.
(b) For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center, measure the voltage between ICR+ and body ground.

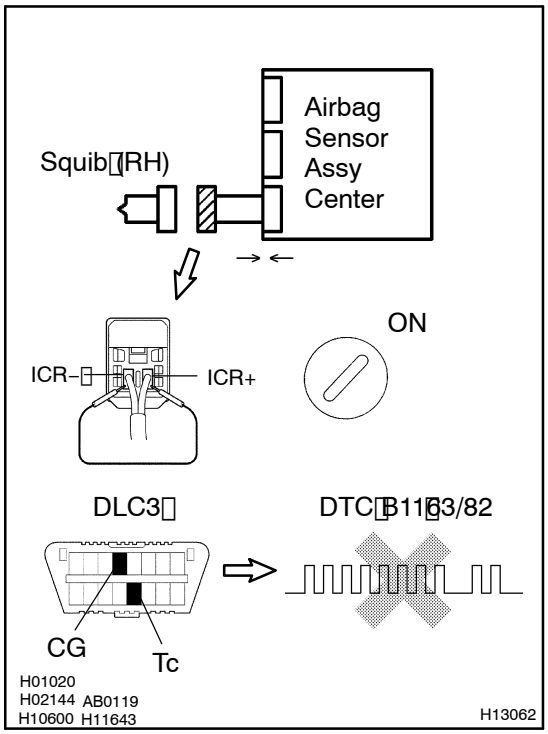
OK:

Voltage: 0 V

NG	Repair or replace harness or connector between curtain shield airbag assy (RH) and airbag sensor assy center.

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICR+ and ICR– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (RH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1163/82 is not output.

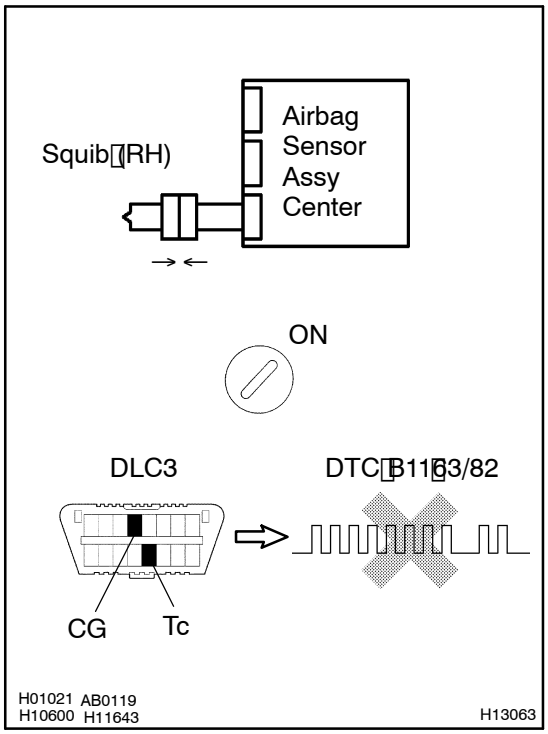
HINT:

Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (RH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1163/82 is not output.

HINT:

Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PF–16

DTC	B1165/87	Short in Curtain Shield Squib (LH) Circuit

CIRCUIT DESCRIPTION

The curtain shield squib (LH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (LH).

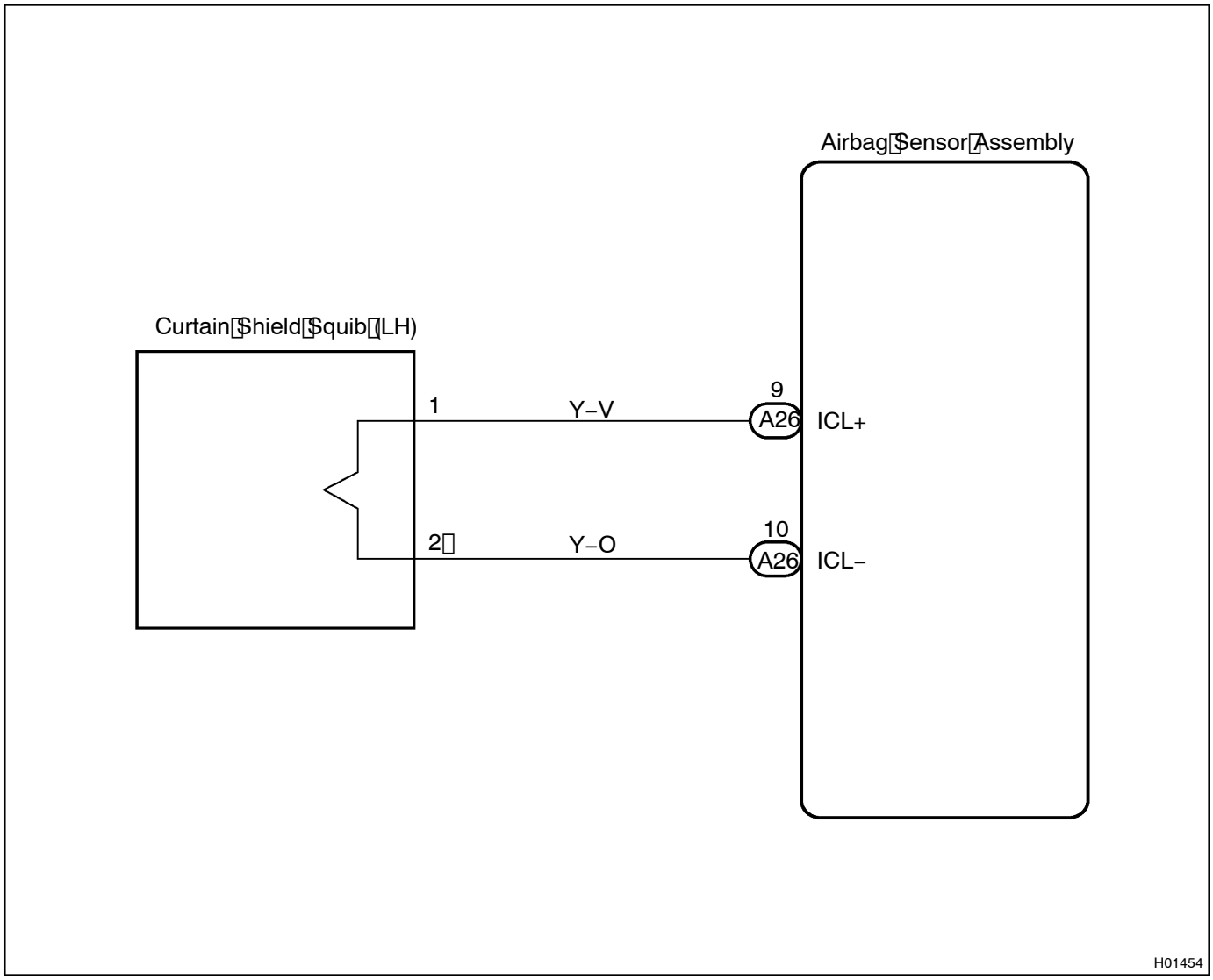
It causes the SRS to deploy when the SRS deployment conditions are satisfied.

For details of the function of each component, see OPERATION on page RS–2.

DTC B1165/87 is recorded when a short is detected in the curtain shield squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1165/87	• Short circuit between ICL+ wire harness and ICL– wire harness of squib • Curtain shield squib (LH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (LH) • Airbag sensor assy center • Wire harness

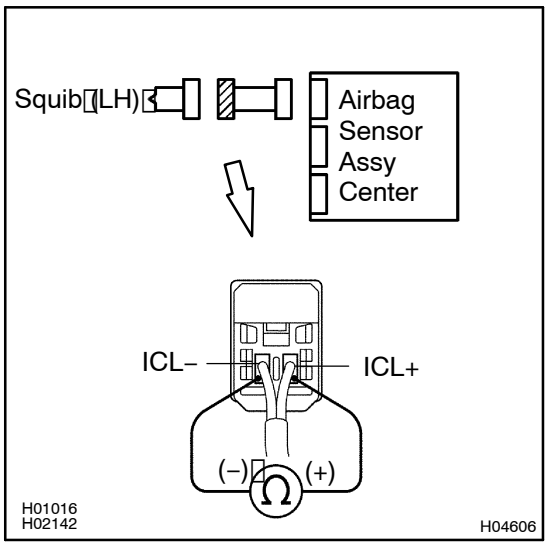
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (LH) circuit.



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assy center side) between the airbag sensor assy center and the curtain shield airbag assy (LH) (See page DI–413).

CHECK:

For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center, measure the resistance between ICL+ and ICL–.

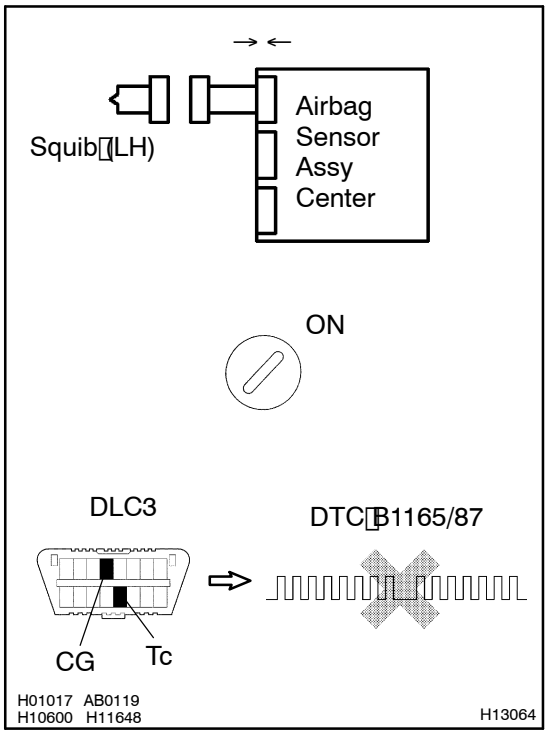
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace harness or connector between curtain shield airbag assy (LH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1165/87 is not output.

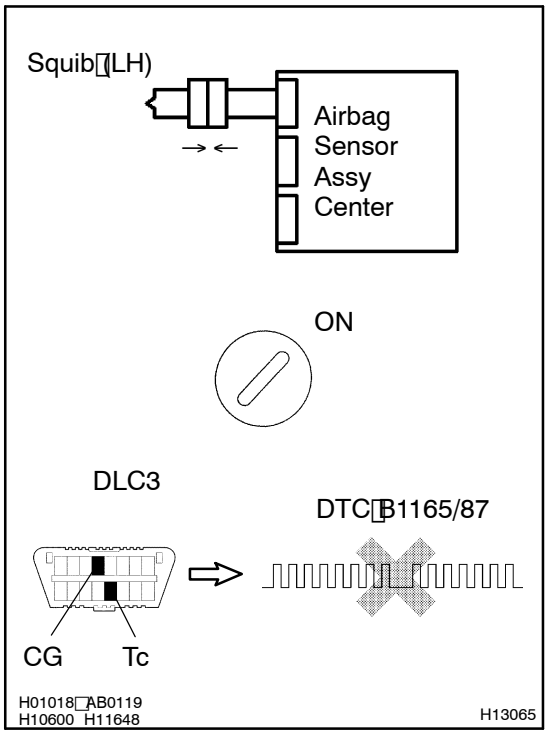
HINT:

Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (LH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1165/87 is not output.

HINT:

Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1166/88	Open in Curtain Shield Squib (LH) Circuit

CIRCUIT DESCRIPTION

The curtain shield squib (LH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1166/88 is recorded when an open is detected in the curtain shield squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1166/88	• Open circuit in ICL+ wire harness or ICL– wire harness of squib • Curtain shield squib (LH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (LH) • Airbag sensor assy center • Wire harness

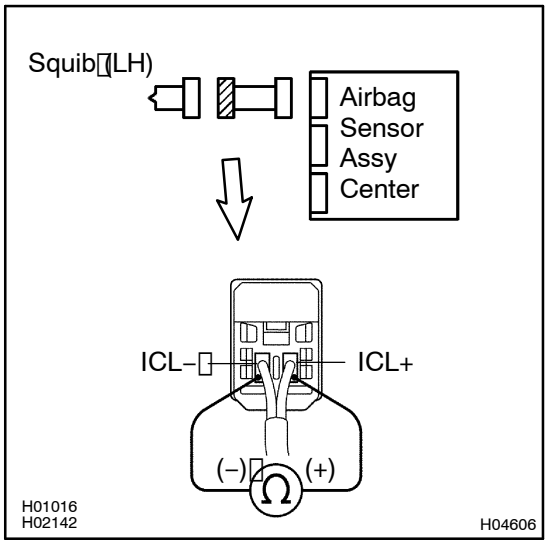
WIRING DIAGRAM

See page DI–461.

INSPECTION PROCEDURE

1	Prepare for inspection. (See Pub. No. RM776E on page DI–40)

2	Check curtain shield squib (LH) circuit.

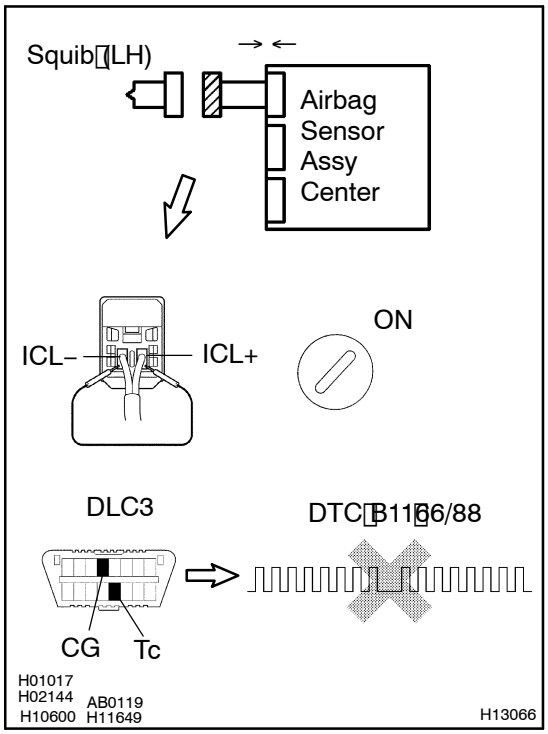


CHECK:
For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center, measure the resistance between ICL+ and ICL–.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between curtain shield airbag assy (LH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICL+ and ICL– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1166/88 is not output.

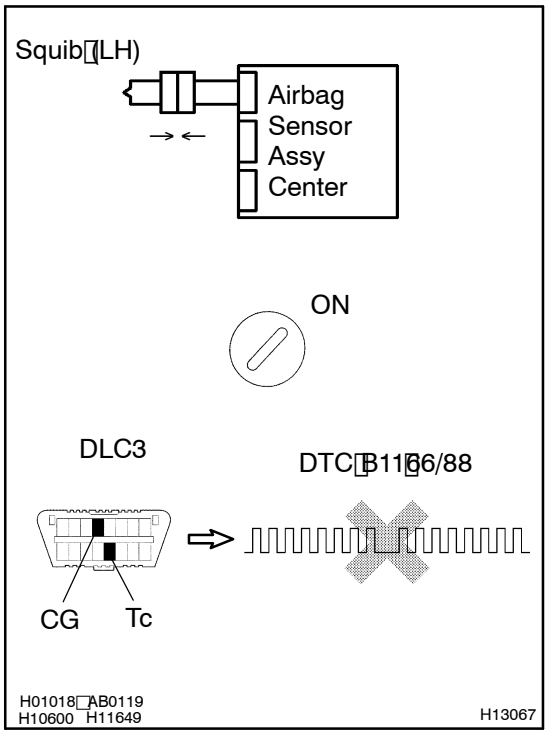
HINT:

Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag sensor assy center.

OK

4	Check curtain shield squib (LH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1166/88 is not output.

HINT:

Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1167/85	Short in Curtain Shield Squib (LH) Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib (LH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1167/85 is recorded when ground short is detected in the curtain shield squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1167/85	• Short circuit in curtain shield squib (LH) wire harness (to ground) • Curtain shield squib (LH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (LH) • Airbag sensor assy center • Wire harness

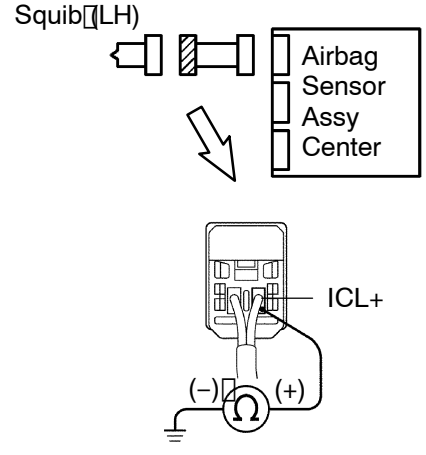
WIRING DIAGRAM

See page DI–448.

INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (LH) circuit.

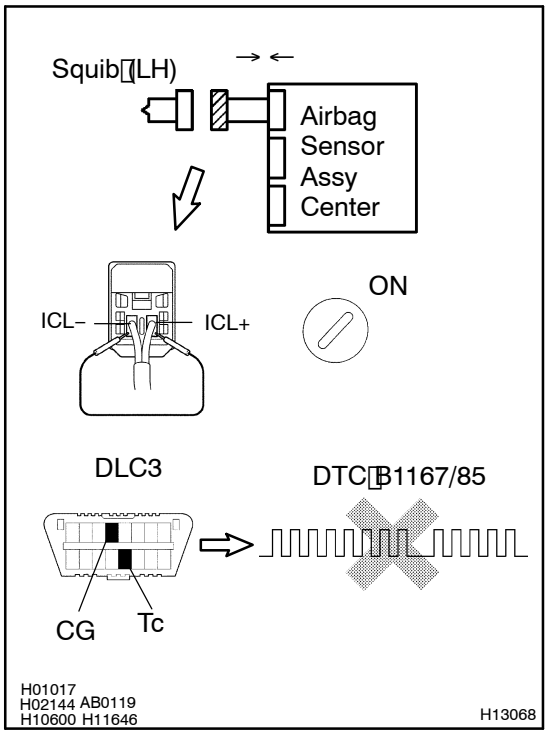


CHECK:
For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center, measure the resistance between ICL+ and body ground.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between curtain shield airbag assy (LH) and airbag sensor assy center.**

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICL+ and ICL– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1167/85 is not output.

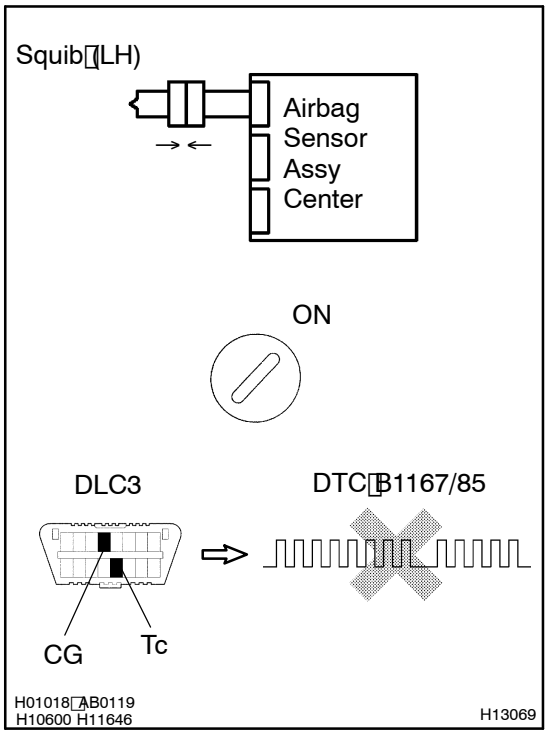
HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (LH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1167/85 is not output.

HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DTC	B1168/86	Short in Curtain Shield Squib (LH) Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib (LH) circuit consists of the airbag sensor assy center and curtain shield airbag assy (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B1168/86 is recorded when a B+ short is detected in the curtain shield squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1168/86	• Short circuit in curtain shield squib (LH) wire harness (to B+) • Curtain shield squib (LH) malfunction • Airbag sensor assy center malfunction	• Curtain shield airbag assy (LH) • Airbag sensor assy center • Wire harness

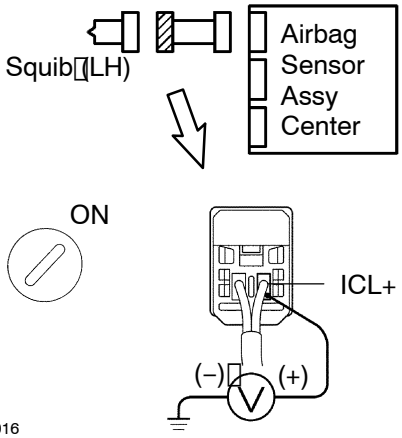
WIRING DIAGRAM

See page DI–461.

INSPECTION PROCEDURE

1	Prepare for inspection (See Pub. No. RM776E on page DI–40).

2	Check curtain shield squib (LH) circuit.



CHECK:

(a) Turn the ignition switch to ON.

(b) For the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center, measure the voltage between ICL+ and body ground.

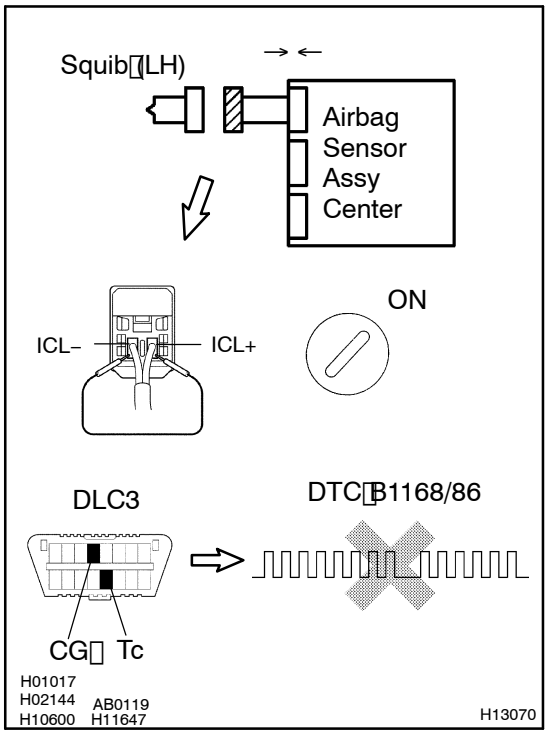
OK:

Voltage: 0 V

NG	Repair or replace harness or connector between curtain shield airbag assy (LH) and airbag sensor assy center.

OK

3	Check airbag sensor assy center.



PREPARATION:

(a) Connect the connector to the airbag sensor assy center.

(b) Using a service wire, connect ICL+ and ICL– of the connector (on the curtain shield airbag assy side) between the curtain shield airbag assy (LH) and the airbag sensor assy center.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON and wait at least for 20 seconds.

(b) Clear the DTC stored in memory (See page DI–413).

(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn the ignition switch to ON, and wait at least for 20 seconds.

(e) Check the DTC (See page DI–413).

OK:

DTC B1168/86 is not output.

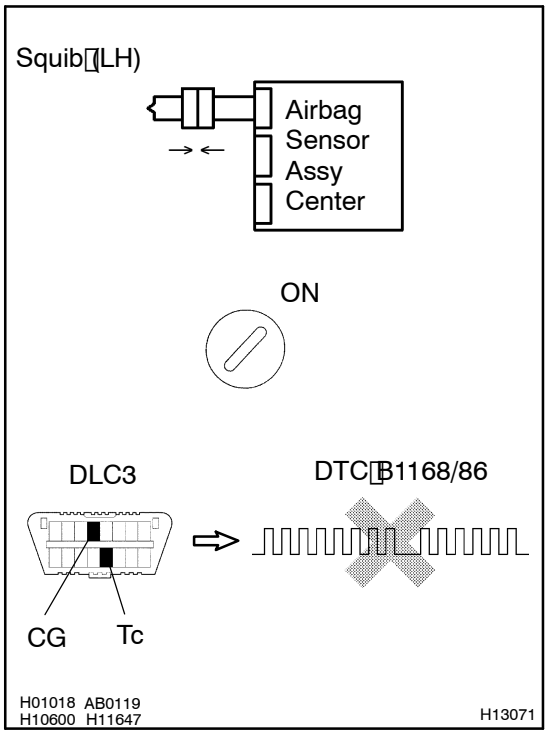
HINT:

Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assy center.

OK

4	Check curtain shield squib (LH).



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assy (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 20 seconds.
(b) Clear the DTC stored in memory (See page DI–413).
(c) Turn the ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn the ignition switch to ON, and wait at least for 20 seconds.
(e) Check the DTC (See page DI–413).

OK:

DTC B1168/86 is not output.

HINT:

Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG	Replace curtain shield airbag assy (LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

THEFT DETERRENT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI611–06

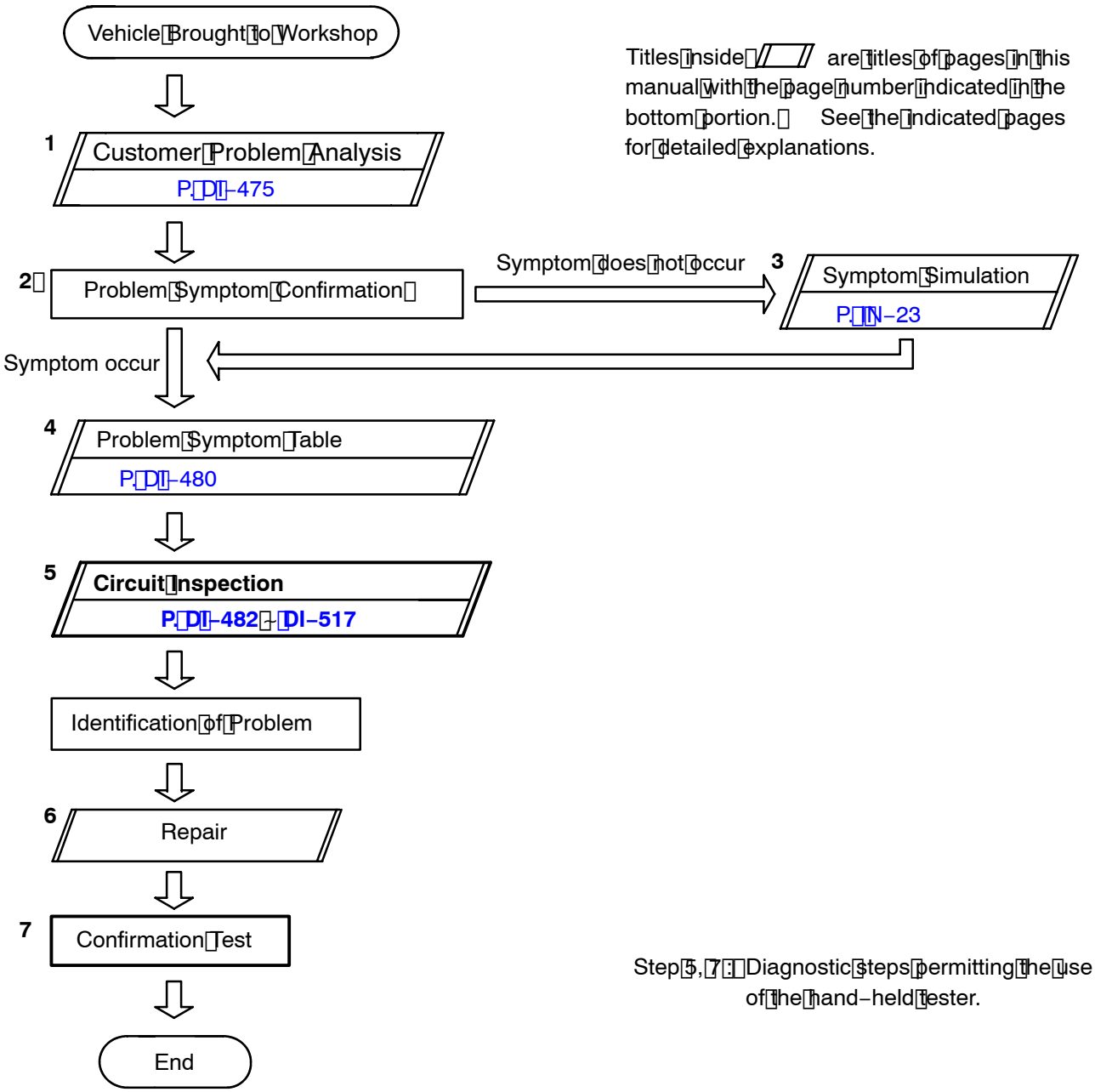
HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

For troubleshooting use a volt/ohm meter.

Be sure to use troubleshooting procedure appropriate to the diagnostic tool being used.

Perform troubleshooting in accordance with the procedure on the following page.



DI612–01

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: _____

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

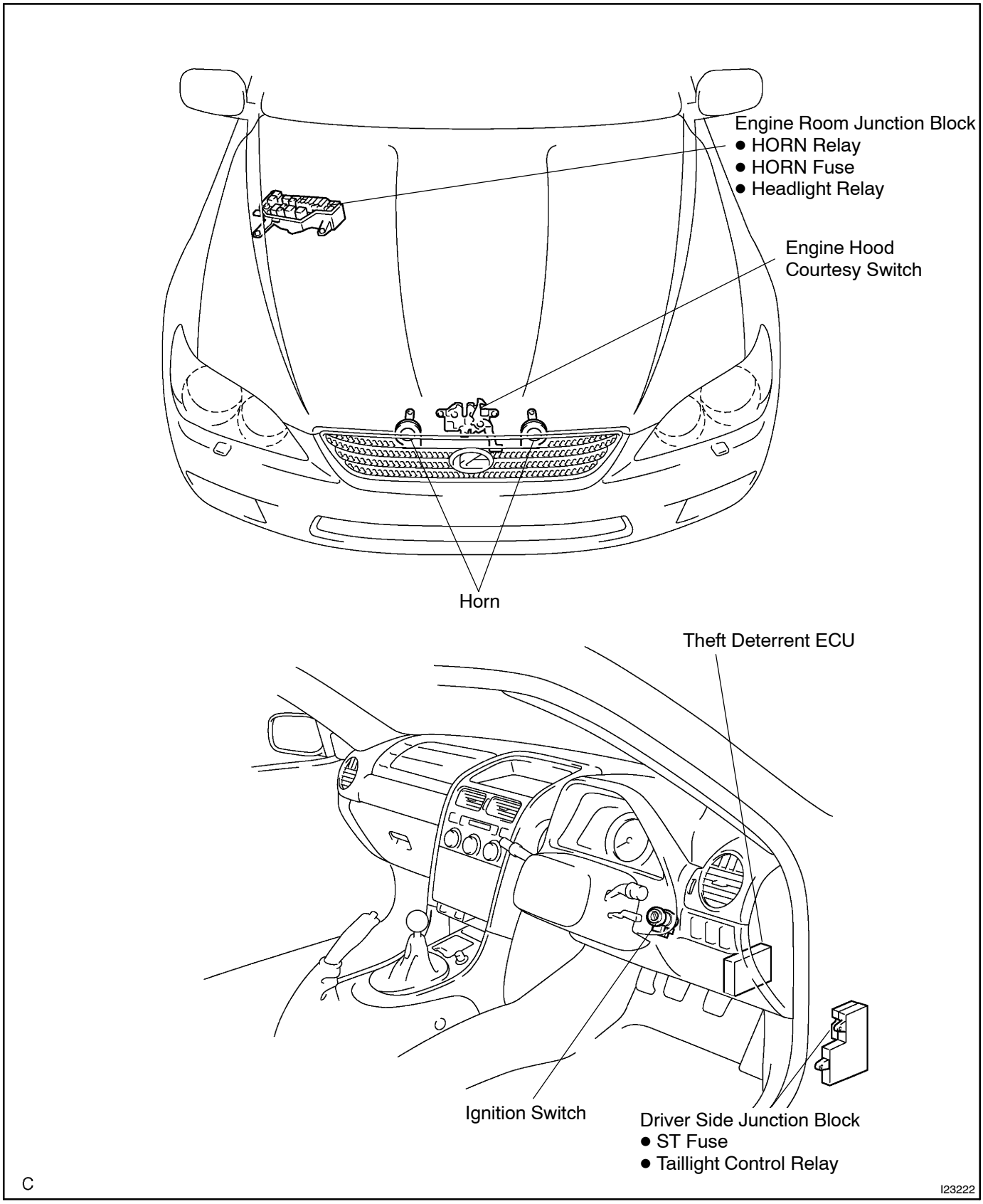
Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (Times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Problem Symptom

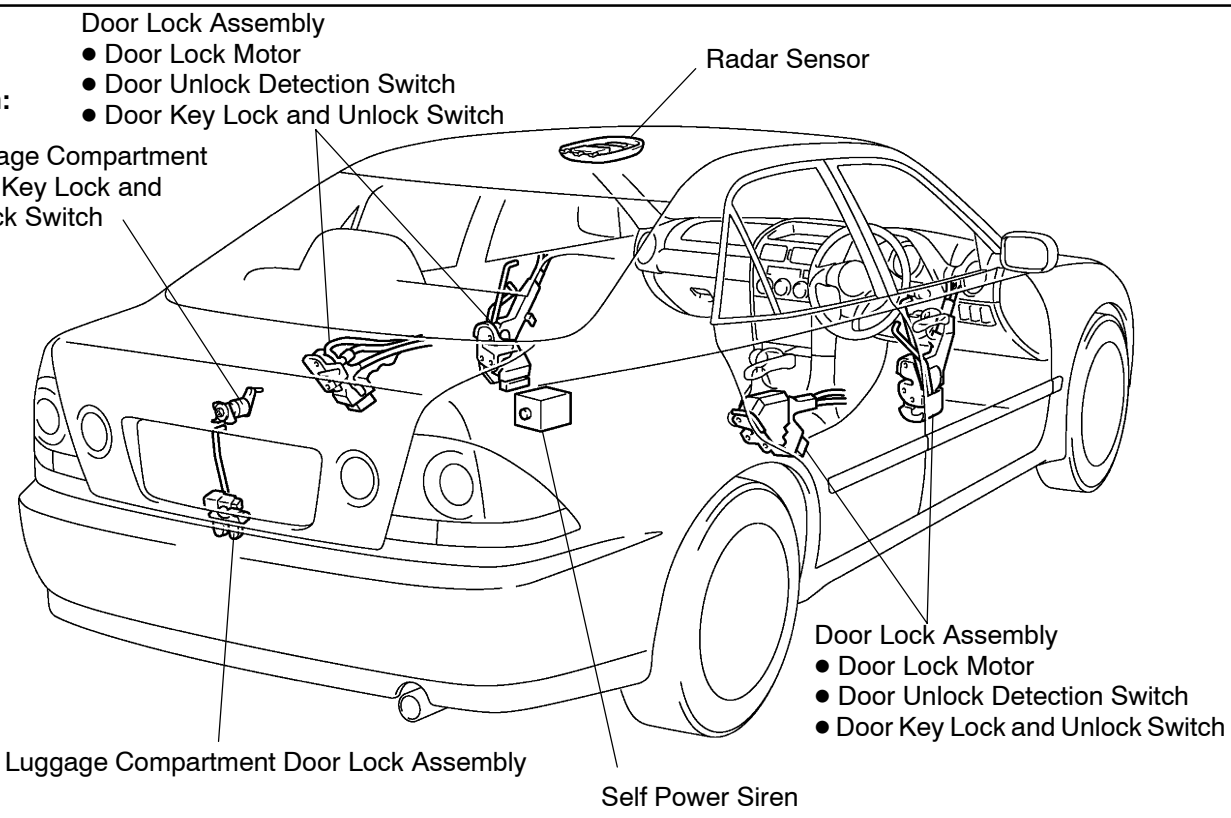
☐ Theft deterrent system cannot be set.		
☐ Indicator light does not flash when the theft deterrent system is set. (It stays ON or does not light at all.)		
☐ Theft deterrent system does not operate.	☐ When unlocked using the door lock knob. ☐ When the engine hood is opened.	Malfunction ☐ Horns only ☐ Theft deterrent horn only ☐ Headlights only ☐ Taillights only ☐ Door lock operation only
☐ System cannot be canceled once set.	☐ When door is unlocked using key or wireless door lock control system. ☐ When the key is inserted in the ignition key cylinder and turned to ACC or ON position. (However, only when the system has never operated) ☐ When the luggage compartment door is opened with the key.	
☐ System cannot be canceled during warning operation.	☐ When door is unlocked using key or wireless door lock control system. ☐ When the key is inserted in the ignition key cylinder and turned to ACC or ON position.	
☐ Warning operation starts when the system is set and the door or luggage compartment door is opened with the key.		
☐ Others.		

DI9HW–01

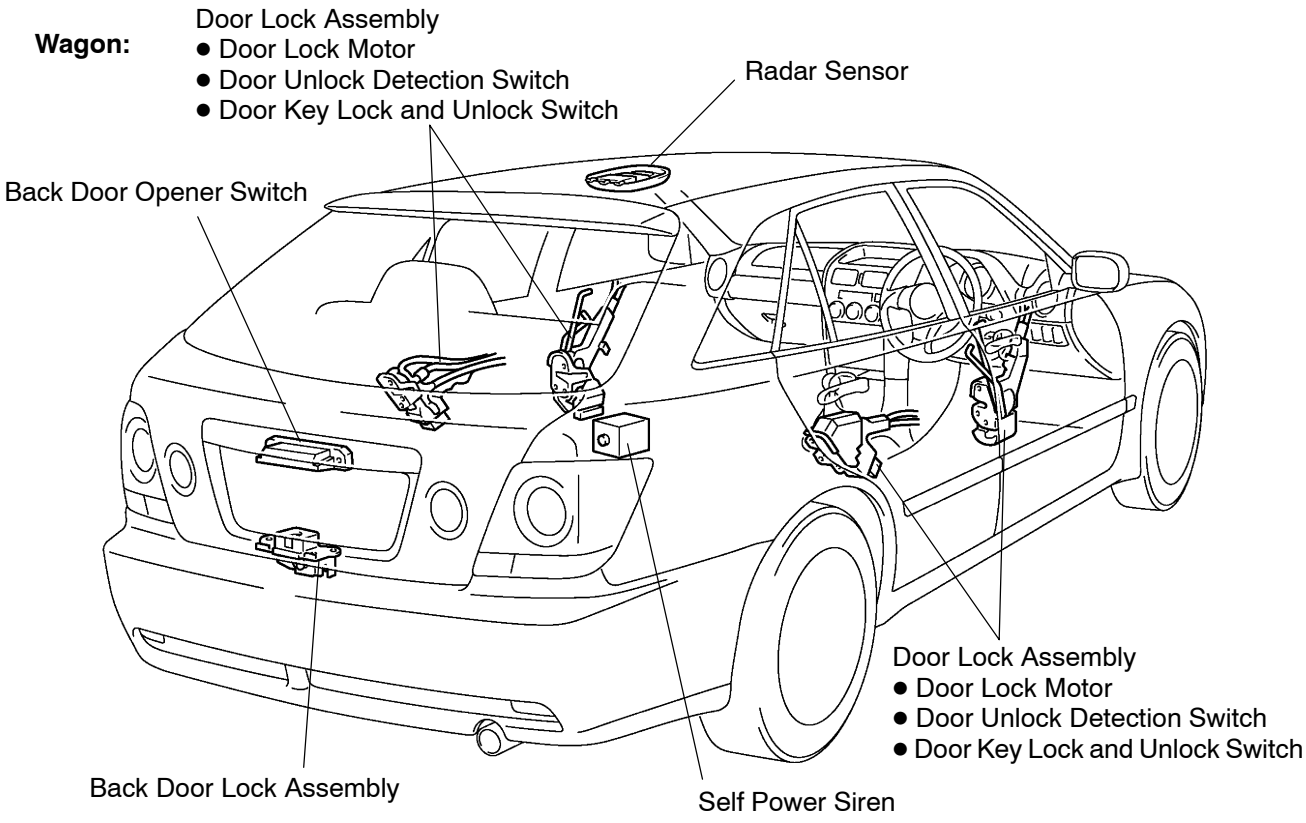
PARTS LOCATION



Sedan:



Wagon:

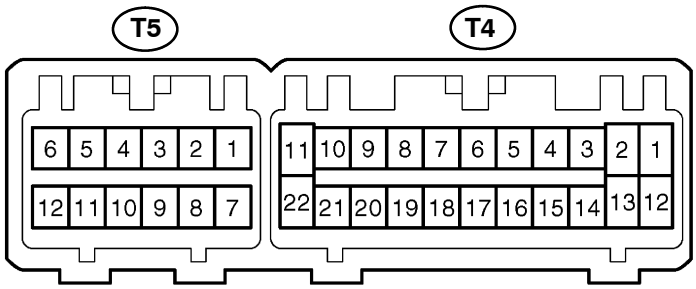


C

I23223

DI615–05

TERMINALS OF ECU



I01920

Symbols (Terminals No.)	Wiring Color	Condition	STD Value
HEAD ↔ E (T4–1 ↔ T4–22)	R–B ↔ W–B	Light control switch position is HEAD.	Below 1 V
		Light control switch position is OFF or TAIL.	10 – 14 V
TAIL ↔ E (T4–2 ↔ T4–22)	R–W ↔ W–B	Light control switch position is TAIL or HEAD.	Below 1 V
		Light control switch position is OFF.	10 – 14 V
DSWH ↔ E (T4–4 ↔ T4–22)	L–R ↔ W–B	Engine hood courtesy switch position is ON. (Engine hood opened)	Below 1 V
		Engine hood courtesy switch position is OFF. (Engine hood closed)	7 – 8 V
LUG ↔ E (T4–5 ↔ T4–22)	B–W ↔ W–B	Luggage compartment door key lock and unlock switch position is ON.	Below 1 V
		Luggage compartment door key lock and unlock switch position is OFF.	7 – 8 V
NAVI1(T4–6)	G–W	Navigation system checking.	–
S+B ↔ E (T4–8 ↔ T4–22)	G ↔ W–B	Constant	10 – 14 V
CLTB ↔ E (T4–9 ↔ T4–22)	R ↔ W–B	Ignition switch position is LOCK.	Below 1 V
		Ignition switch position is ACC or ON.	10 – 14 V
IG ↔ E (T4–10 ↔ T4–22)	B–R ↔ W–B	Ignition switch position is LOCK or ACC.	Below 1 V
		Ignition switch position is ON.	10 – 14 V
+B1 ↔ E (T4–11 ↔ T4–22)	W–R ↔ W–B	Constant	10 – 14 V
H ↔ E (T4–12 ↔ T4–22)	R–Y ↔ W–B	Light control switch position is HEAD.	Below 1 V
		Light control switch position is OFF or TAIL.	10 – 14 V
T ↔ E (T4–13 ↔ T4–22)	R ↔ W–B	Light control switch position is TAIL or HEAD.	Below 1 V
		Light control switch position is OFF.	10 – 14 V
A ↔ E (T4–14 ↔ T4–22)	G–Y ↔ W–B	Light control switch position is AUTO.	Below 1 V
		Light control switch position is OFF, TAIL or HEAD.	10 – 14 V
FOG ↔ E (T4–17 ↔ T4–22)	W–R ↔ W–B	Fog light switch position is ON.	Below 1 V
		Fog light switch position is OFF.	10 – 14 V
IOUT ↔ E (T4–18 ↔ T4–22)	G–O ↔ W–B	Radar sensor detection invader	Below 1 V
		Constant	10 – 14 V
KSW ↔ E (T4–19 ↔ T4–22)	B–Y ↔ W–B	Key is inserted.	Below 1 V
		Key is not inserted.	10 – 14 V
CLTS ↔ E (T4–20 ↔ T4–22)	Y ↔ W–B	Ignition switch position is LOCK.	Below 1 V
		Ignition switch position is ACC or ON.	10 – 14 V

CLTE ↔ E (T4–21 ↔ T4–22)	BR ↔ W–B	Constant	Below 1 V
E ↔ Body ground (T4–22 ↔ Body ground)	W–B ↔ Body ground	Constant	Below 1 V
HORN ↔ E (T5–4 ↔ T4–22)	G–W ↔ W–B	Horn switch position is ON.	Below 1 V
		Horn switch position is OFF.	10 – 14 V
MPX1(T5–7)	O	Multiplex communication circuit.	–
MPX2(T5–8)	L	Multiplex communication circuit.	–
CLTS ↔ E (T5–9 ↔ T4–22)	L–Y ↔ W–B	Theft deterrent system change condition.	One time
		Constant	2 – 4 V
TRIG ↔ E (T5–10 ↔ T4–22)	L–O ↔ W–B	Theft deterrent system is alarming condition.	Below 1 V
		Constant	10 – 14 V
IND ↔ E (T5–12 ↔ T4–22)	L–B ↔ W–B	During set preparation.	3 – 5 V

DI616–06

PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and trouble-shoot for each circuit.

HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

Symptom	Suspect Area	See page
The theft deterrent system cannot be set	3. Indicator light circuit 4. ECU power source circuit 5. Key unlock warning switch circuit 6. Luggage compartment door key lock and unlock switch circuit 7. Luggage compartment door courtesy switch circuit 8. Door key lock and unlock switch circuit 9. Door courtesy switch circuit 10. Door unlock detection switch circuit 11. Engine hood courtesy switch circuit	DI–482 DI–484 DI–507 DI–509 DI–577* DI–589* DI–574* DI–586* DI–517
The indicator light does not blink when system is set.	Indicator light circuit	DI–482
When the system is set (The system does not operate when the rear door is unlocked).	Door unlock detection switch circuit	DI–586*
When the system is set (The system does not operate when the luggage compartment door is opened by a method other than the key).	Luggage compartment door courtesy switch circuit	DI–577*
When the system is set (The system does not operate when the engine hood is opened).	Engine hood courtesy switch circuit	DI–517
When the system is set (It is not canceled when the ignition key is turned to ACC or ON position (Except Europe Models)).	Ignition switch circuit	DI–487
When the system is set (It still operates when the luggage compartment door is opened with the key (Except Europe Models)).	Luggage compartment door key lock and unlock switch circuit	DI–509
When the system is set (The system does not operate when after 30 seconds put your hand through the window and shake it near the sensor).	Radar sensor circuit	DI–515
While the system is in warning operation (Horns do not sound).	Horn relay circuit	DI–490
While the system is in warning operation (Siren does not sound).	Self power siren circuit	DI–512
While the system is in warning operation (When the siren does not sound or stops soon after it starts).	Self power siren battery	BE–124*
While the system is in warning operation (Headlights do not flash).	Headlight control relay circuit	DI–500
While the system is in warning operation (Taillights do not flash).	Taillight control relay circuit	DI–503
While the system is in warning operation (Hazard lights do not flash).	Hazard switch circuit	DI–559*
While the system is in warning operation (The door lock is not locked).	Door unlock detection switch circuit	DI–586*
System is still set even when a rear door is open	Door courtesy switch circuit	DI–574*
Even when the system is not set (Horns sound).	Horn relay circuit	DI–490

Even when the system is not set (Siren sounds).	Self power siren circuit	DI–512
Even when the system is not set (when the siren does not sound or stops soon after it starts).	Self power siren battery	BE–124*
Even when the system is not set (Headlights stay on).	Headlight control relay circuit	DI–500
Even when the system is not set (Taillights stay on).	Taillight control relay circuit	DI–503
Even when the system is not set (Hazard lights do not flash).	Hazard switch circuit	DI–559*

* : See Pub No. RM684E

DI617–05

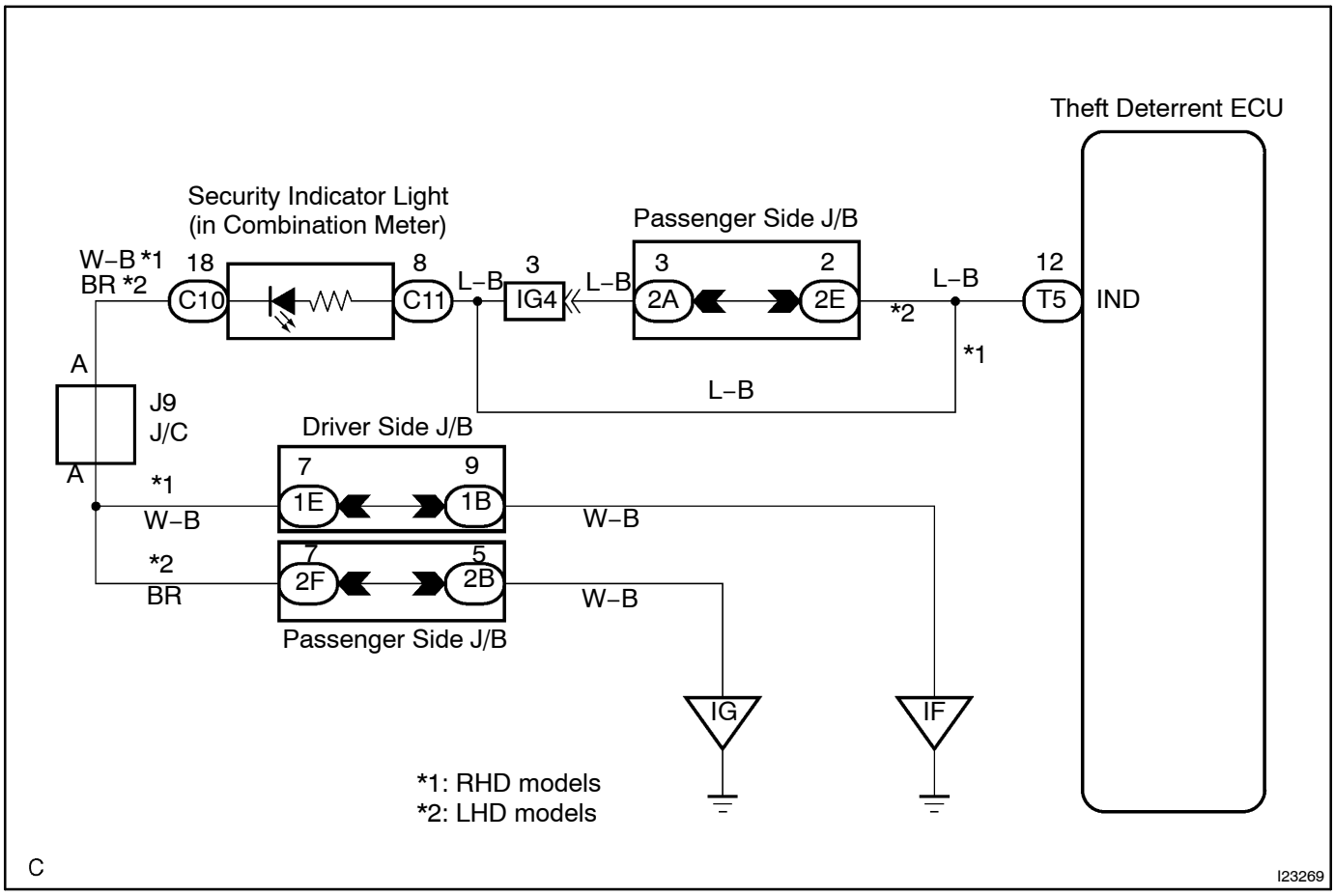
CIRCUIT INSPECTION

Indicator Light Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continually turns the indicator light ON for 0.2 second and turns it OFF for 1.8 second, thus blinking the indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check theft deterrent indicator using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Connect terminals Tc and E1 of DLC1.

CHECK:
Check that the theft deterrent indicator can light in an ACTIVE TEST.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	**Check indicator light (See Pub No. RM684E on page BE–124).**

NG → **Replace the bulb or meter wire harness.**

OK

3	**Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page IN–34).**

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

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–480).

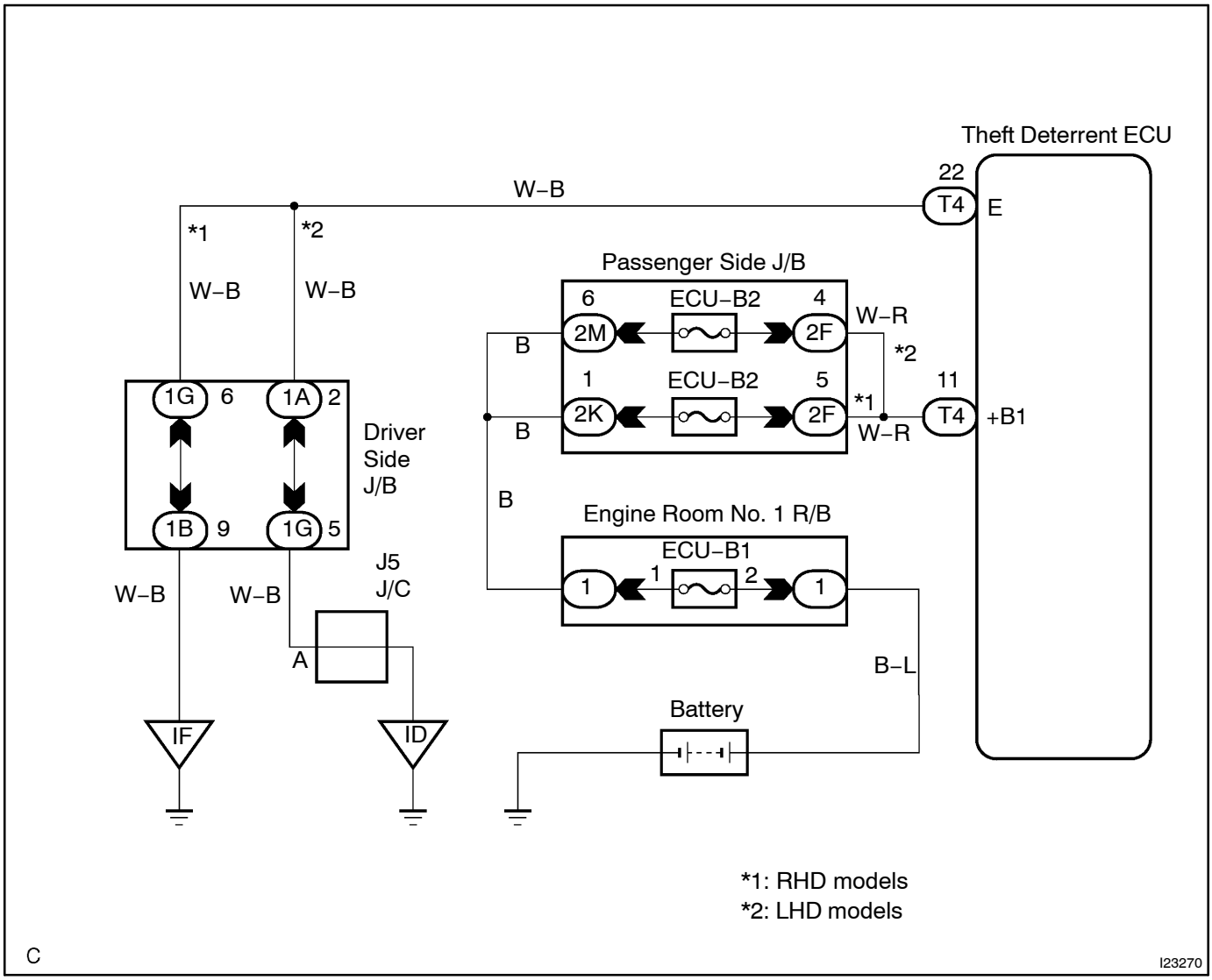
DI618–04

ECU Power Source Circuit

CIRCUIT DESCRIPTION

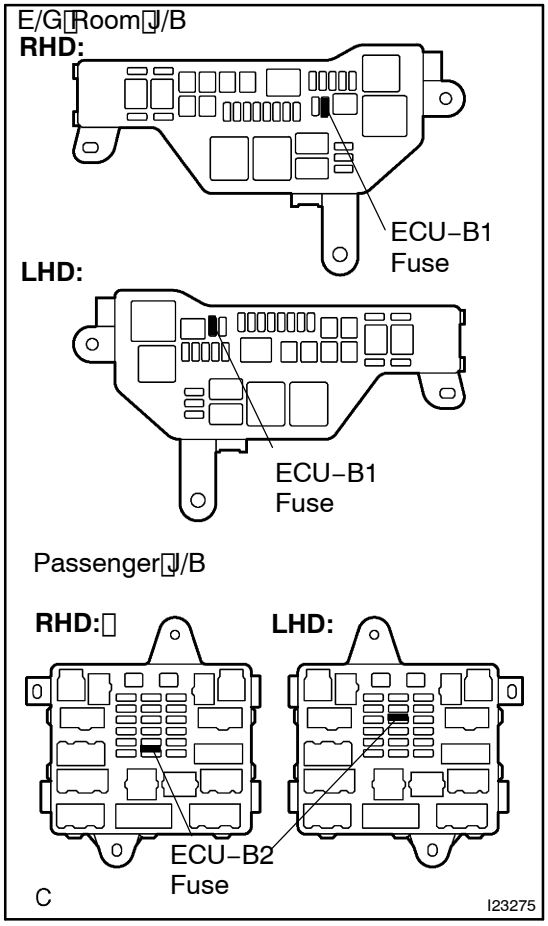
This circuit provides power to operate the theft deterrent ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check ECU–B2 and ECU–B1



PREPARATION:

Remove ECU–B2 and ECU–B1 fuse from engine room junction block No. 2.

CHECK:

Check continuity of ECU–B2 and ECU–B1 fuse.

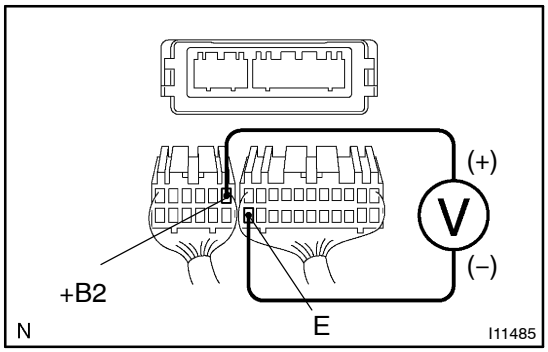
OK:

Continuity

NG → **Check for short in all the harness and components connected to the ECU–B2 and ECU–B1 fuse (See attached wiring diagram).**

OK

2	Check voltage between terminals +B2 and E of theft deterrent ECU connector.



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminals +B2 and E of theft deterrent ECU connector.

OK:

Voltage: 10~14V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–480).**

NG

3	Check for open in harness and connector between ECU and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and repair harness and connector between ECU and battery.

DI9HX–01

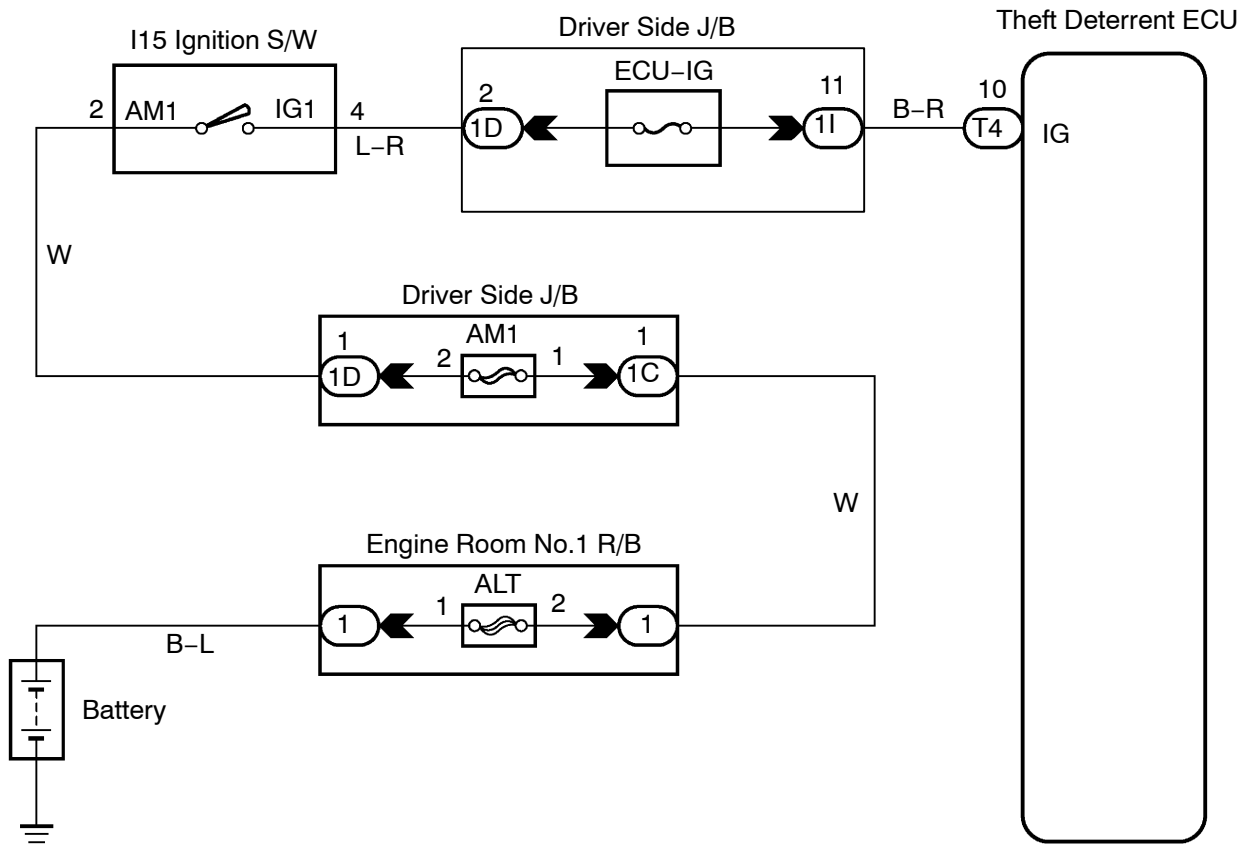
Ignition Switch Circuit

CIRCUIT DESCRIPTION

If the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals IG of the ECU. Furthermore, power supplied from the terminals IG of the ECU is used as power for the door courtesy switch, and position switch, etc.

WIRING DIAGRAM

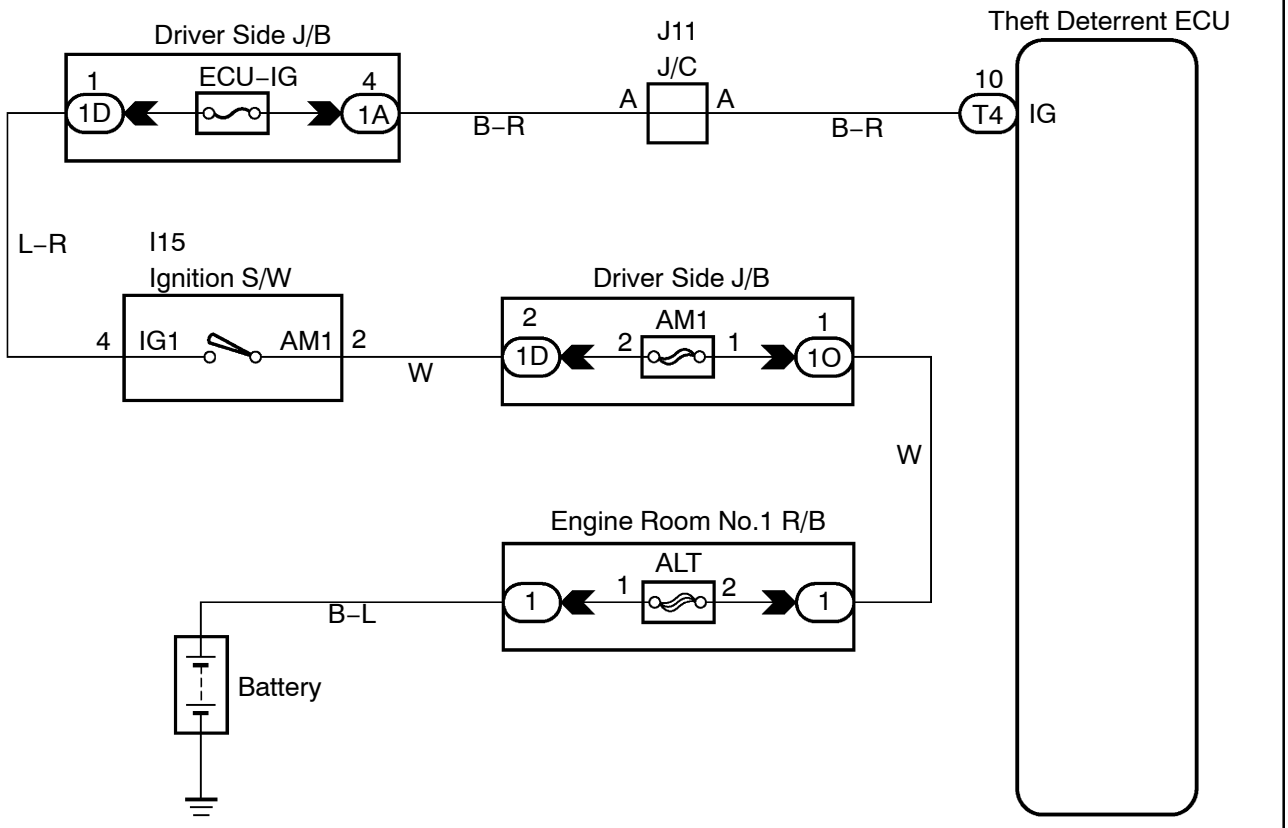
RHD models



N

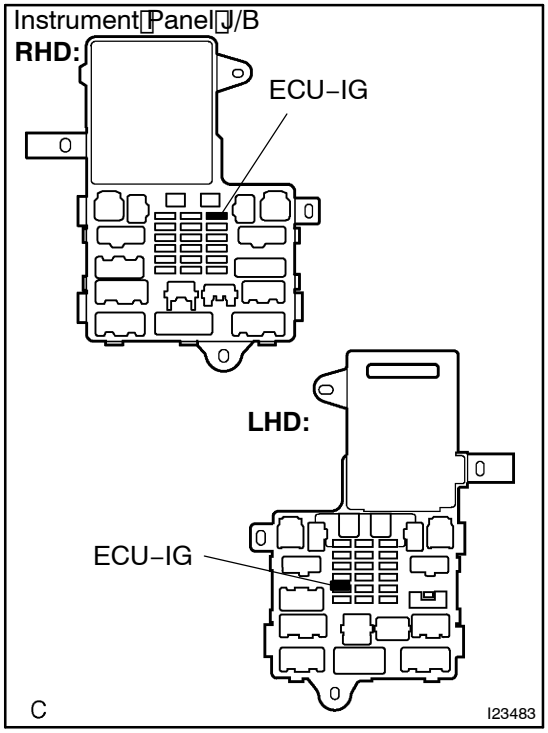
I11439

LHD models


Driver Side J/B
1
ECU–IG
4
1D
1A
B–R
J11
J/C
A
A
B–R
Theft Deterrent ECU
10
T4
IG
L–R
I15
Ignition S/W
4
IG1
AM1
2
W
Driver Side J/B
2
AM1
1
1D
2
1
1O
W
Engine Room No.1 R/B
ALT
1
1
2
1
B–L
Battery
N
I15559

INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:

(a) Remove the fuse box opening cover.

(b) Remove ECU–IG fuse from instrument panel junction block.

CHECK:

Check continuity of ECU–IG fuses.

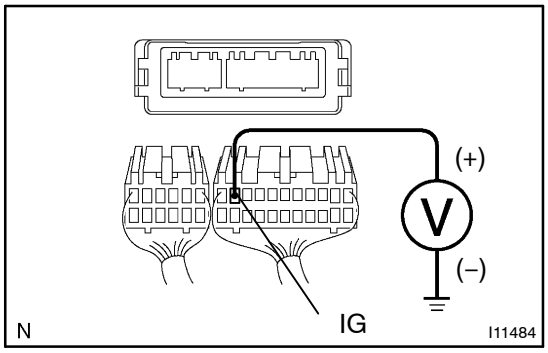
OK:

Continuity

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

OK

2	**Check voltage between terminals IG of theft deterrent ECU and body ground.**



PREPARATION:

(a) Disconnect the theft deterrent ECU connectors.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals IG of theft deterrent ECU connector and body ground.

OK:

Voltage: 10~14V

NG → **Check and repair harness and connector between theft deterrent ECU and battery (See page IN–34).**

OK

Check and replace theft deterrent ECU.

DI9HY–01

Horn Relay Circuit

CIRCUIT DESCRIPTION

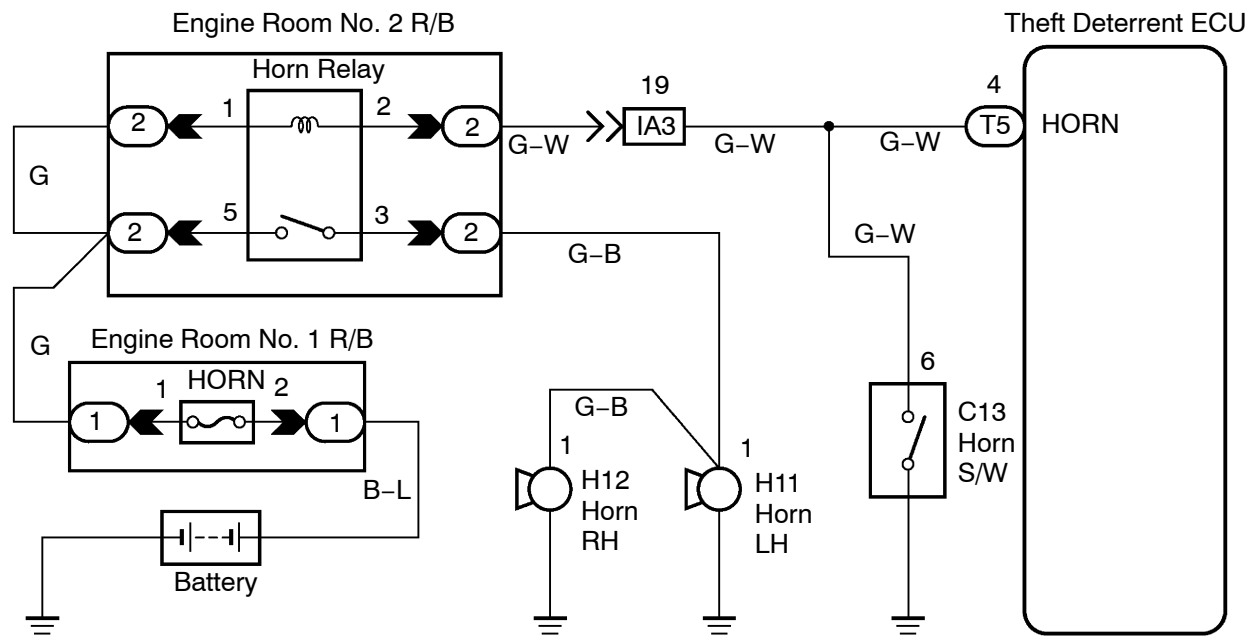
When the theft deterrent system is activated, it causes the transistor in the ECU to switch ON and OFF in approximately 0.4 sec. cycles. This switches the horn relay ON and OFF, thus the horns blow (See the wiring diagram below).

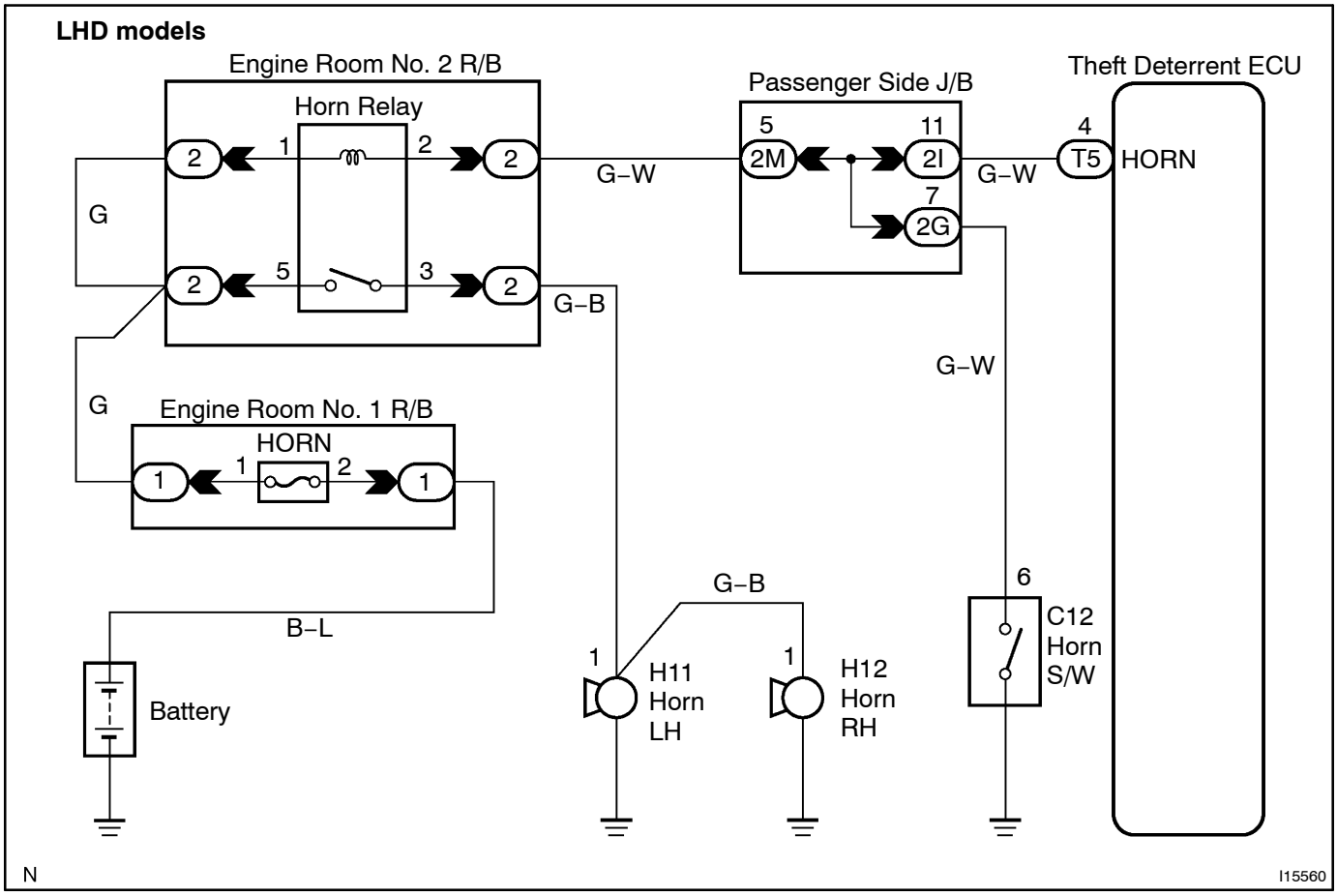
In this condition, if any of the following operations is done, the transistor in the ECU goes OFF and the horn relay switches OFF, thus stopping the horns from blowing:

(1) Unlock the front LH or RH door with key. (Except Europe Models)
(2) Turn the ignition switch to ON position. (Except Europe Models)
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

RHD models



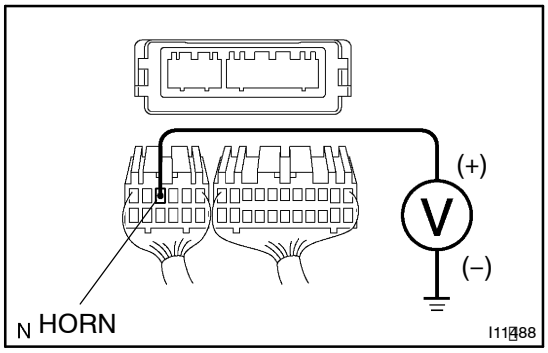

LHD models
Engine Room No. 2 R/B
Horn Relay
Passenger Side J/B
Theft Deterrent ECU
2
1
2
2
G–W
5
11
4
2M
2I
T5
HORN
G–W
7
2G
G
5
3
2
G–B
G–W
G
Engine Room No. 1 R/B
HORN
1
1
2
1
6
G–B
B–L
C12
Horn
S/W
1
H11
Horn
LH
1
H12
Horn
RH
Battery
N
I15560

INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the horns blow normally whenever the horn switch is operated. If horn operation is not normal when the horn switch is operated, check the horn switch.

1	**Check voltage between terminal HORN of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connectors.

CHECK:

Measure voltage between terminal HORN of theft deterrent ECU connector and body ground.

OK:

Voltage: 10~14V

NG → **Check and repair harness and connector between theft deterrent ECU and horn relay (See page IN–34).**

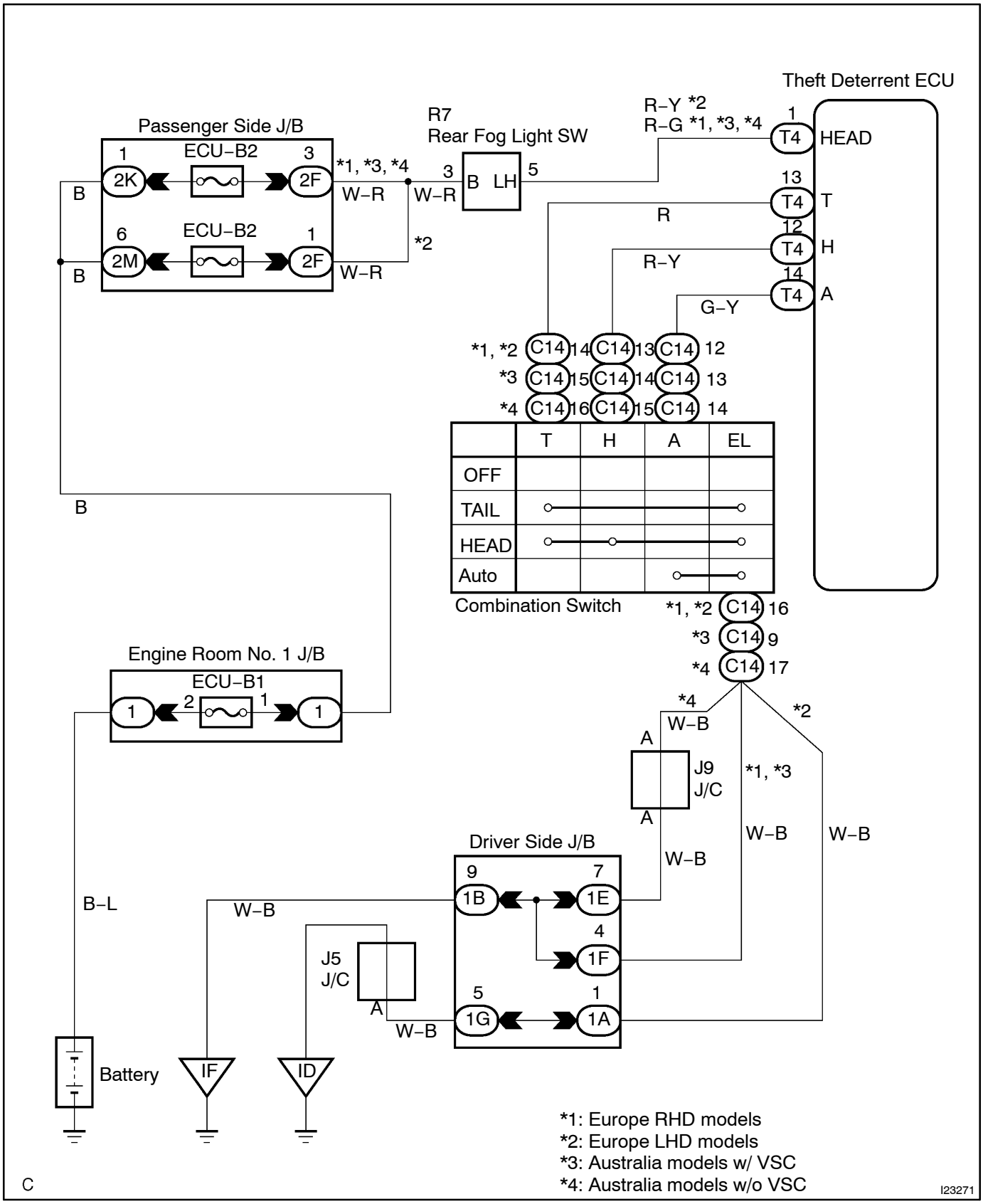
OK

Check and replace theft deterrent ECU (See page IN–34).

DI61B–03

Light control switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check headlight control switch using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the headlight control switch using DATA LIST.
OK:

Terminal (tester display) / Switch position	Headlight Switch (Tail)	Headlight Switch (Head)	Auto light switch
OFF	OFF	OFF	OFF
TAIL	ON	OFF	OFF
HEAD	ON	ON	OFF
AUTO	OFF	OFF	ON

OK → **Proceed to next circuit inspection shown in problem symptoms table.(See page DI–480).**

NG

2	**Check headlight control switch (See Pub No. RM684E on page BE–30).**

NG → **Replace the headlight control switch.**

OK

3	Check wire harness and connector between headlight control switch and Body ECU (See page IN–34).

NG → Repair or replace wire harness or connector.

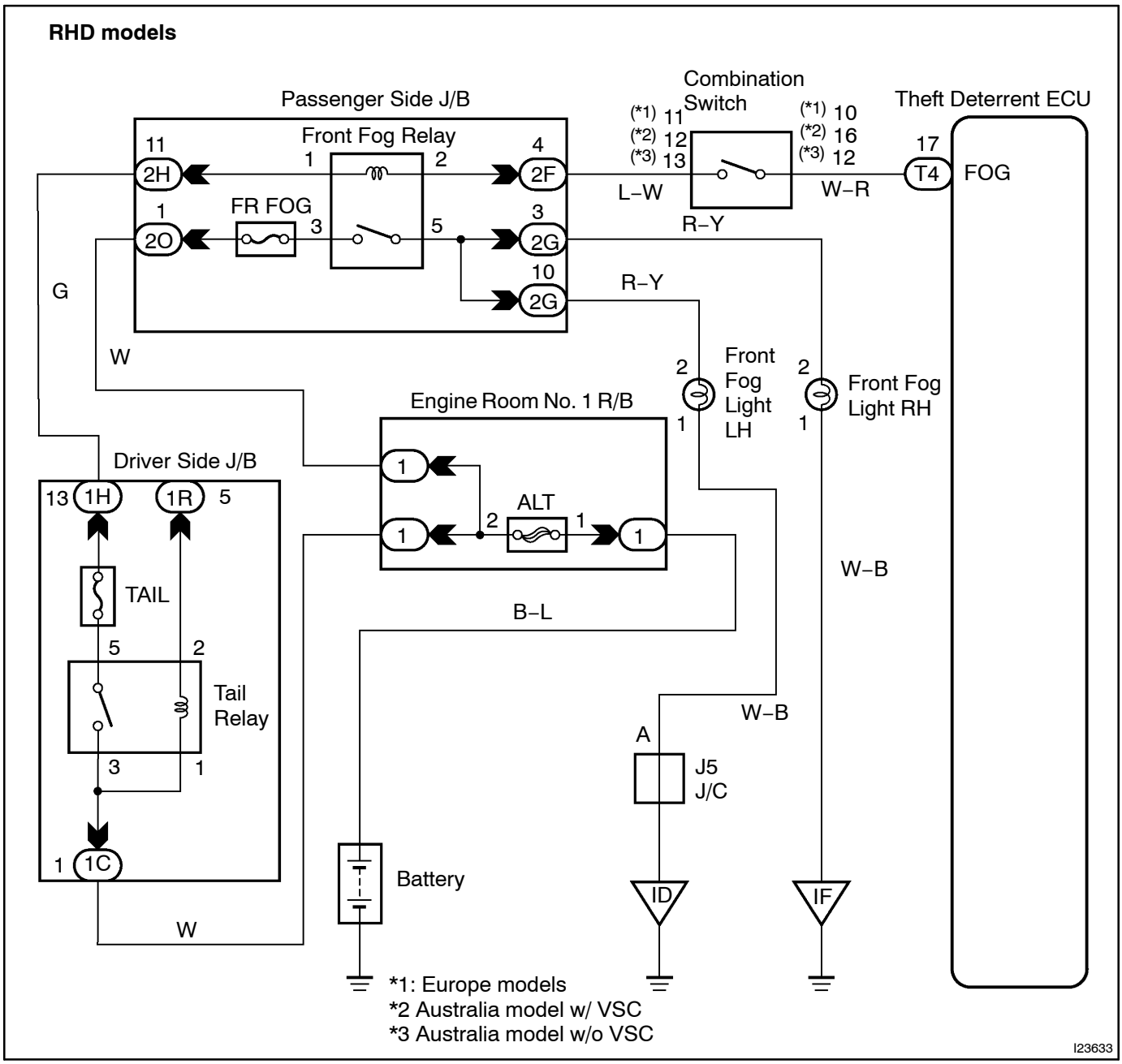
OK

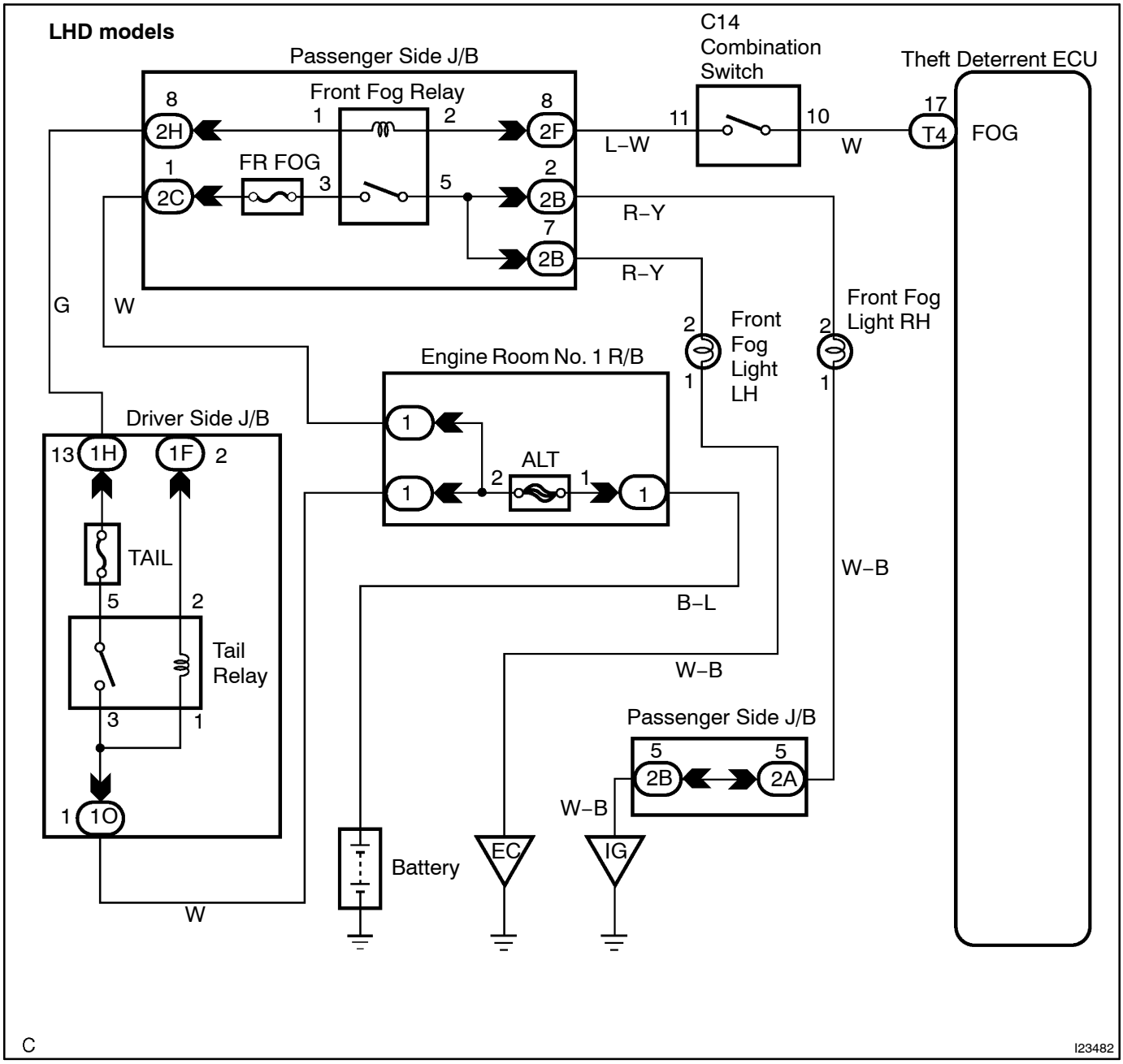
Proceed to next circuit inspection shown on problem symptoms table (See page DI–480).

DI9I1–01

Front fog light switch and relay circuit

WIRING DIAGRAM




LHD models
Passenger Side J/B
Front Fog Relay
FR FOG
C14
Combination
Switch
Theft Deterrent ECU
FOG
Front Fog
Light LH
Front Fog
Light RH
Engine Room No. 1 R/B
ALT
Driver Side J/B
TAIL
Tail
Relay
Passenger Side J/B
Battery
EC
IG
L–W
W
R–Y
G
W–B
B–L
C
I23482

INSPECTION PROCEDURE

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

1	**Check front fog light relay using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check that the front fog light relay can operate in an ACTIVE TEST.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	**Check front fog light relay (See Pub No. RM684E on page BE–45).**

NG → **Replace the front fog light relay.**

OK

3	**Check front fog light switch (See Pub No. RM684E on page BE–45).**

NG → **Replace the front fog light switch.**

OK

4	**Check wire harness and connector between front fog light relay and theft deterrent ECU, battery and front fog light relay (See page IN–34).**

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

OK

5	Check wire harness and connector between front fog light switch and theft deterrent ECU, battery and front fog light switch (See page IN–34).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–480).

DI61D–03

Headlight Control Relay Circuit

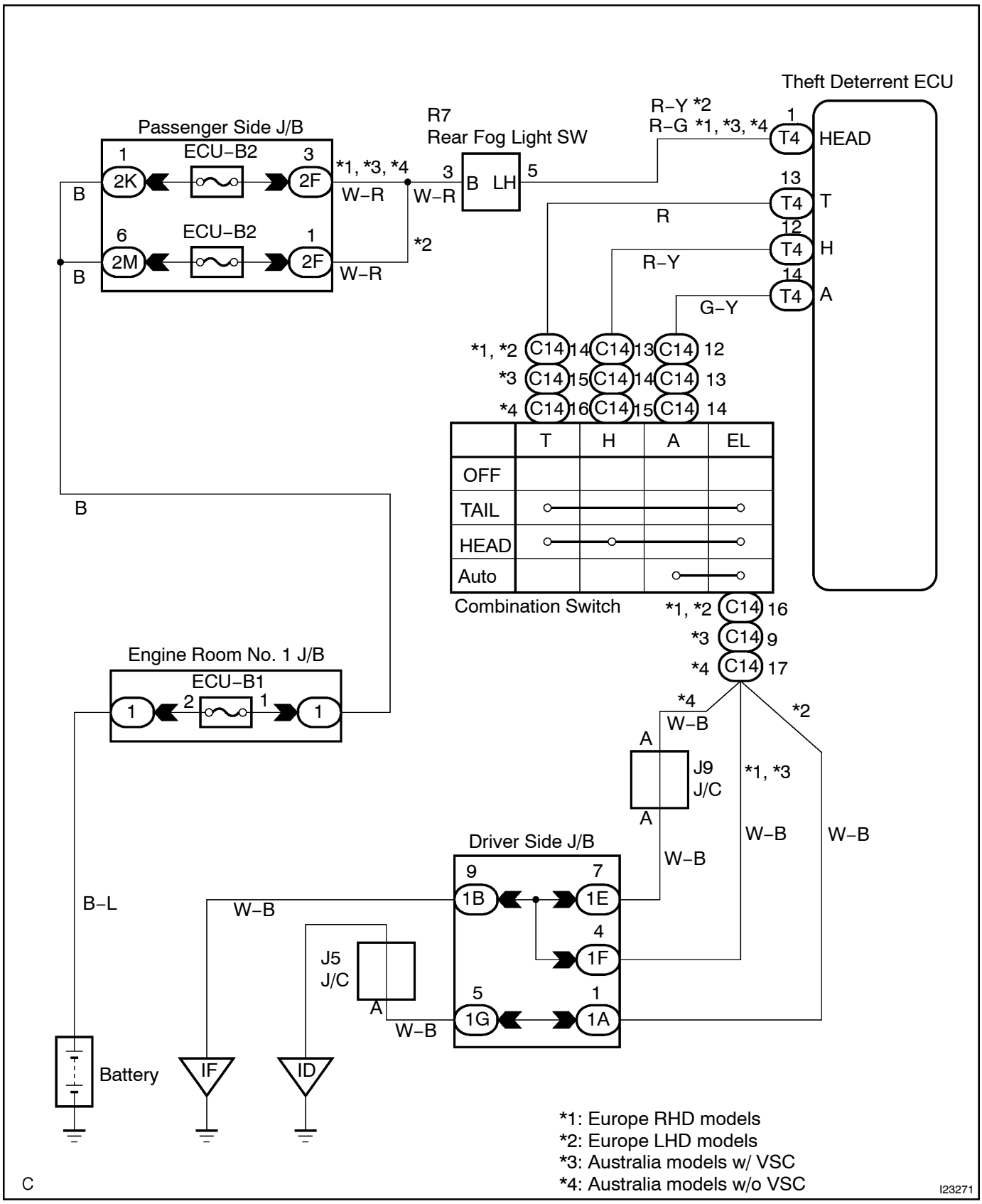
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the transistor in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the headlight control relay ON and OFF, thus flashing the headlights (See the wiring diagram below).

In this condition, if any of the following operations is done, the transistor in the ECU goes OFF and the headlight control relay switches OFF, thus stopping the headlights flashing:

(1) Unlock the front LH or RH door with a key. (Except Europe Models)
(2) Turn the ignition switch to ON position. (Except Europe Models)
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the headlights light up normally whenever the light control switch is operated. If headlight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–2.

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

1	**Check headlight relay using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check that the headlight relay can operate in an ACTIVE TEST.

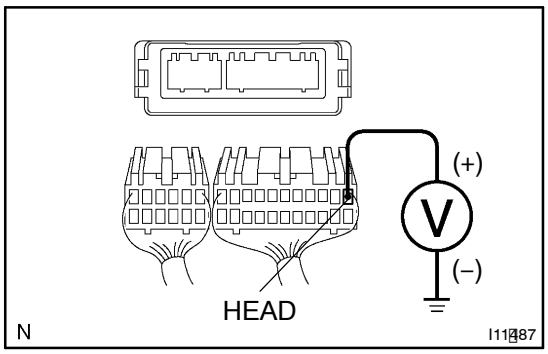
HINT:

If the headlight relay is normal, the headlight comes "ON". In the case that the headlight relay activates but the headlight will not come on, check the headlight circuit.

OK: Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).

NG

2	**Check voltage between terminal HEAD of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminal HEAD of theft deterrent ECU connector and body ground.

OK:

Voltage: 10~14V

NG: Check and repair harness and connector between theft deterrent ECU and headlight control relay (See page IN–34).

OK

Check and replace theft deterrent ECU (See page IN–34).

DI9HZ–01

Taillight Control Relay Circuit

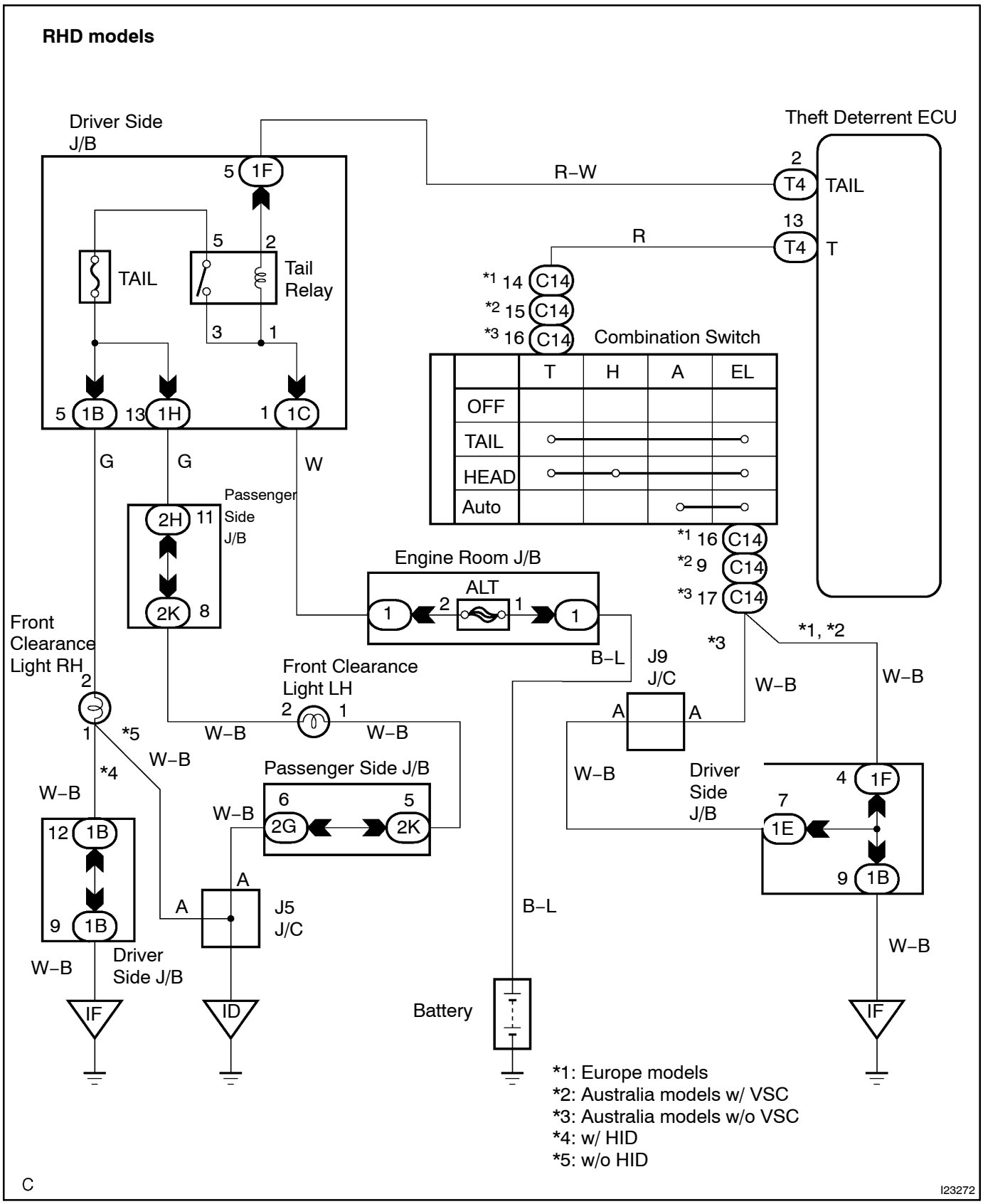
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the transistor in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the taillight control relay ON and OFF, thus flashing the taillights (See the wiring diagram below).

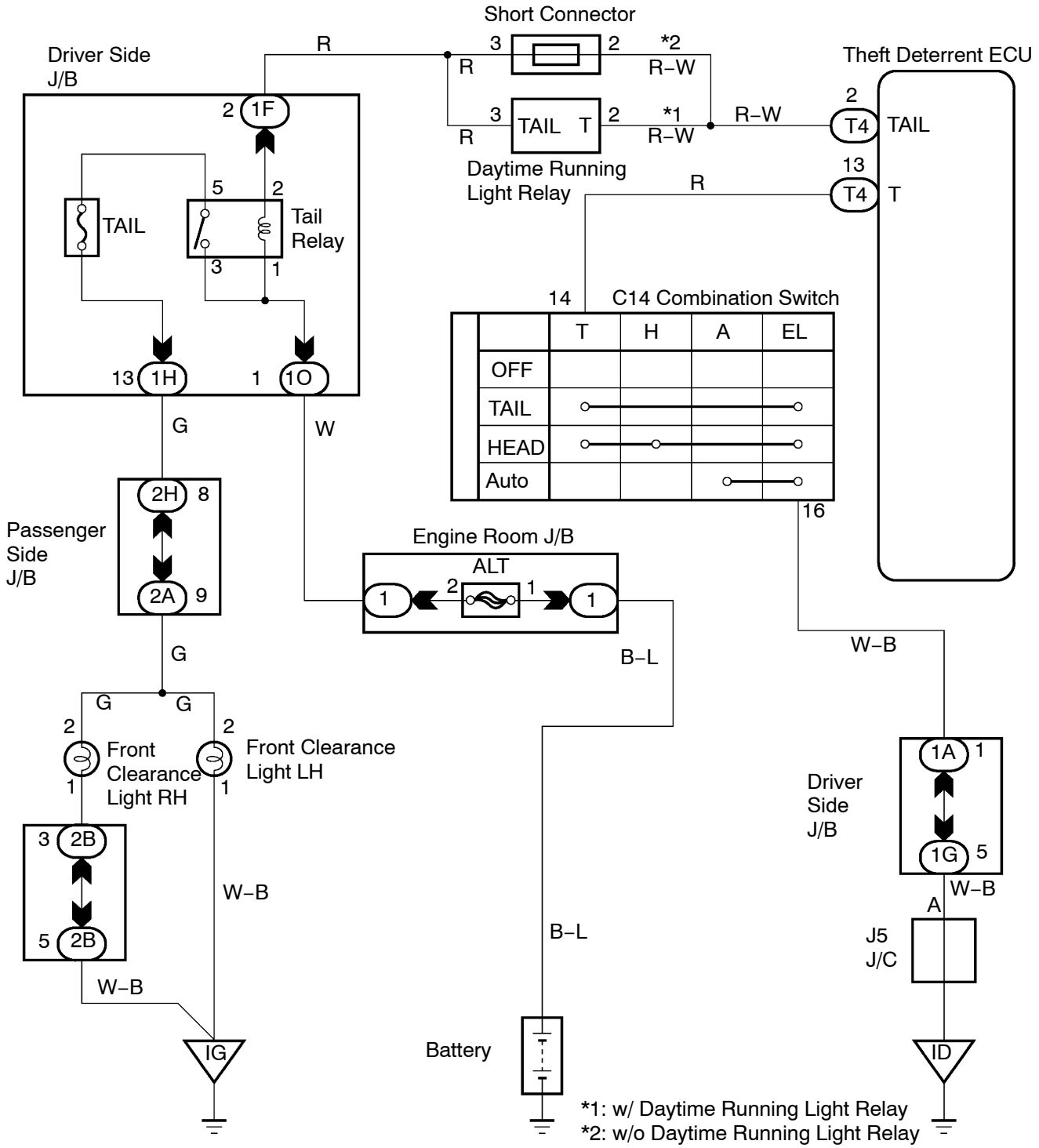
In this condition, if any of the following operations is done, the transistor in the ECU goes OFF and the taillight control relay switches OFF, thus stopping the taillights flashing:

(1) Unlock the front LH or RH door with a key. (Except Europe Models)
(2) Turn the ignition switch to ON position. (Except Europe Models)
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



LHD models


Short Connector
Driver Side J/B
Theft Deterrent ECU
Daytime Running Light Relay
TAIL
Tail Relay
C14 Combination Switch
OFF
TAIL
HEAD
Auto
Passenger Side J/B
Engine Room J/B
ALT
Front Clearance Light RH
Front Clearance Light LH
Driver Side J/B
J5 J/C
Battery
IG
ID
*1: w/ Daytime Running Light Relay
*2: w/o Daytime Running Light Relay
I23273

INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the taillights light up normally whenever the light control switch is operated. If taillight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–2.

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

1	**Check tail light relay using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check that the taillight relay can operate in an ACTIVE TEST.

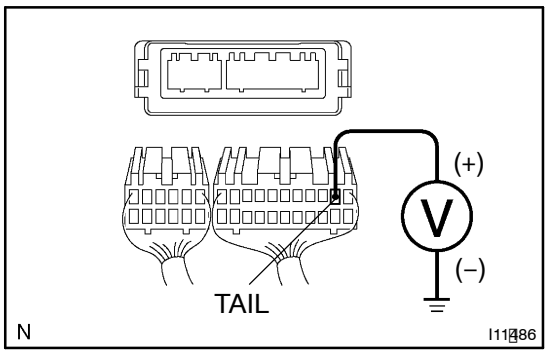
HINT:

If the headlight relay is normal, the headlight comes "ON". In the case that the headlight relay activates but the headlight will not come on, check the headlight circuit.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	**Check voltage between terminal TAIL of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminal TAIL of theft deterrent ECU connector and body ground.

OK:

Voltage: 10~14V

NG → **Check and repair harness and connector between theft deterrent ECU and taillight control relay (See page IN–34).**

OK

Check and replace theft deterrent ECU (See page IN–34).

DI9I0-01

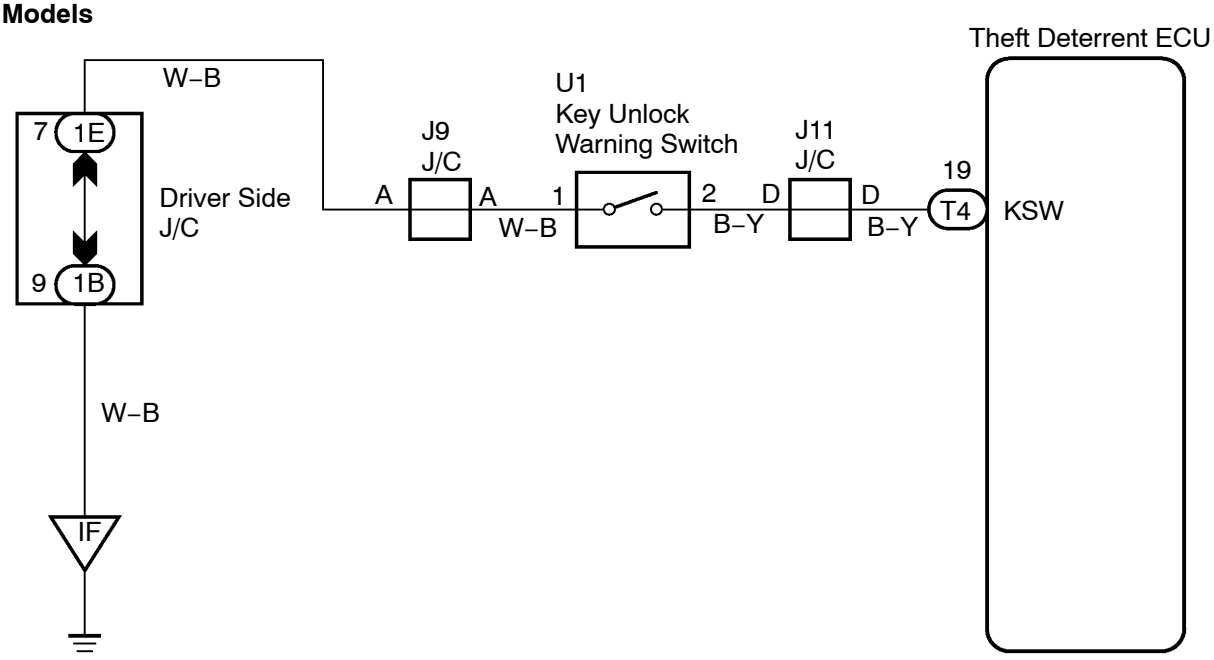
Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

The key unlock warning switch goes ON when the ignition key is inserted in the key cylinder and goes OFF when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is ON.

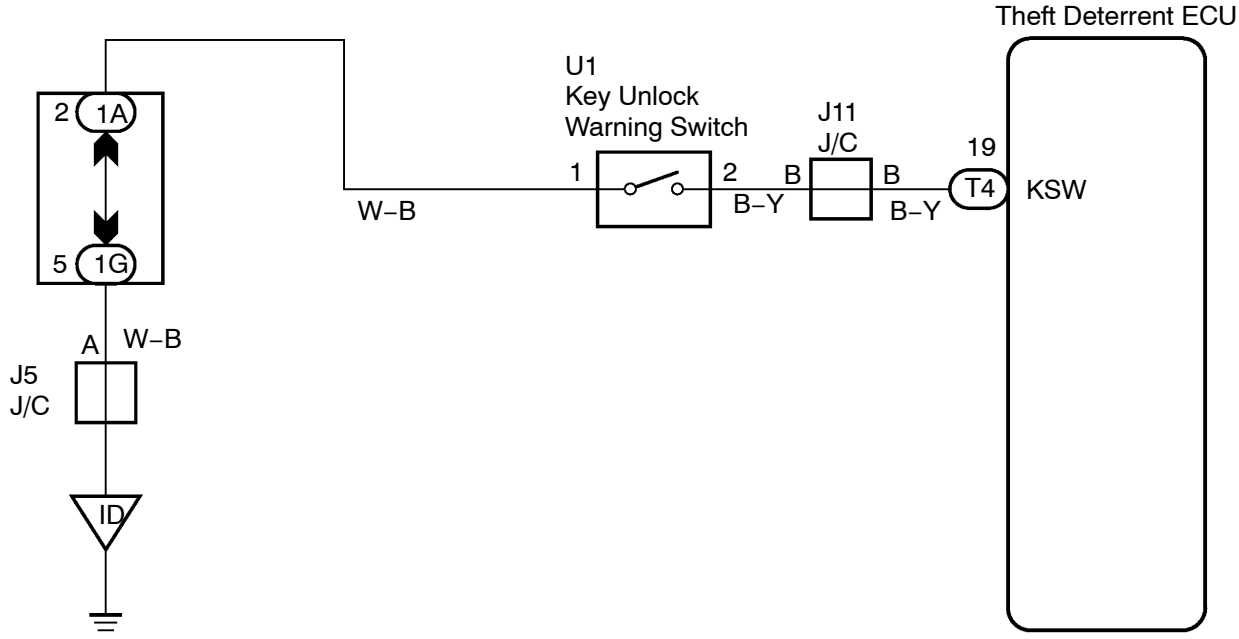
WIRING DIAGRAM

RHD Models



I23485

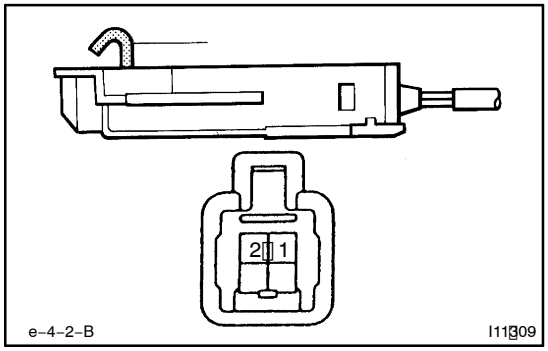
LHD Models



I23486

INSPECTION PROCEDURE

1	Check key unlock warning switch.



PREPARATION:
Disconnect key unlock warning switch connector.
CHECK:
Check continuity between terminal 1 and 2 of key unlock warning switch connector, when the key is inserted into the key cylinder or removed.
OK:

Switch position	Tester connection	Specified condition
ON (Key inserted)	1 – 2	Continuity
OFF (Key removed)	–	No continuity

NG → Replace key unlock warning switch.

OK

2	Check harness and connectors between ECU and key unlock warning switch, key unlock warning switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–480).

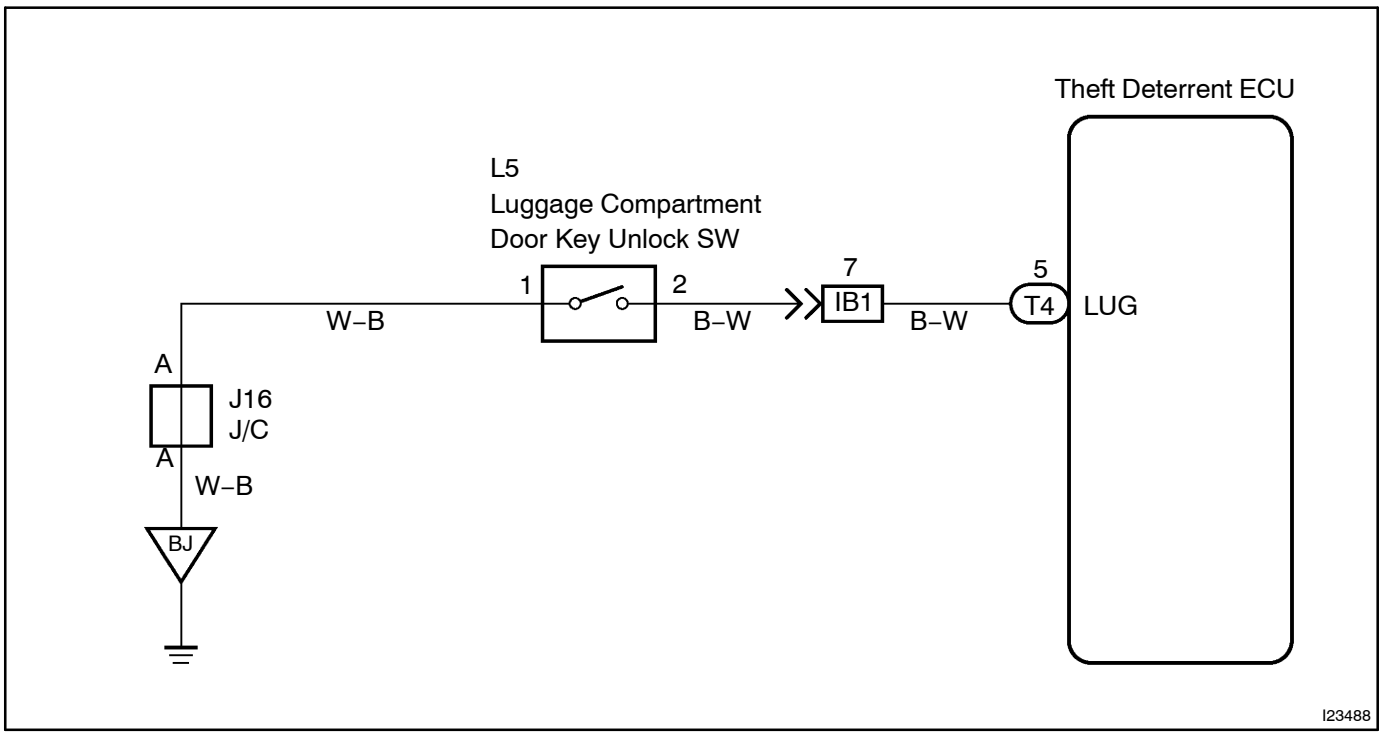
DI61G-03

Luggage Compartment Door Key Lock and Unlock Switch Circuit (Except Europe Models)

CIRCUIT DESCRIPTION

The luggage compartment door key lock and unlock switch goes ON when the luggage compartment door key cylinder is turned to the unlock side with the key.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

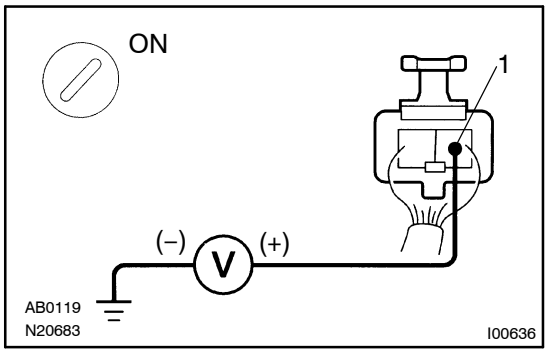
1	**Check luggage compartment door lock and unlock switch using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the luggage compartment door lock and unlock switch using DATA LIST.

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	**Check voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground.**



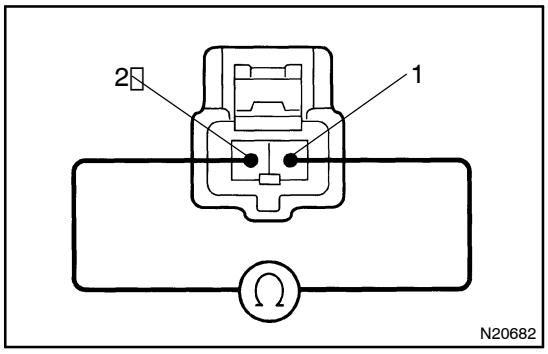
PREPARATION:
(a) Remove luggage compartment door trim.
(b) Turn ignition switch ON.
CHECK:
Measure voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground, when the key is turned to the unlock side and not turned.
OK:

Key operation	Voltage
Turned to the unlock side	0 V
Not turned	Battery positive voltage

OK	**Check and replace theft deterrent ECU.*1**

NG

3	**Check luggage compartment door key lock and unlock switch.**



PREPARATION:

Disconnect luggage compartment door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1 and 2, when the key is turned to the unlock side and not turned.

OK:

Key operation	Tester connection	Specified condition
Turned to unlock	1 – 2	Continuity
Not turned	–	No continuity

NG → **Repair or replace luggage compartment door key lock and unlock switch.**

OK

4	**Check harness and connector between theft deterrent ECU and key lock and unlock switch, key lock and unlock switch and body ground (See page IN–34).**

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

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–480).

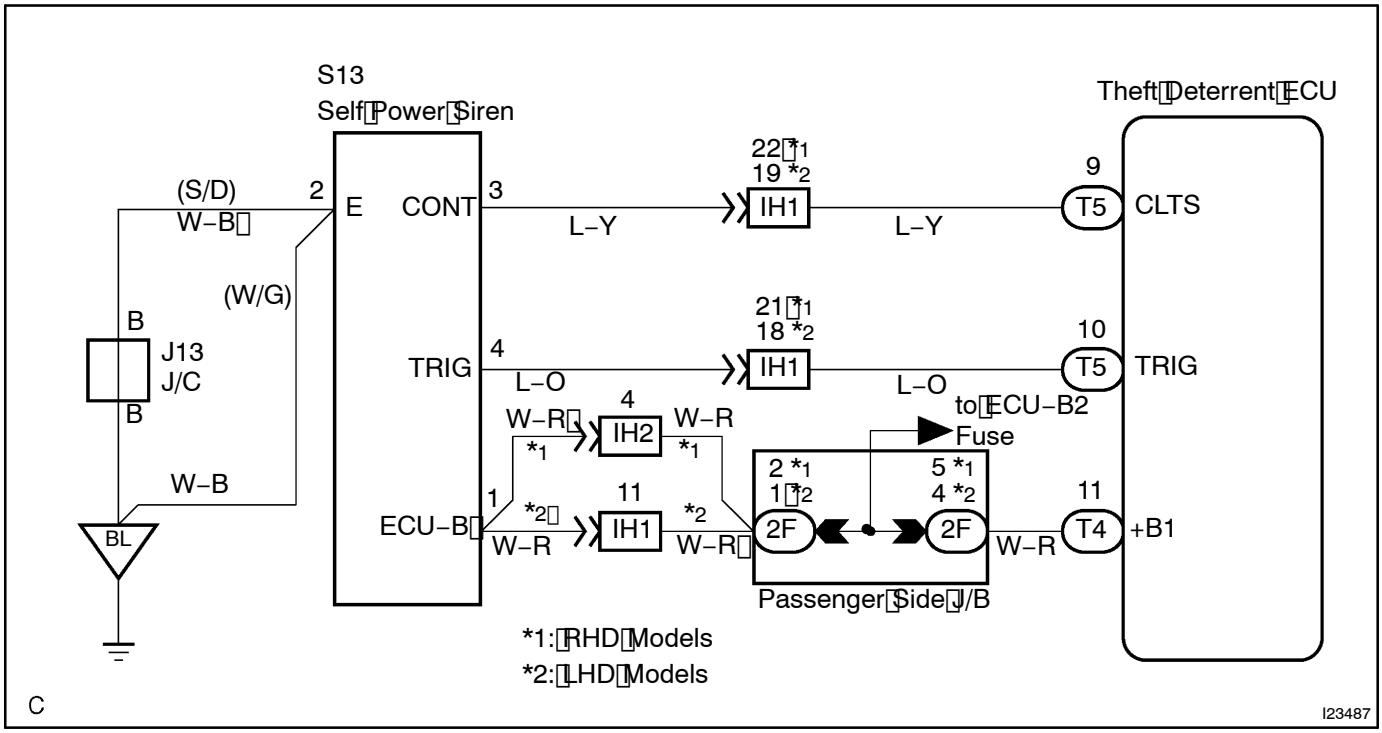
DI61I–03

Self Power Siren

CIRCUIT DESCRIPTION

A radio transmitter is integrated into the dome light.
This creates a spherical electric field inside the vehicle, detects intrusion using the Doppler effect caused by movement of an object in the vehicle, and outputs a warning trigger signal to the theft deterrent ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

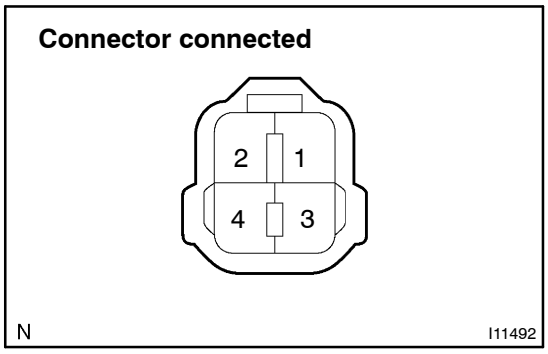
1	**Check self power siren using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check that the self power alarm can operated in an ACTIVE TEST.
OK:
The self power alarm should sound.

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	Check self power siren.



PREPARATION:

(a) Remove the self power siren.

(b) Disconnect the self power siren connector.

CHECK:

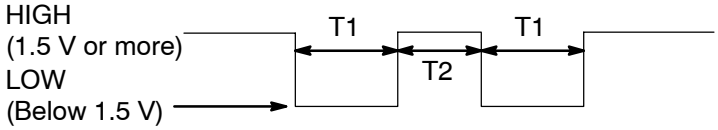
(a) Case 1:
Check terminal 3 in case of the system set signal is not input to the siren.

(b) Case 2:
Check terminal 4 in case of the siren drive signal is not input when the alarm is triggered.

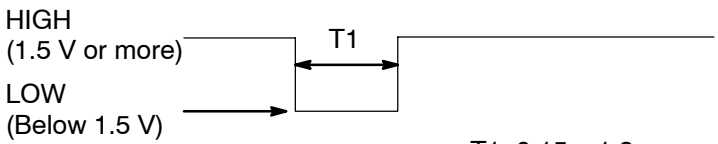
OK:

Tester connection	Condition	Specified condition
1 – Ground	Constant	Battery voltage
2 – Ground	Constant	No voltage
3 – Ground	When transforming from armed or arming preparation state to disarmed state.	Using an oscilloscope *1
	When transforming from the arming preparation state to armed state.	Using an oscilloscope *2
	Normal condition	Approx. 1.4 V
4 – Ground	Normal condition	Battery voltage
	Arming condition	Below 1 V

*1: wave pattern



*2: wave pattern



T1: 0.15 – 1.3 secs
T2: 0.15 – 0.25 secs

OK	Replace self power siren.

NG

3	Check harness and connector between ECU and alarm, alarm and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Proceed to next circuit inspection shown in problem symptom table (See page DI–480).

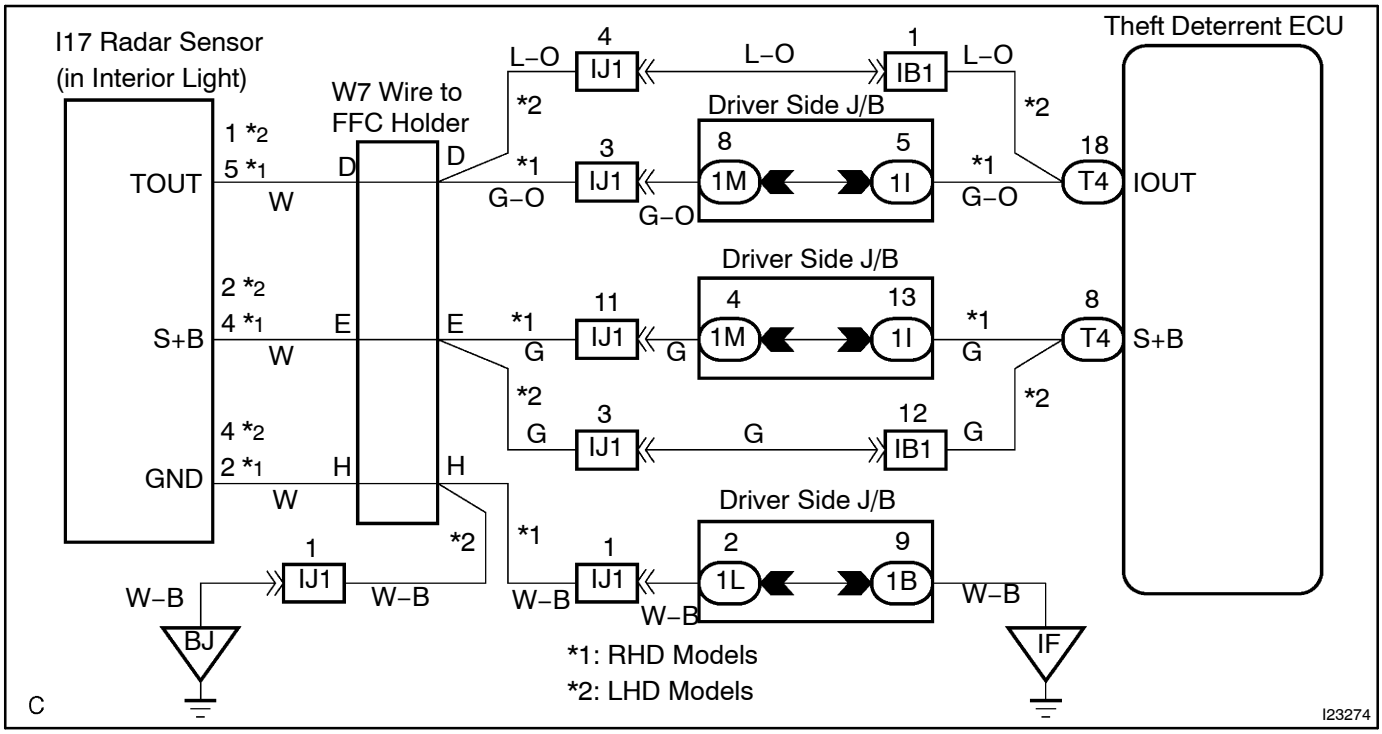
DI61J–03

Radar Sensor (Except Singapore)

CIRCUIT DESCRIPTION

Based on the alarm sounding state input from the theft deterrent ECU (to the TRIG terminal) an alarm is issued.
However, the armed/disarmed state is determined by the CONT terminal, which monitors vehicle status, and input to the TRIG terminal is only accepted from the ECU while armed state is ON.
Moreover, open circuit detection is only carried out while armed state is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check radar sensor operation.**

CHECK:

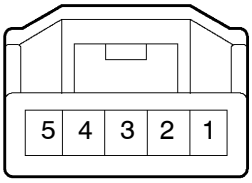
Set the system with a window open, and after 30 seconds put your hand through the window and shake it near the sensor to check if the alarm is triggered.

OK	**No problem.**

NG

2	Check radar sensor.

Connector connected



N I11491

PREPARATION:
Remove the room light assembly.
CHECK:
Measure the voltage and continuity at terminals.
OK:

Tester connection	Condition	Specified condition
RHD: 5 – Ground LHD: 5 – Ground	Arming preparation state or armed state.	Battery voltage
	Disarmed state.	Below 1 V
RHD: 4 – Ground LHD: 2 – Ground	When the sensor does not detect any movement.	6.8 V ± 2 V
	When the sensor detects movement when in arming preparation or armed state.	Below 1 V
RHD: 2 – Ground LHD: 4 – Ground	Constant	Continuity

NG → Replace radar sensor. (in Room light assembly)

OK

3	Check harness and connector between ECU and sensor, sensor and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–480).

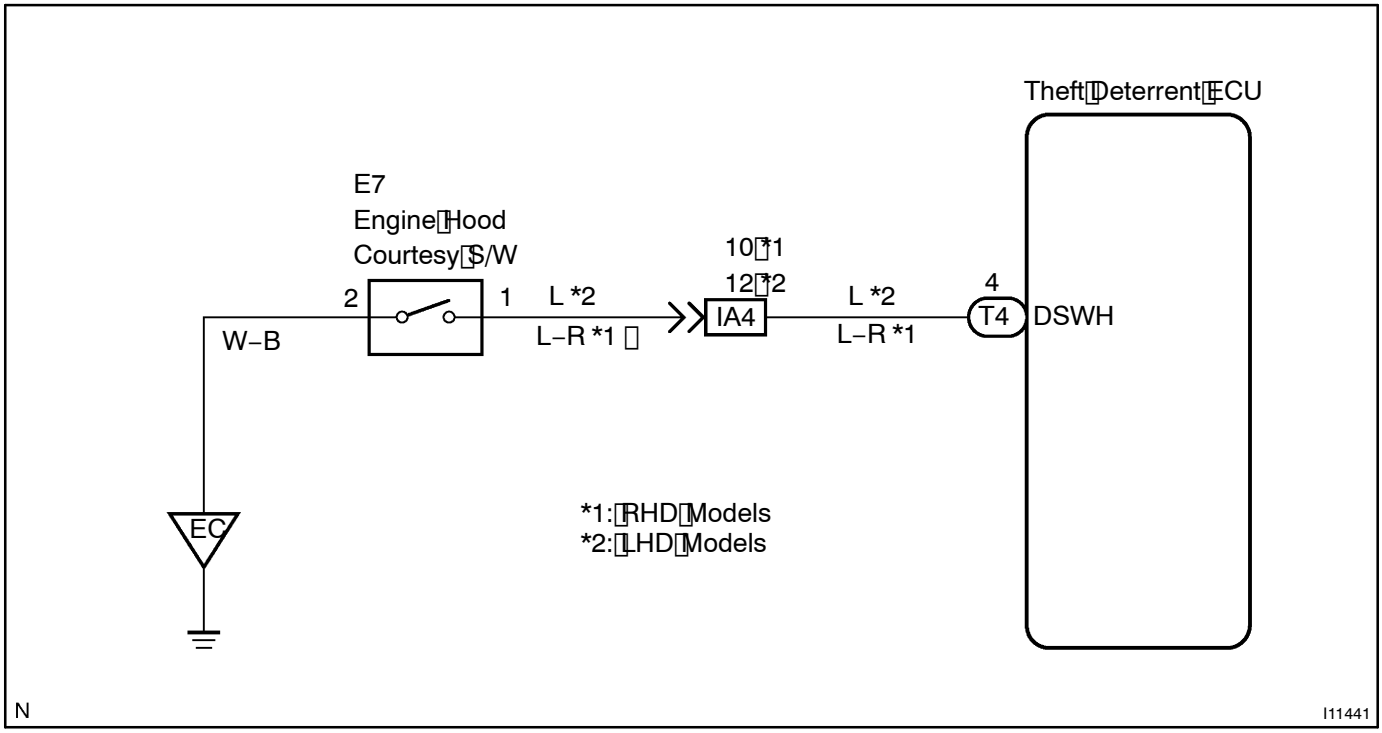
DI61H–05

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The engine hood courtesy switch is built into the engine hood lock assembly and goes ON when the engine hood is opened and goes OFF when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**Check hood courtesy switch using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

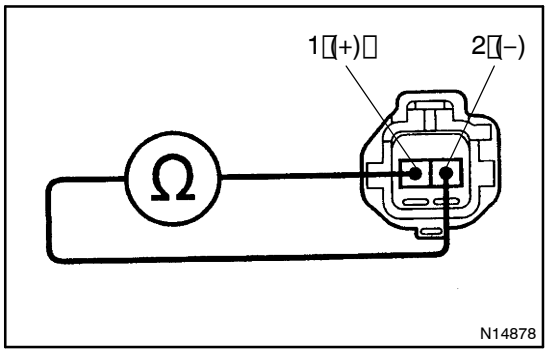
CHECK:

Check the hood courtesy switch using DATA LIST.

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–480).**

NG

2	Check engine hood courtesy switch.



PREPARATION:

(a) Remove engine hood lock assembly.

(b) Disconnect engine hood courtesy switch connector.

CHECK:

Check continuity between terminals 1 and 2 when engine hood lock is locked and unlocked.

OK:

Engine hood lock	Tester connection	Specified condition
LOCK	–	No continuity
UNLOCK	1 – 2	Continuity

NG → Replace engine hood courtesy switch.

OK

3	Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

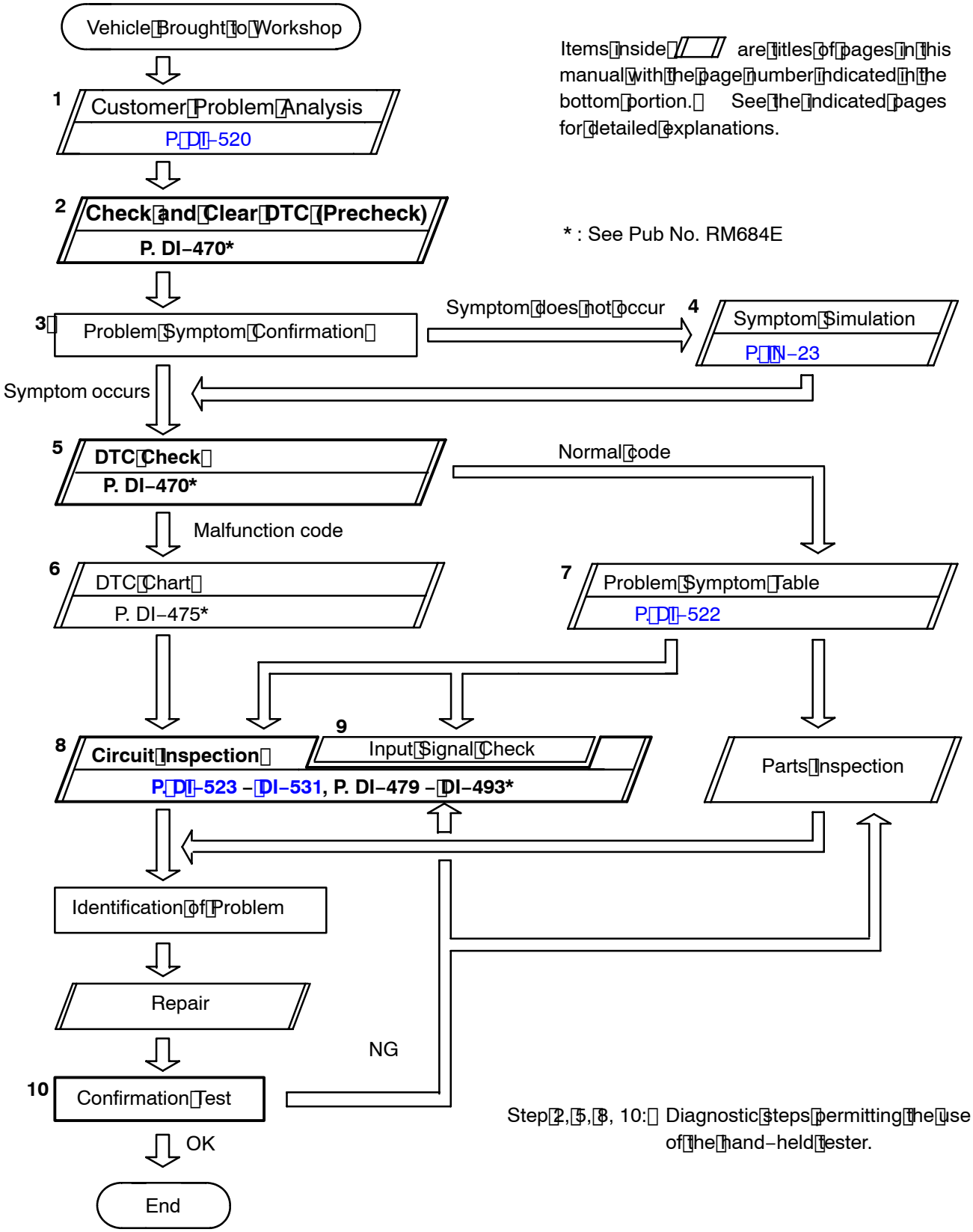
Check and replace theft deterrent ECU (See page IN–34).

CRUISE CONTROL SYSTEM

DI26R–25

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



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.

* : See Pub No. RM684E

Step 2, 5, 8, 10: Diagnostic steps permitting the use of the hand–held tester.

DI26S–16

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	Frequency Problem Occurs?	☐ Continuous ☐ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	**km Mile**

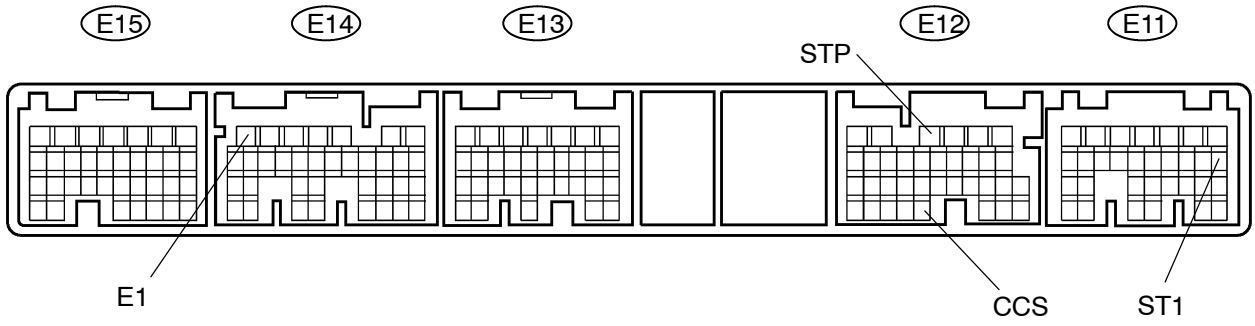
Symptoms	☐ Auto cancel occurs	● Driving condition ☐ City driving ☐ Freeway ☐ Up hill ☐ Down hill ● After cancel occurred, did the driver activate cruise control again? ☐ Yes ☐ No
	☐ Cancel does not occur	☐ With brake ON ☐ Except D position shift ☐ When control SW turns to CANCEL position
	☐ Cruise control malfunction	☐ Slip to acceleration side ☐ Slip to deceleration side ☐ Hunting occurs ☐ O/D cut off does not occur ☐ O/D does not return
	☐ Switch malfunction	☐ SET ☐ ACCEL ☐ COAST ☐ RESUME ☐ CANCEL
	☐ Cruise MAIN indicator light	☐ Remains ON ☐ Does not light up ☐ Blinks

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

DI3MK–08

TERMINALS OF ECU

2JZ–GE:



C

I23299

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP ↔ E1 (E12–4 ↔ E6–7)	G–W ↔ BR	Depress brake pedal	10 – 16 V
		Release brake pedal	Below 1 V
CCS ↔ E1 (E12–31 ↔ E6–7)	L–R ↔ BR	Ignition switch ON	10 – 16 V
		Ignition switch ON CANCEL switch hold ON	6.9 – 9.8 V
		Ignition switch ON SET/COAST switch hold ON	4.7 – 6.9 V
		Ignition switch ON RES/ACC switch hold ON	2.4 – 3.8 V
		Ignition switch ON MAIN switch hold ON	Below 1 V
ST1– ↔ E1 (E11–8 ↔ E6–7)	B–L ↔ BR	Depress brake pedal	Below 1 V
		Release brake pedal	10 – 14 V

DI26X–25

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Input Signal Circuit 2. Vehicle Speed Sensor Circuit 3. Stop Light Switch Circuit 4. Neutral Start Switch Circuit 5. Engine and ECT ECU	DI–485* DI–479* DI–523 DI–195* IN–34
SET not occurring or CANCEL occurring. (DTC is not output)	1. Engine and ECT ECU	IN–34
Actual vehicle speed deviates above or below the set speed.	1. Input Signal Circuit 2. Engine and ECT ECU	DI–485* IN–34
Gear shifting occurs frequently between 3rd and O/D when driving on uphill road. (Hurting)	1. Engine and ECT ECU	IN–34
Cruise control not cancelled, even when brake pedal is depressed.	1. Stop Light Switch Circuit 2. Engine and ECT ECU	DI–523 IN–34
Cruise control not cancelled, even when transmission is shifted to ”N” position.	1. Neutral Start Switch Circuit 2. Engine and ECT ECU	DI–195* IN–34
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	1. Cruise Control Switch Circuit 2. Engine and ECT ECU	DI–531 IN–34
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Input Signal Circuit 2. Engine and ECT ECU	DI–485* IN–34
Poor response is ACCEL and RESUME modes.	1. Engine and ECT ECU	IN–34
O/D does not resume, even though the road is not uphill.	1. Engine and ECT ECU	IN–34
DTC memory is erased.	1. Engine and ECT ECU	IN–34
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. Engine and ECT ECU	– IN–34
Cruise MAIN indicator light remains ON or falls to light up.	1. Input Signal Circuit 2. Engine and ECT ECU	DI–485* IN–34

* : See Pub No. RM684E

DI623–02

CIRCUIT INSPECTION

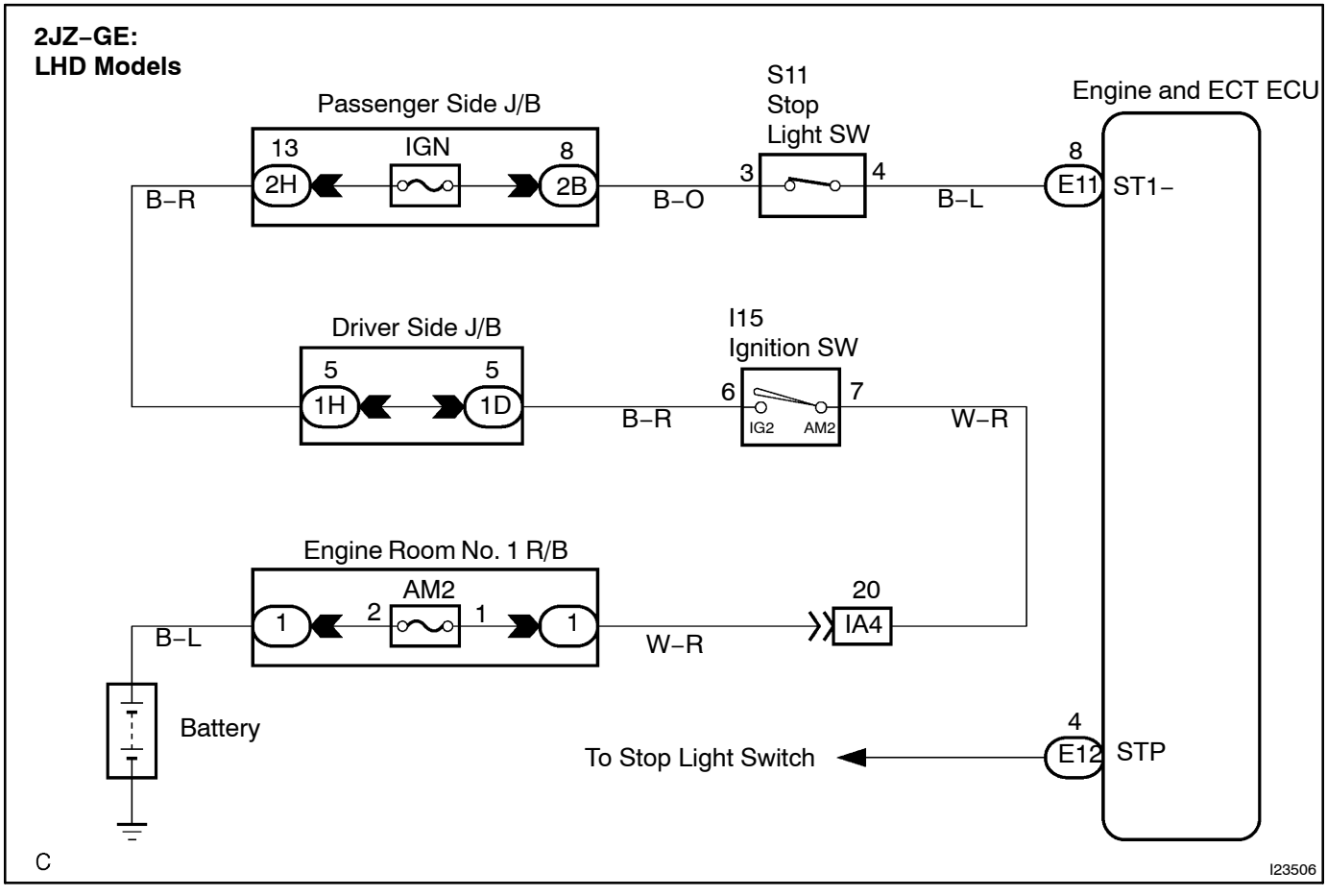
DTC	P1520/52	Stop light switch circuit

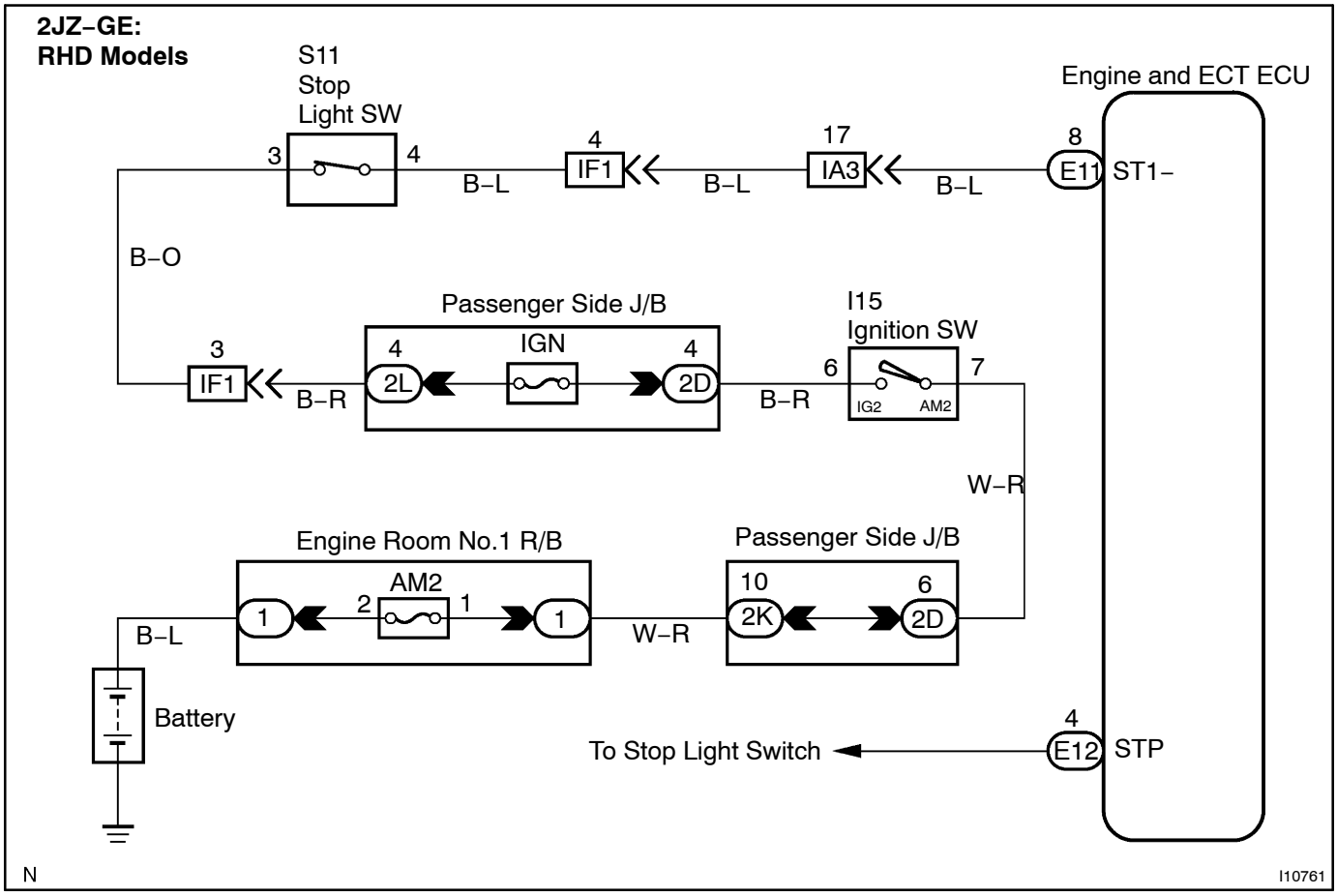
CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the Engine and ECT ECU. When the Engine and ECT ECU receives this signal, it cancels the cruise control.
A fail–safe function is provided so that the cancel functions normally, even if there is a malfunction in the stop light signal circuit.
The cancel condition is that battery voltage is supplied to terminal STP.
When the brake is on, battery voltage is normally applied through the STOP fuse and stop light switch to terminal STP of the Engine and ECT ECU, and the Engine and ECT ECU turns the cruise control OFF.
If the harness connected to terminal STP has an open circuit, terminal STP will have battery voltage and the cruise control will be turned OFF.

DTC No.	Detection Item	Trouble Area
52	Stop light switch circuit.	• Stop light switch • Harness or connector between Engine and ECT ECU and stop light switch circuit • Engine and ECT ECU

WIRING DIAGRAM




2JZ–GE:
RHD Models
S11
Stop
Light SW
Engine and ECT ECU
3
4
B–L
4
IF1
B–L
17
IA3
B–L
8
E11
ST1–
B–O
Passenger Side J/B
I15
Ignition SW
3
IF1
B–R
4
2L
IGN
4
2D
B–R
6
7
IG2
AM2
W–R
Engine Room No.1 R/B
Passenger Side J/B
AM2
2
1
1
10
2K
6
2D
B–L
W–R
Battery
4
To Stop Light Switch
E12
STP
N
I10761

INSPECTION PROCEDURE

HINT:

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

1	**Check stop light switch using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check the stop light switch using DATALIST.

OK:

Condition	Stop light switch 1 (Sub CPU)	Stop light switch 2 (Sub CPU)	Stop light switch 2 (Main CPU)
Depressed	ON	ON	ON
Released	OFF	OFF	OFF

HINT:

- Stop light SW 1 has a function to disconnect the connection (OFF) when depressing the pedal, however, Engine and ECT ECU controls by the logic rivers, so with the hand–held tester, it displays ON.
- Stop light SW 1 indicates the input of ST1– terminal and Stop light SW 2 indicates the input of STP terminal.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–522).**

NG

2	**Check operation of stop light.**

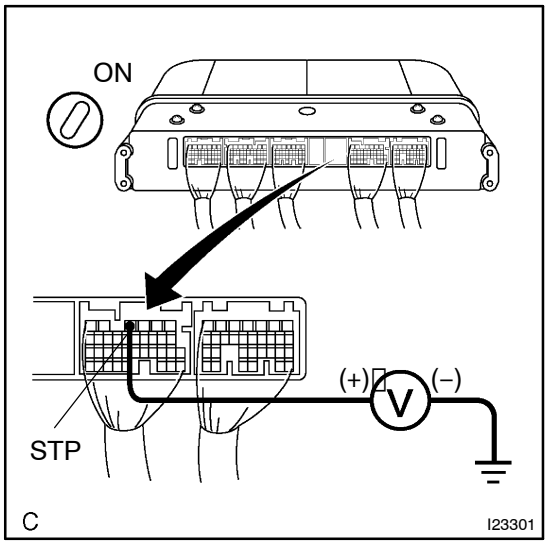
CHECK:

Check that stop light comes on when brake pedal is depressed, and turns off when brake pedal is released.

NG → **Check stop light system (See page BE–25).**

OK

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



PREPARATION:

(a) Remove the Engine and ECT ECU with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP of Engine and ECT ECU connector and body ground, when the brake pedal is depressed and released.

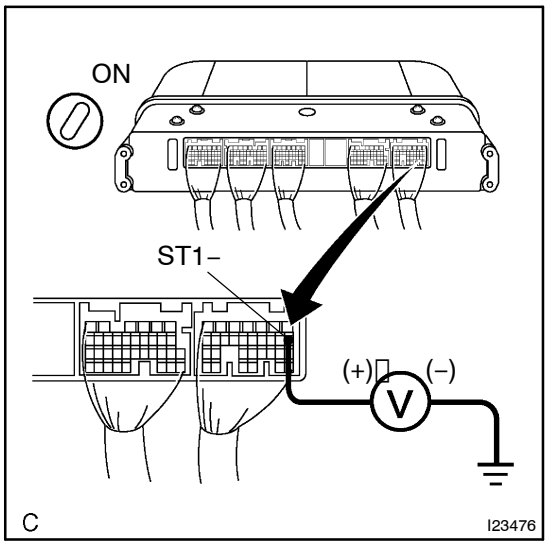
OK:

Depressed	10 – 14 V
Released	Below 1 V

OK: **Proceed to next circuit inspection shown in problem symptom table (See page DI–522).**

NG

4	**Check voltage between terminal ST1– of Engine and ECT ECU connector and body ground.**



PREPARATION:

(a) Remove the Engine and ECT ECU with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal ST1– of Engine and ECT ECU connector and body ground, when the brake pedal is depressed and released.

OK:

Depressed	Below 1 V
Released	10 – 14 V

OK: **Proceed to next circuit inspection shown in problem symptoms table (See page DI–522).**

NG

5	Check wire harness and connector between terminal STP of Engine and ECT ECU and stop light switch, and terminal ST1– of Engine and ECT ECU and stop light switch (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace Engine and ECT ECU (See page IN–34).

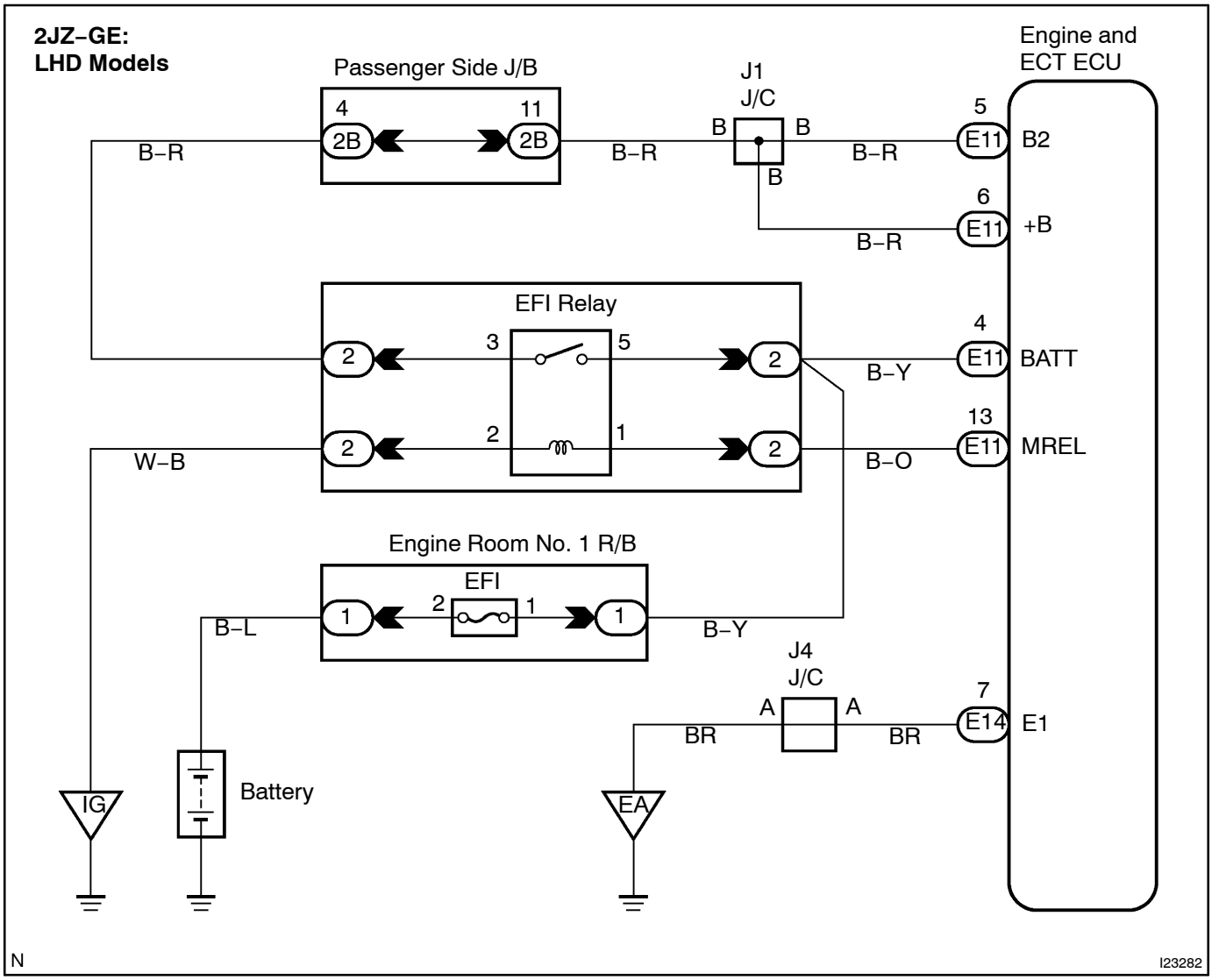
DI624–02

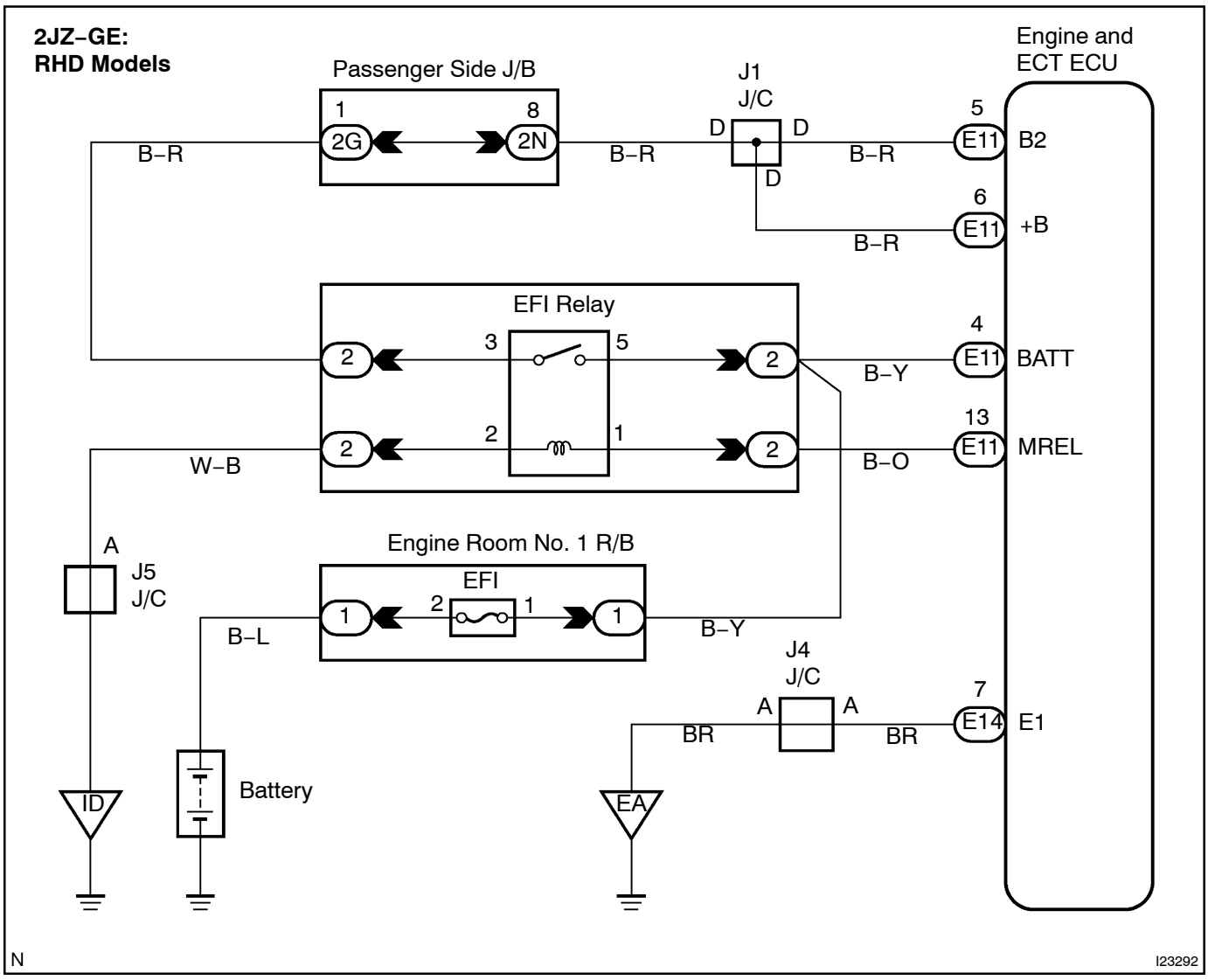
Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the Engine and ECT ECU.

WIRING DIAGRAM




2JZ–GE:
RHD Models
Engine and
ECT ECU
Passenger Side J/B
J1
J/C
1
8
2G
2N
B–R
B–R
D
D
D
B–R
5
E11
B2
6
E11
+B
B–R
EFI Relay
3
5
2
2
4
E11
BATT
B–Y
2
1
2
2
13
E11
MREL
W–B
B–O
A
J5
J/C
Engine Room No. 1 R/B
EFI
2
1
1
1
B–L
B–Y
J4
J/C
A
A
7
E14
E1
BR
BR
Battery
ID
EA
N
I23292

INSPECTION PROCEDURE

1	**Check IGN and EFI fuse.**

CHECK:
Check continuity of IGN and EFI fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK

2	**Check voltage between terminals IGSW, BATT and GND of Engine and ECT ECU connector (See page IN–34).**

PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the Engine and ECT ECU connector.
CHECK:
Measure voltage between terminals IGSW, BATT and GND
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–522).**

NG

3	**Check wire harness and connector between Engine and ECT ECU and body ground (See page IN–34).**

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

OK

Check and repair wire harness and connector between Engine and ECT ECU and battery (See page IN–34).

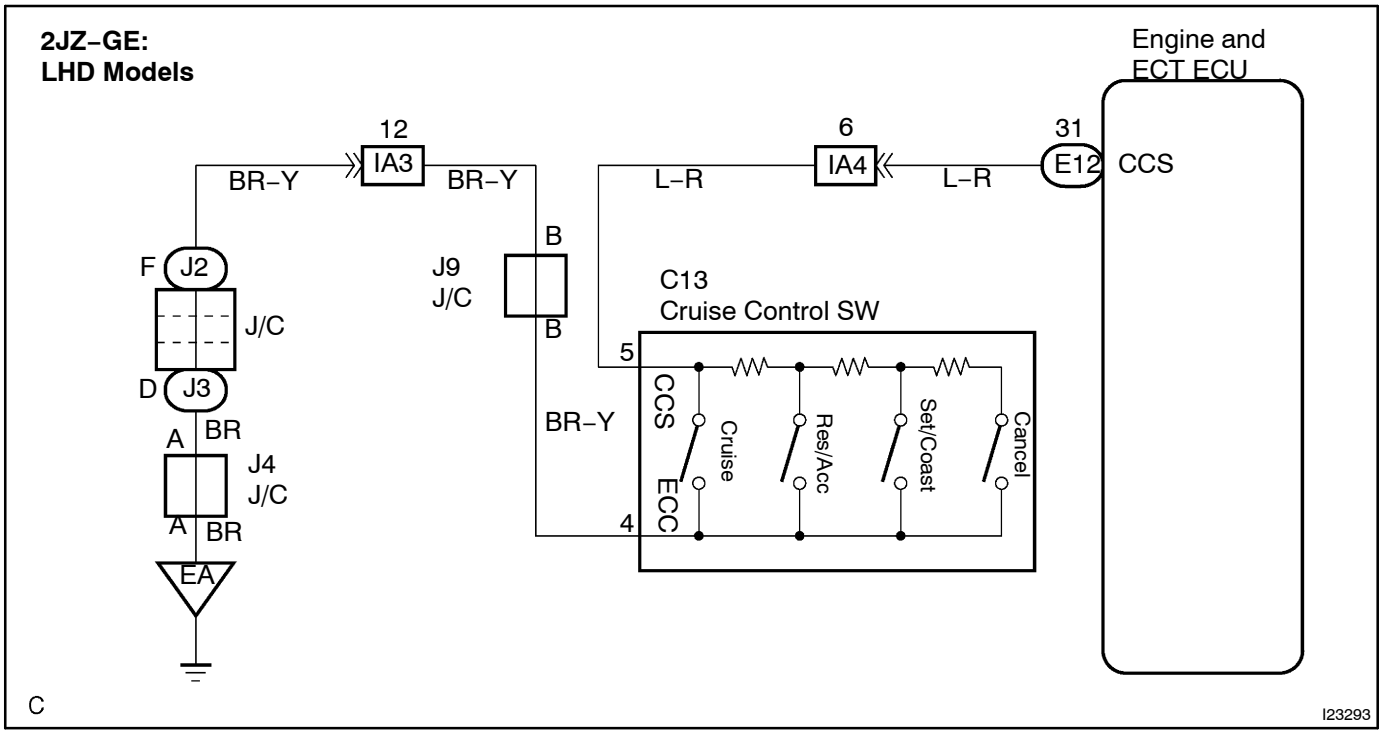
DI625–02

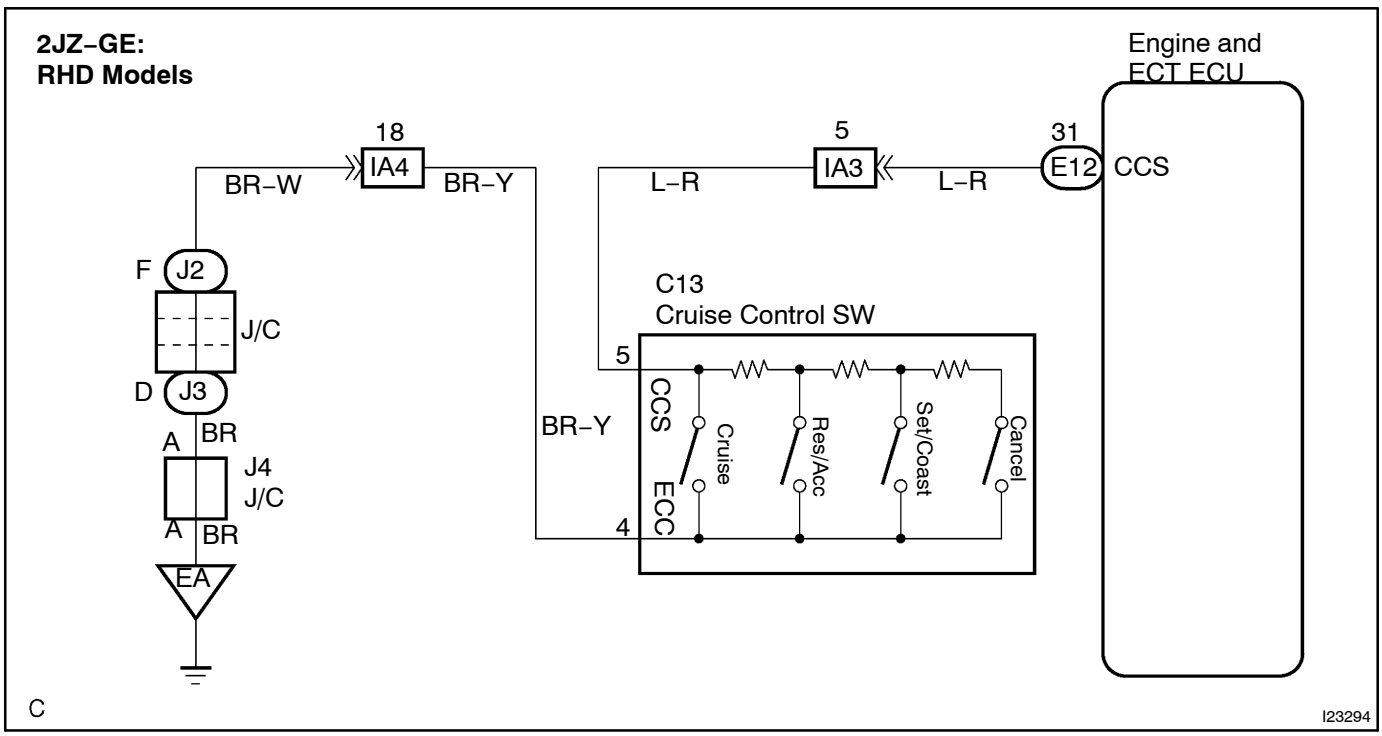
Cruise Control Switch Circuit

CIRCUIT DESCRIPTION

This circuit carries the SET/COAST, RESUME/ACCEL and CANCEL signal (each voltage) to the ECU.

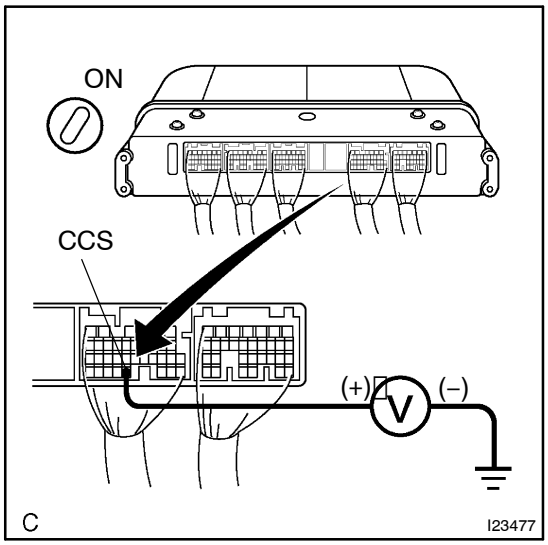
WIRING DIAGRAM





INSPECTION PROCEDURE

1	**Check voltage between terminals CCS of Engine & ECT ECU connector and body ground.**



PREPARATION:

(a) Remove the Engine & ECT ECU with connector still connected.

(b) Turn ignition switch ON.

CHECK:

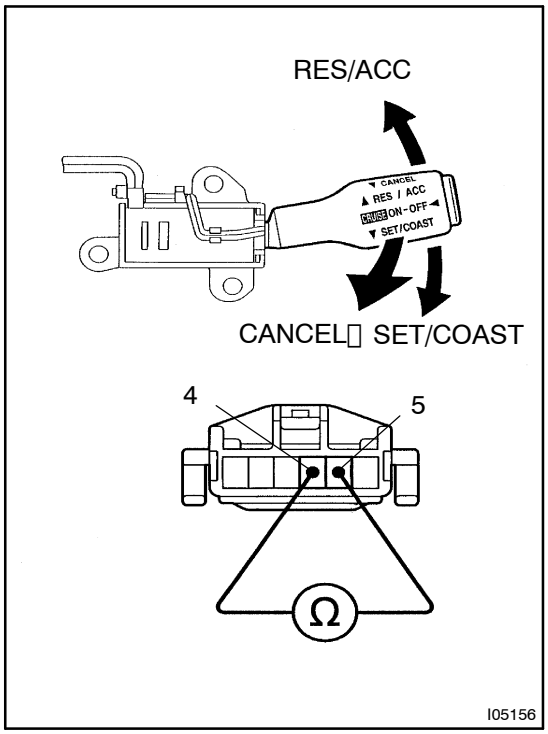
Measure voltage between terminals CCS of Engine & ECT ECU connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

Switch position	Resistance (V)
Neutral	10 – 16 V
RES/ACC	2.4 – 3.8 V
SET/COAST	4.7 – 6.9 V
CANCEL	6.9 – 9.8 V

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–522).**

OK

2	Check control switch continuity.



PREPARATION:

(a) Remove steering wheel center pad.

(b) Disconnect the control switch connector.

CHECK:

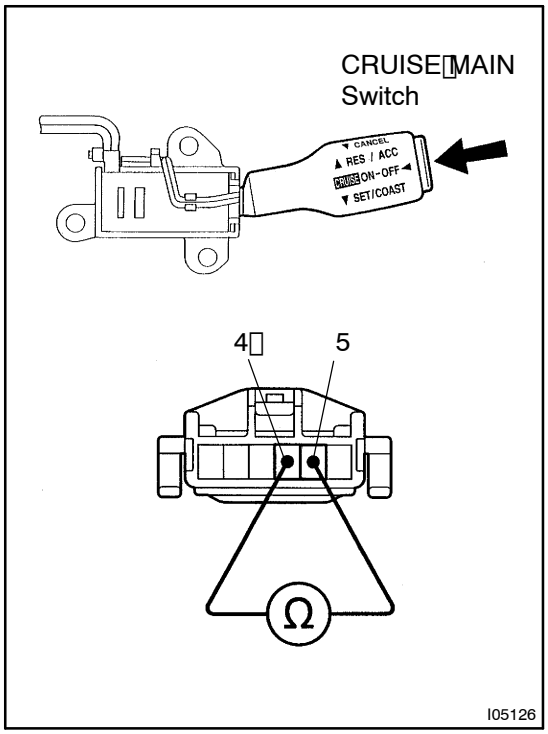
Measure resistance between terminals 4 and 5 of control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
RES/ACC	220 – 260
SET/COAST	600 – 660
CANCEL	1,500 – 1,600

NG → **Replace control switch.**

OK

3	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad. (See Pub No. RM684E on page SR–12)

(b) Disconnect the control switch connector.

CHECK:

Check continuity between terminals 4 and 5 of control switch connector when main switch is held ON and OFF.

OK:

Switch position	Tester connection	Specified condition
OFF	–	No continuity
Hold ON	4 – 5	Continuity

NG → **Replace control switch.**

OK

4	Check harness and connector between Engine & ECT ECU and cruise control switch, cruise control switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

5	Check cruise control indicator light (See combination meter).

NG → Replace combination meter.

OK

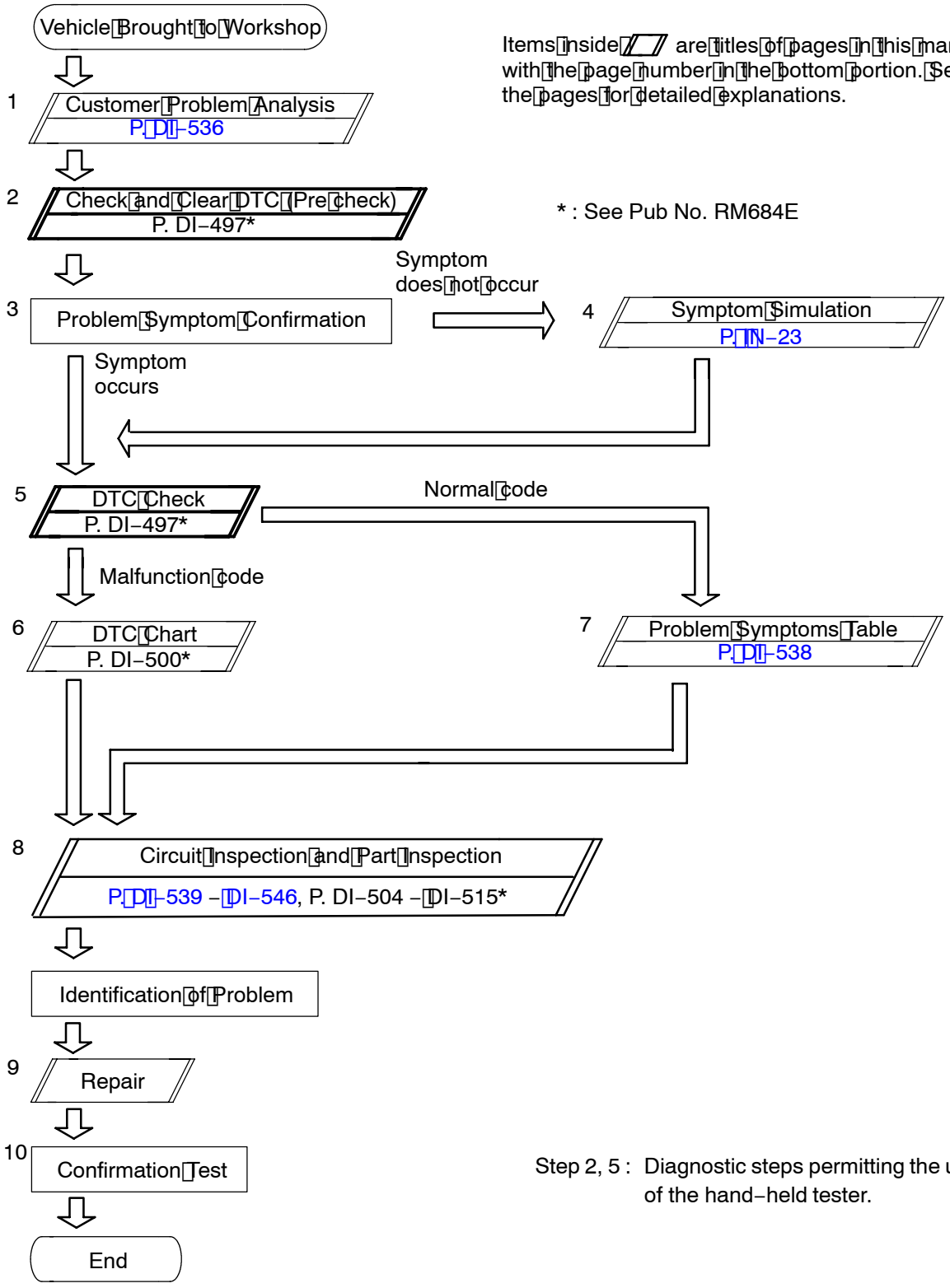
Check and replace Engine and ECT ECU (See page IN–34).

ENGINE IMMOBILISER SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI1AJ–31

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.

* : See Pub No. RM684E

Step 2, 5 : Diagnostic steps permitting the use of the hand–held tester.

DI1AK–16

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER 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.

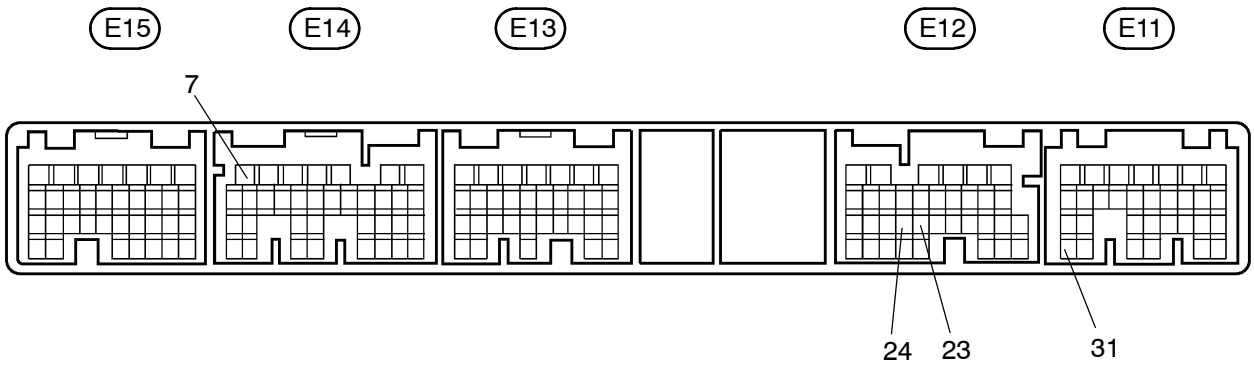
Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

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

DI3ML–06

TERMINALS OF ECU

2JZ–GE:



C

I23299

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CODE – E1 (E11 – 31 ↔ E14 – 17)	LHD: G–B ↔ BR RHD: G ↔ BR	Ignition Switch ON	10 – 14
TXCT – E1 (E12 – 23 ↔ E14 – 17)	LHD: P–B ↔ BR RHD: P ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E12 – 24 ↔ E14 – 17)	V ↔ BR	Ignition Switch ON	10 – 14

DI1AP–28

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. Engine and ECT ECU	IN–34
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. Engine and ECT ECU	*1 IN–34 BE–201*3 IN–34
Security indicator is always ON.	1. Security indicator 2. Wire harness 3. Engine and ECT ECU	*2 IN–34 IN–34
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2 Transponder key coil 3. Amplifier 4. Engine and ECT ECU	IN–34 BE–201*3 IN–34
Security indicator is OFF. (When DTC of immobiliser is output)	1. Wire harness 2 Transponder key coil 3. Amplifier 4. Engine and ECT ECU	IN–34 BE–201*3 IN–34
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Wire harness 2. Engine and ECT ECU	IN–34 IN–34
Security indicator is abnormally blinking.	1. Wire harness 2. Engine and ECT ECU	IN–34 IN–34

*1 : 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.

*2 : Finish the automatic registration mode because the mode might still remain.

*3 : See Pub No. RM684E.

DI628–02

CIRCUIT INSPECTION

DTC	B2796/99	No Communication in Immobiliser system

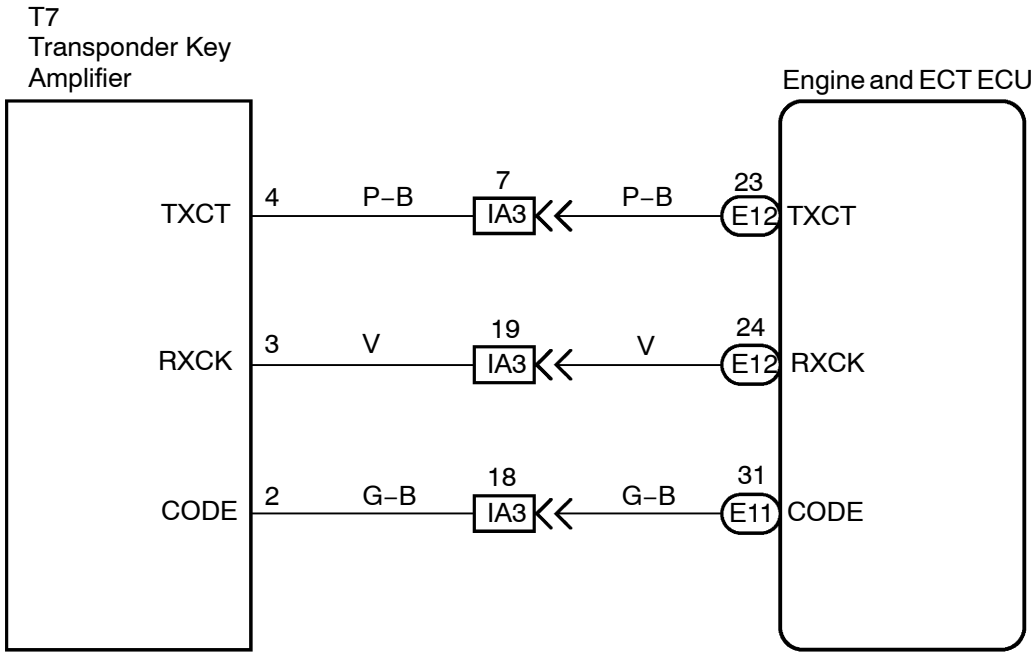
CIRCUIT DESCRIPTION

This code is stored in memory when inserting the key that does not have a transponder chip or if communication between the key and Engine and ECT ECU is impossible.

DTC No.	DTC Detecting Condition	Trouble Area
B2796/99	No communication	• Key • Transponder Key Coil • Transponder Key Amplifier • Wire harness • Engine and ECT ECU

WIRING DIAGRAM

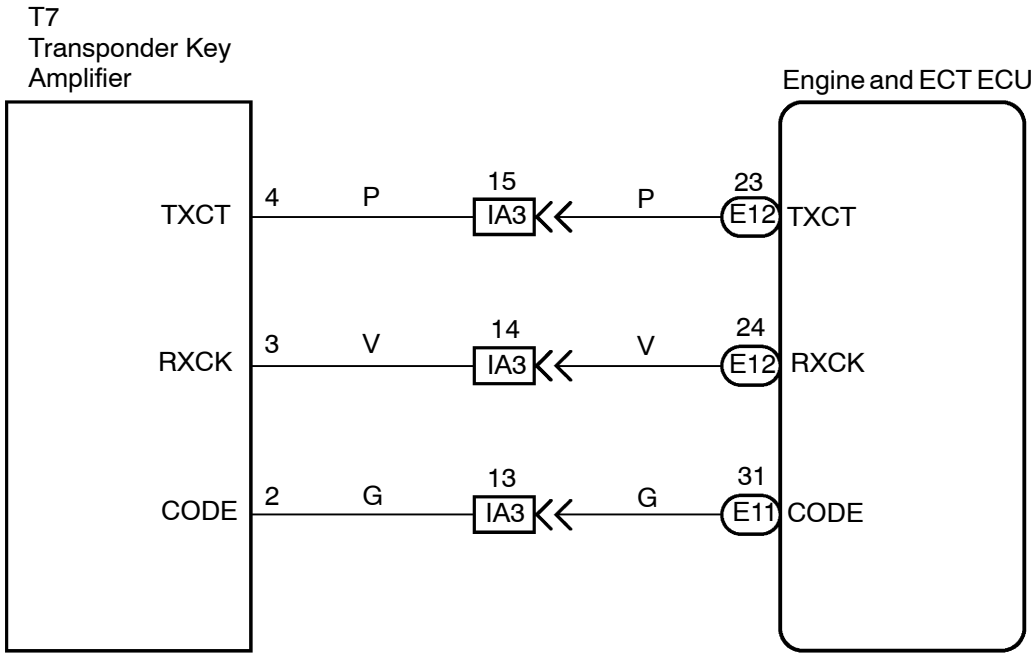
2JZ–GE:
LHD Models



N

I10750

2JZ–GE:
RHD Models



N

INSPECTION PROCEDURE

1	**Delete DTC and insert all the presently available keys to check whether the engine starts or not.**

RESULT:

A	All keys start the engine.
B	A specific key does not start the engine. In this case, DTC (B 2796) is stored in memory.
C	All keys do not start the engine. In this case, DTC (B 2796) 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 → **The transponder chip of a specific key is defective. Replace the key.**

C

2	**Check transponder key coil (See Pub No. RM684E on page BE–201).**

NG → **Replace transponder key coil.**

OK

3	**Check harness and connector between transponder key amplifier and Engine and ECT ECU.**

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

OK

4	**Does it operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Replace Engine and ECT ECU.

DI629–02

DTC	B2797/99	Communication Malfunction No.1

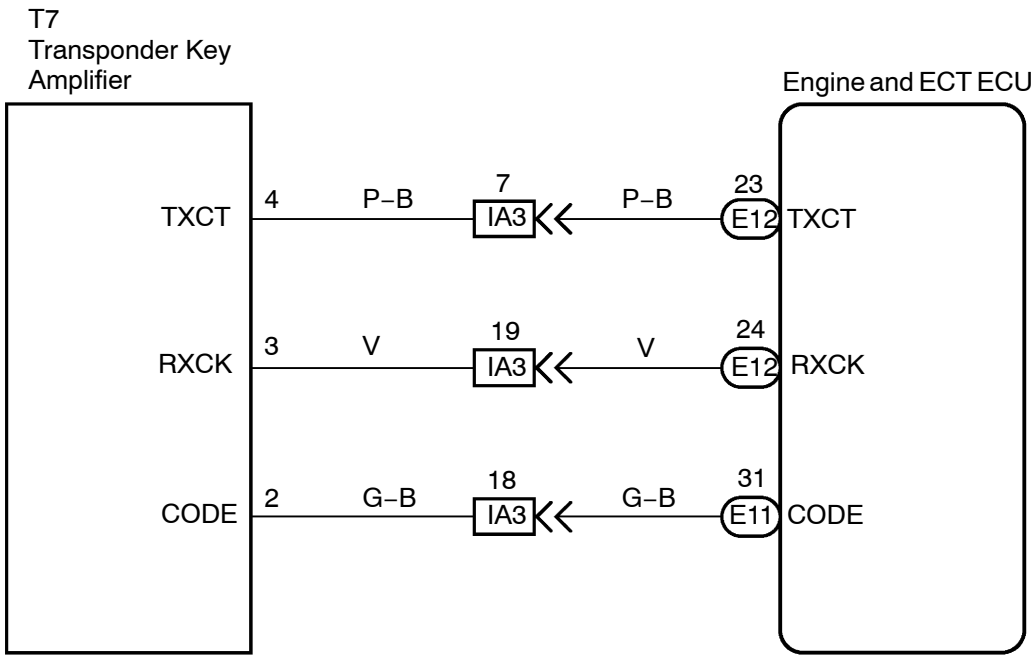
CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is included in communication line.)

DTC No.	DTC Detecting Condition	Trouble Area
B2797/99	Communication error	• Wire Harness • Transponder Key Amplifier • Engine and ECT ECU

WIRING DIAGRAM

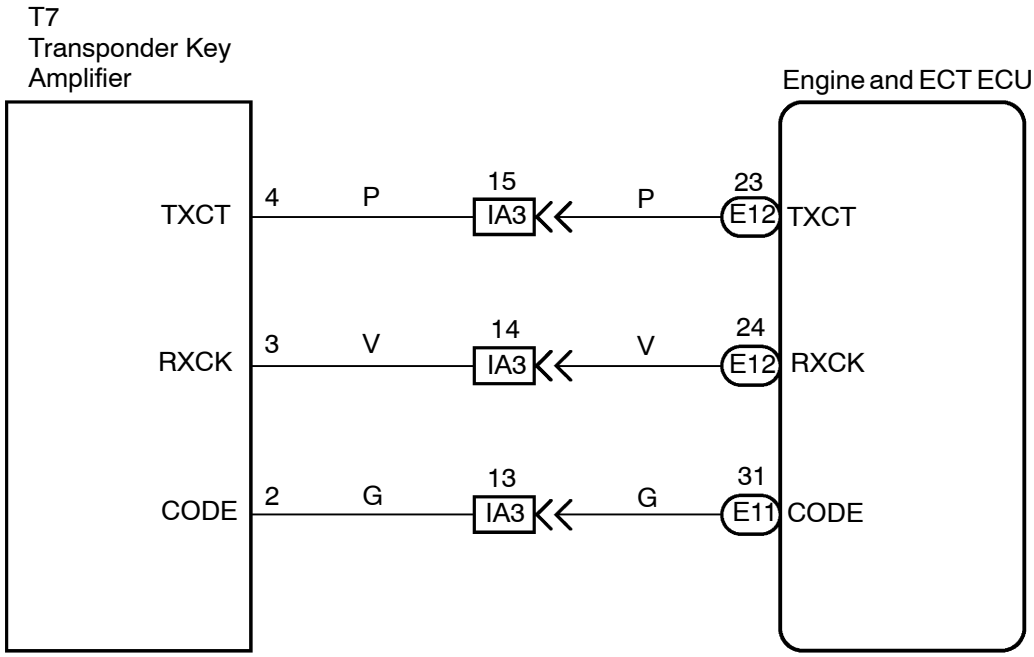
2JZ–GE:
LHD Models



N

I10750

2JZ–GE:
RHD Models

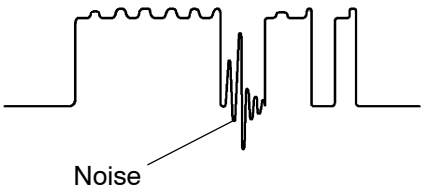


N

I10759

INSPECTION PROCEDURE

1	**Noise check**



PREPARATION:
Insert the already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or hand–held tester, check that noise is included in the signals sent to the CODE terminal of Engine and ECT ECU.
OK:
No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK

2	**Does the system operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Replace Engine and ECT ECU.

DI62A–03

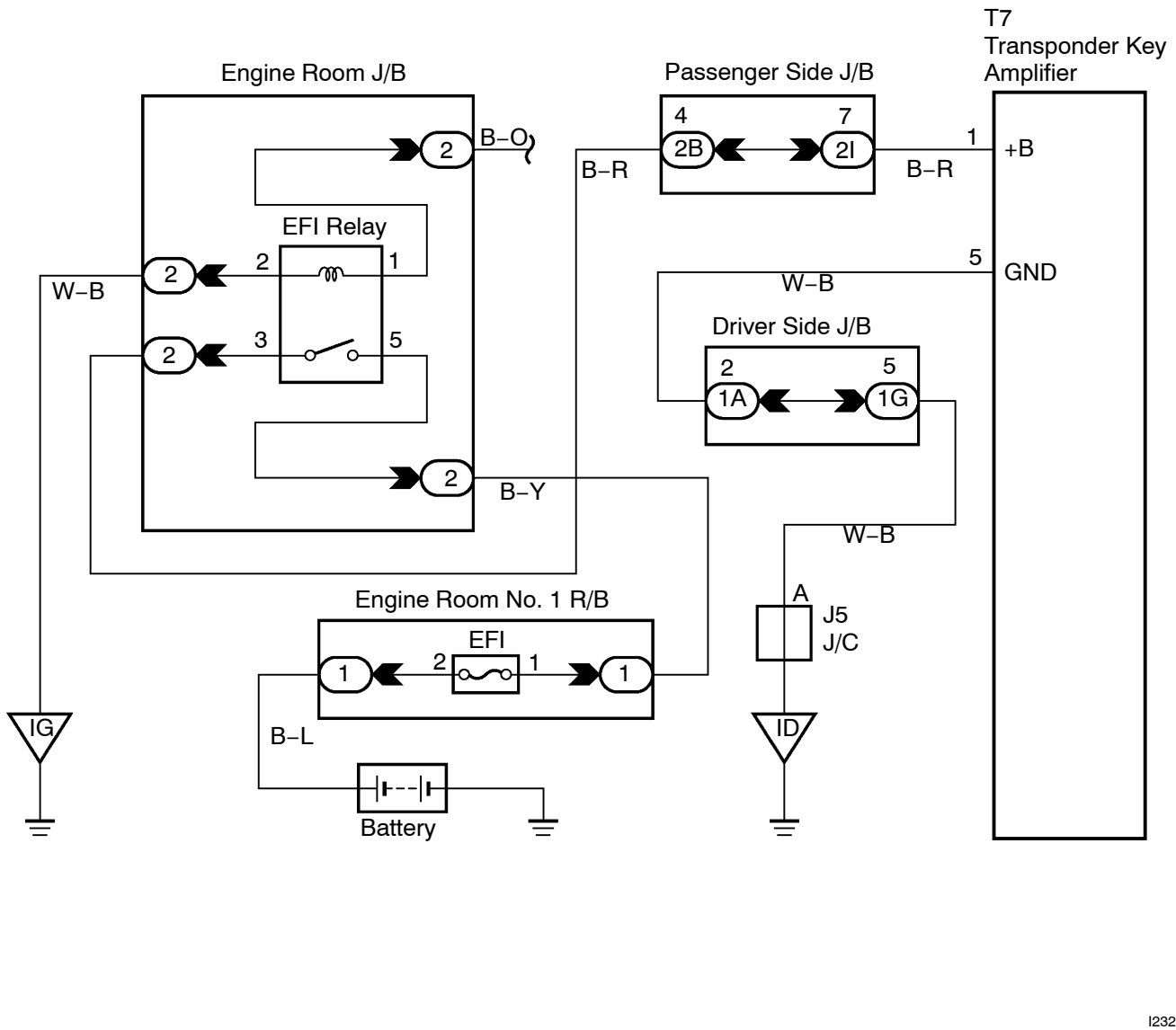
Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the Transponder Key ECU

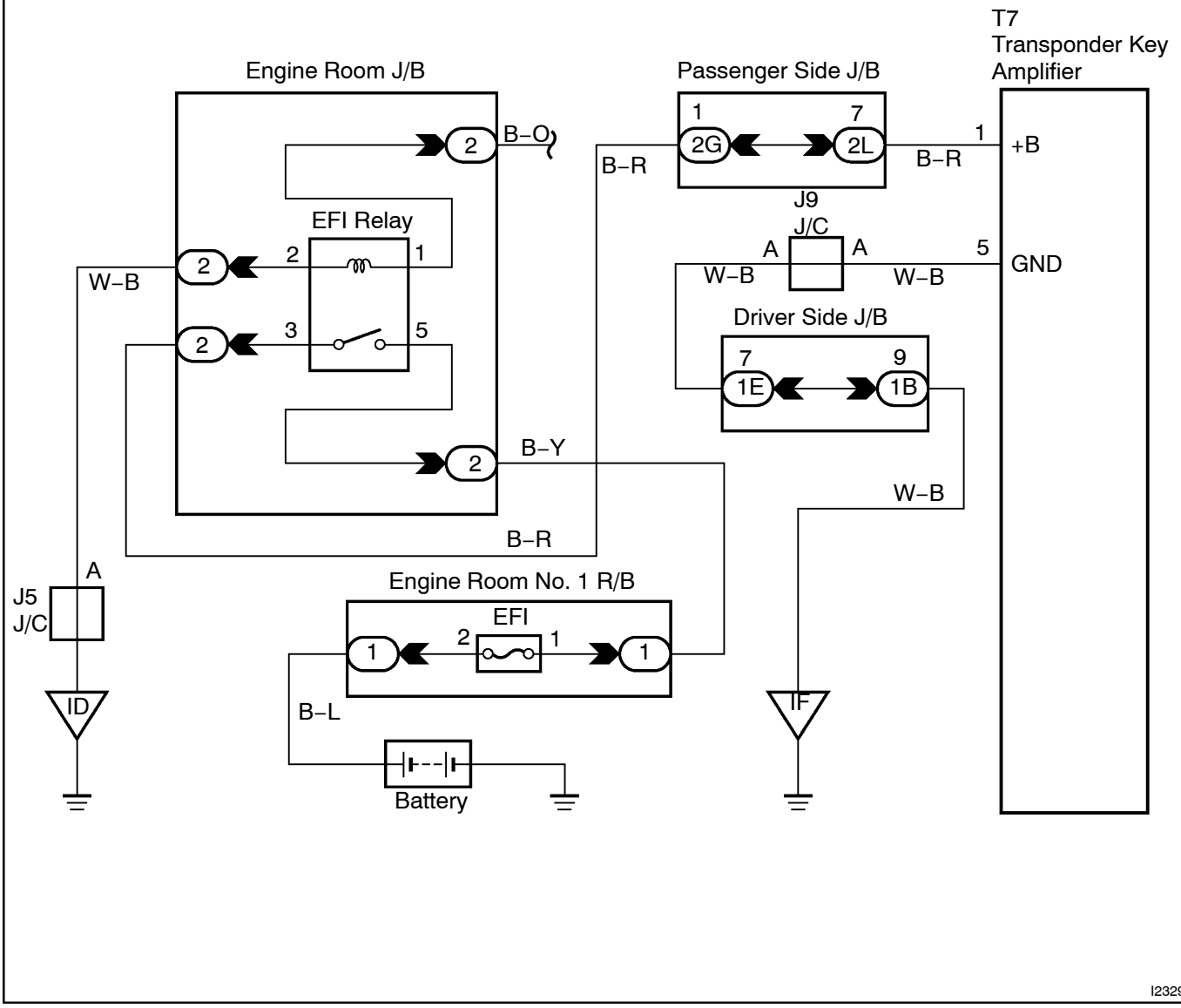
WIRING DIAGRAM

2JZ–GE:
LHD Models



I23295

2JZ–GE:
RHD Models



INSPECTION PROCEDURE

1	**Check EFI fuse.**

CHECK:
Check continuity of EFI fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK ↓

2	**Check voltage between terminals EFI and GND of Transponder Key ECU connector.**

PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the Transponder Key ECU connector.
CHECK:
Measure voltage between terminals +B and GND.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–538).**

NG ↓

3	**Check wire harness and connector between Transponder Key ECU and body ground.**

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

OK ↓

Check and repair wire harness and connector between Transponder Key ECU and Battery.

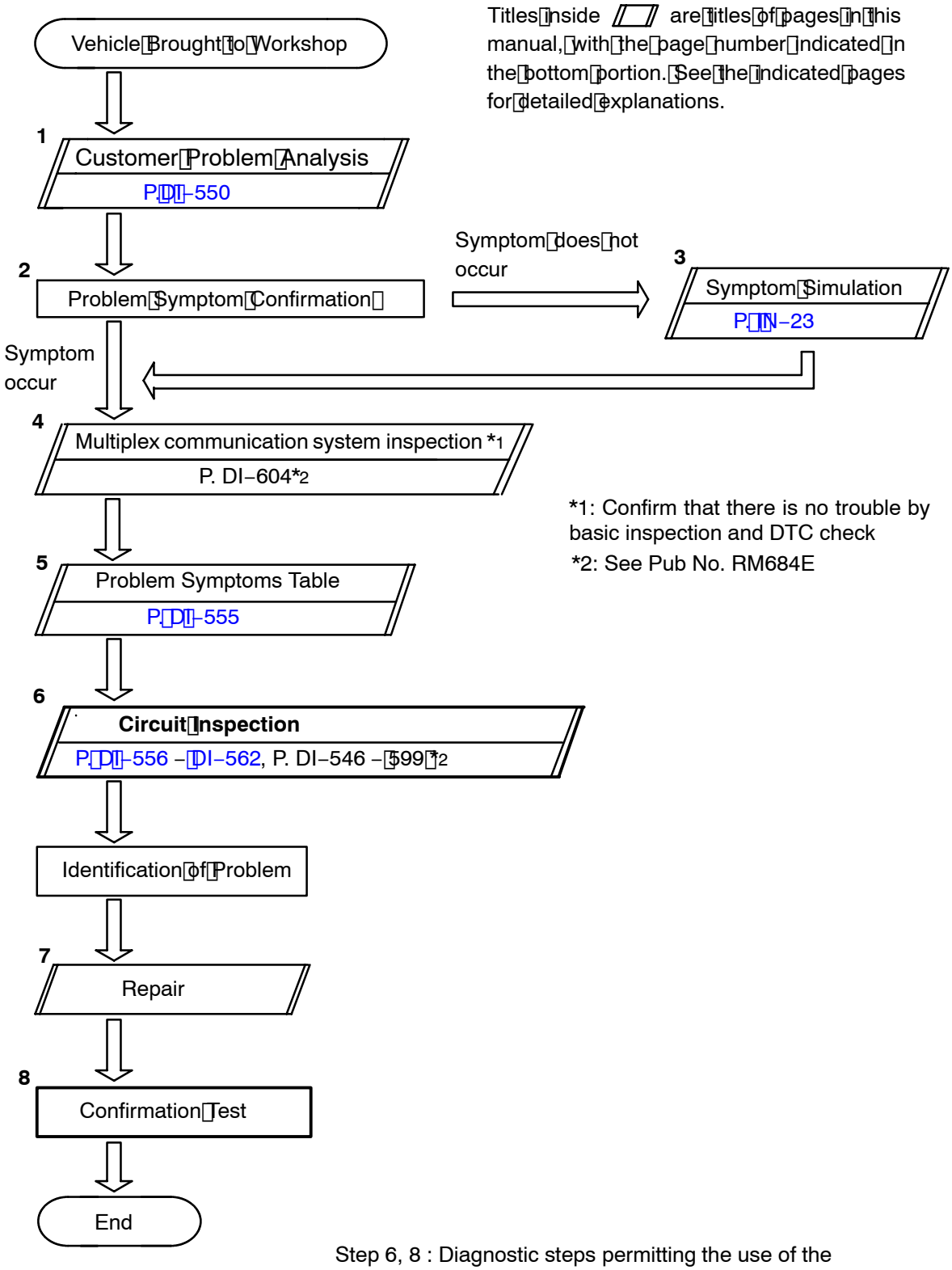
BODY CONTROL SYSTEM

DI62C–09

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no troubles in the multiplex communication system before performing the trouble shooting.



Step 6, 8 : Diagnostic steps permitting the use of the hand–held tester .

DI62D–01

CUSTOMER PROBLEM ANALYSIS CHECK

BODY CONTROL SYSTEM Check Sheet

Inspector's name: _____

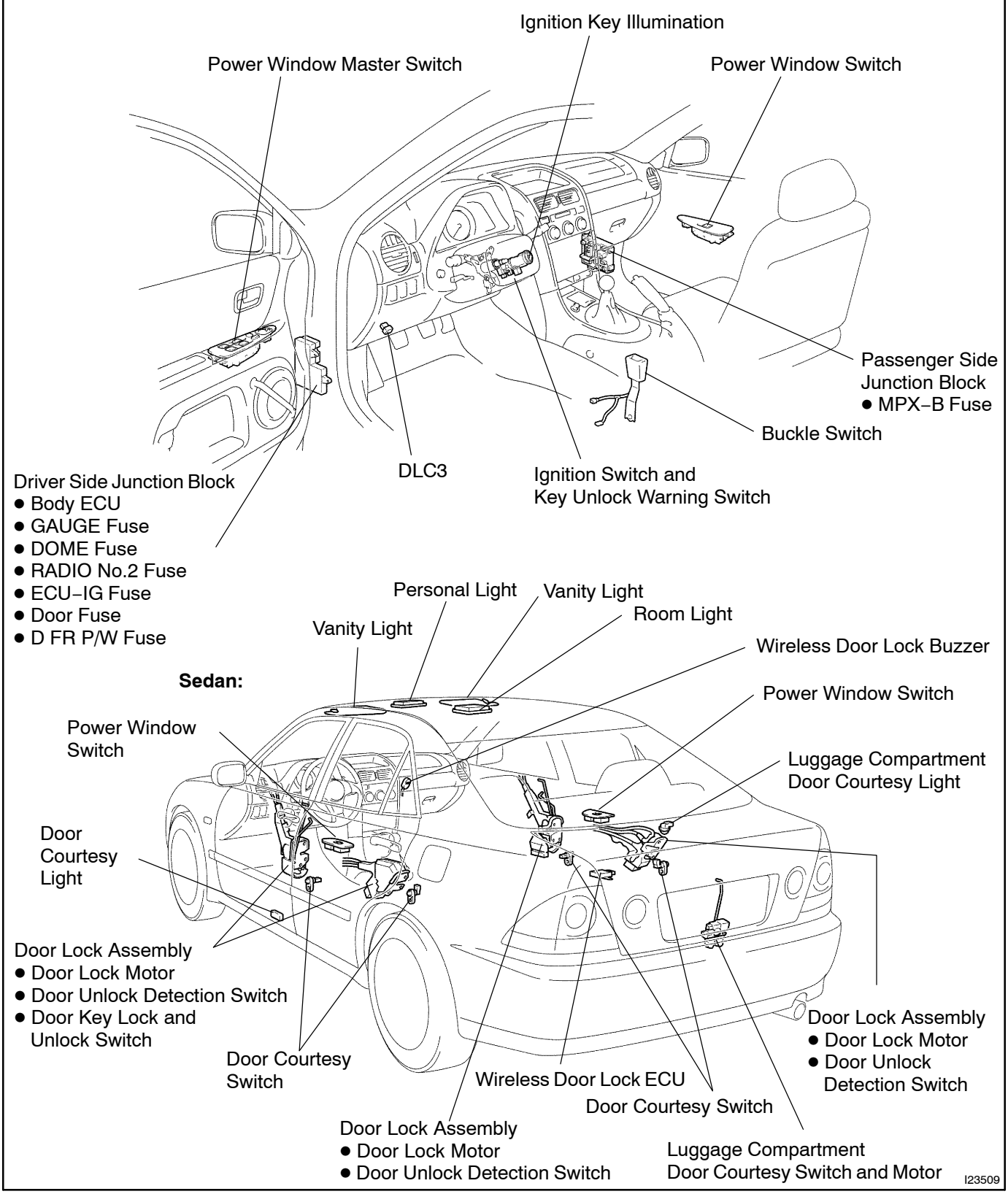
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/ Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

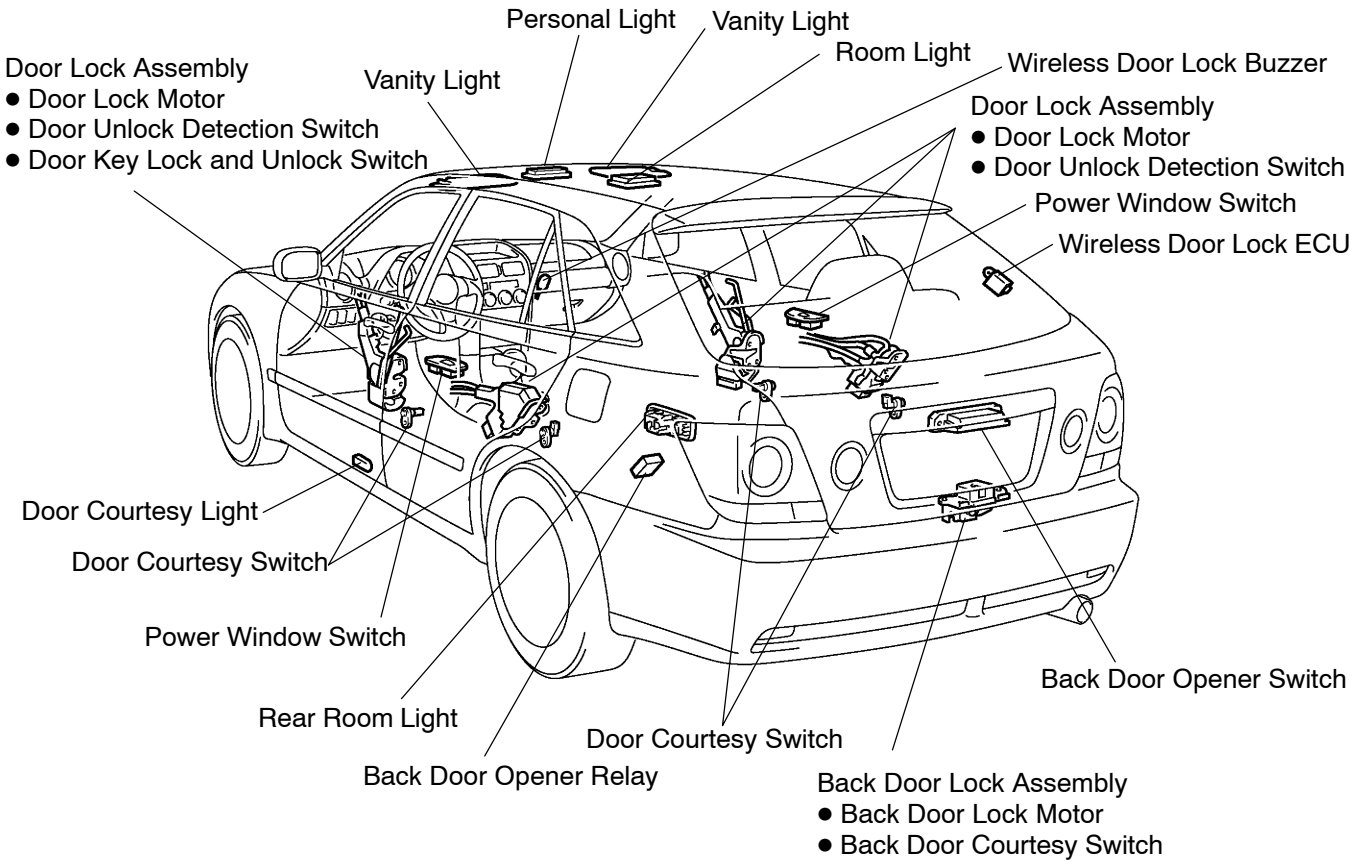
Malfunction System	☐ Key Reminder System
	☐ Light Control System
	☐ Illuminated Entry System
	☐ Seat Belt Warning
	☐ Power Window Control System
	☐ Power Door Lock Control System
	☐ Wireless Door Lock Control System
	☐ Others

DI9I2–01

PARTS LOCATION



Wagon:

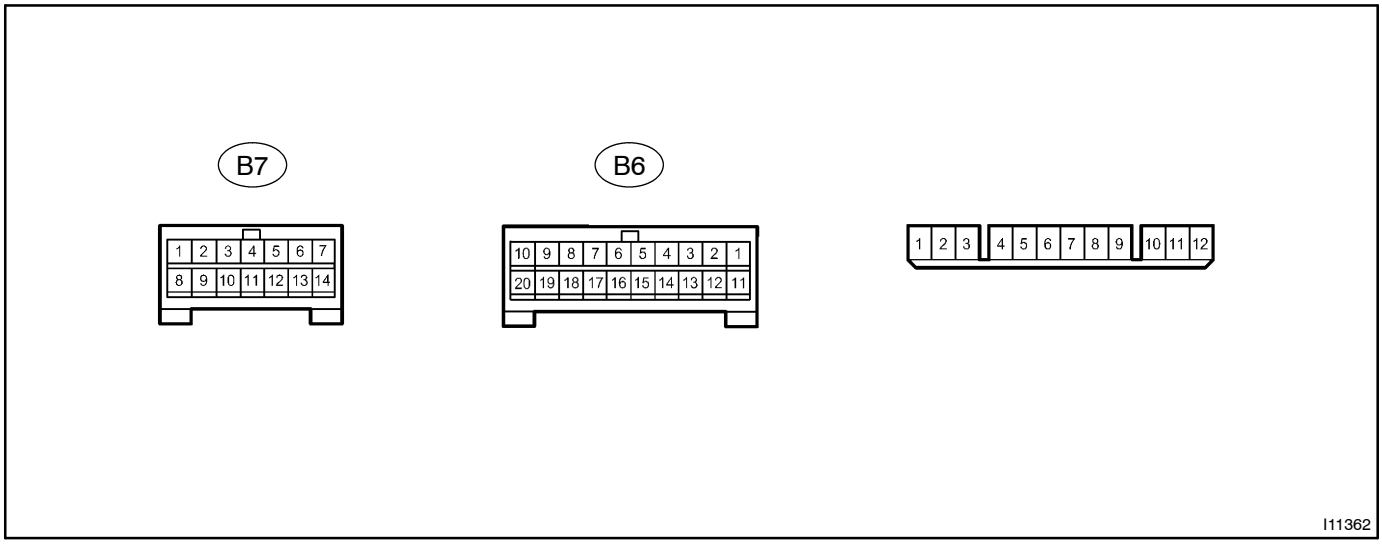


C

I23253

DI62F–03

TERMINALS OF ECU



Symbols (Terminal No.)	Wring Color	Condition	STD Voltage (V)
BSUB – GND (1 – 12)	–	Constant	10 – 14 V
BECU – GND (2 – 12)	–	Constant	10 – 14 V
IG – GND (3 – 12)	–	Ignition switch position is LOCK or ACC.	Below 1 V
		Ignition switch position is ON.	10 – 14 V
ACC – GND (4 – 12)	–	Ignition switch position is LOCK.	Below 1 V
		Ignition switch position is ACC.	10 – 14 V
DEF – GND (5 – 12)	–	Defogger switch position is ON.	Below 1 V
MPX3 (6)	–	Multiplex communication circuit.	–
MPX1 – MPX2 (7 – B6–5)	L	Multiplex communication circuit.	–
ILE – GND (8 – 12)	–	Each interior light switch ON.	Below 1 V
ACT+ – ACT– (9 – 10)	–	Door lock operating.	10 – 14 V
BCTY – GND (11 – 12)	–	Driver door opened.	Below 1 V
		Driver door closed.	10 – 14 V
GND1 – Body ground (12 – Body ground)	–	Constant	Below 1 V
TAIL – GND2 (B6–2 – B6–19)	G – W–B	Light control switch position is TAIL or HEAD.	Below 1 V
		Light control switch position is OFF.	10 – 14 V
RRU – GND2 (B6–3 – B6–19)	R–Y – W–B	Rear Right side power window UP operation.	Below 1 V
RRD – GND2 (B6–4 – B6–19)	G–Y – W–B	Rear Right side power window DOWN operation.	Below 1 V
KSW – GND2 (B6–6 – B6–19)	B–Y – W–B	Key is inserted.	Below 1 V
		Key is not inserted.	10 – 14 V
DCLP – GND2 (B6–7 – B6–19)	R–W – W–B	Each interior light switch ON.	Below 1 V

PCTY – GND2 (B6–8 – B6–19)	R–B – W–B	Passenger door opened.	Below 1 V
		Passenger door closed.	10 – 14 V
PCLP – GND2 (B6–9 – B6–19)	R–G – W–B	Each interior light switch ON.	Below 1 V
RLD – GND2 (B6–10 – B6–19)	G–B – W–B	Rear Left side power window DOWN operation.	Below 1 V
RLU – GND2 (B6–11 – B6–19)	R – W–B	Rear Left side power window UP operation.	Below 1 V
OBD2 – GND2 (B6–14 – B6–19)	W – W–B	OBD2 communication circuit.	–
PU – GND2 (B6–17 – B6–19)	Y–B – W–B	Front Left side power window UP operation.	Below 1 V
PD – GND2 (B6–18 – B6–19)	L–W – W–B	Front Left side power window DOWN operation.	Below 1 V
GND2 – Body ground (B6–19 – Body ground)	W–B – Body ground	Constant	Below 1 V
Wagon: BDSU – GND2 (B6–20 – B6–19)	B–R – W–B	Back door opener switch ON.	Below 1 V
		Back door opener switch OFF.	10 – 14 V
PRG – RDA (B7–1 – B7–2)	R–B – GR–L	Wireless door lock receiver communication circuit.	–
DBKL – GND2 (B7–3 – B6–19)	P–G – W–B	With seat belt ON.	Below 1 V
		No seat belt ON.	10 – 14 V
LSWP – GND2 (B7–4 – B6–19)	L–R – W–B	Except driver's door is unlocked.	Below 1 V
		Except driver's door is locked.	10 – 14 V
RCTY – GND2 (B7–5 – B6–19)	R–L – W–B	Rear door opened.	Below 1 V
		Rear door closed.	10 – 14 V
DCTY – GND2 (B7–6 – B6–19)	R–G – W–B	Driver door opened.	Below 1 V
		Driver door closed.	10 – 14 V
Sedan: LGCY – GND2 (B7–7 – B6–19)	R–Y – W–B	Luggage compartment door opened.	Below 1 V
		Luggage compartment door closed.	10 – 14 V
Wagon: LGCY – GND2 (B7–7 – B6–19)	R–Y – W–B	Back door opened.	Below 1 V
		Back door closed.	10 – 14 V
Sedan: TR+ – GND2 (B7–8 – B6–19)	L–W – W–B	Luggage compartment door opener switch is operated.	Below 1 V
		Luggage compartment door opener switch is not operated.	10 – 14 V
Wagon: TR+ – GND2 (B7–8 – B6–19)	L–W – W–B	Back door opener switch is operated.	Below 1 V
		Back door opener switch is not operated.	10 – 14 V
HAZ – GND2 (B7–9 – B6–19)	G–W – W–B	Hazard warning switch position is ON.	Below 1 V
FE – GND2 (B7–13 – B6–19)	BR–W – W–B	Constant	Below 1 V
FR – GND2 (B7–14 – B6–19)	Y–R – W–B	Ignition switch position ON and fuel sender gauge position float UP.	Approx. 0.5 V
		Ignition switch position ON and fuel sender gauge position float DOWN.	Approx. 0.5 V

DI62G–09

PROBLEM SYMPTOMS TABLE

LIGHT CONTROL:

Symptom	Suspect Area	See page
Auto turn–off does not operate	12.Door courtesy switch circuit (Driver side) 13.Ignition switch 14.Body ECU 15.Theft deterrent ECU	DI–574* DI–549* – –

DOOR LOCK CONTROL:

Symptom	Suspect Area	See page
Lock or unlock cannot be operated with door lock control S/W.	1. Door lock control switch circuit 2. Body ECU 3. Power window master switch	DI–589* – –
Door key linked function does not operate.	1. Door key lock and unlock switch circuit 2. Body ECU 3. Power window master switch	DI–589* – –
Key confinement prevention function does not operate.	1. Key unlock switch circuit 2. Body ECU 3. Power window master switch	DI–566* – –

WIRELESS DOOR LOCK CONTROL:

Symptom	Suspect Area	See page
All function of wireless door lock control system do not operate.	1. Transmitter 2. Key unlock warning switch circuit 3. Wireless door lock ECU 4. Body ECU	BE–132* DI–566* BE–132* –
Lock (or unlock) function does not operate.	1. Door key lock and unlock switch circuit 2. Door unlock detection switch circuit 3. Body ECU	DI–589* DI–586* –
Automatic lock function operates even if any door is opened within 30 seconds after all doors are unlocked by wireless door lock control system .	1. Door courtesy switch circuit 2. Body ECU	DI–574* –

OTHERS:

Symptom	Suspect Area	See page
Does not operate the illuminated entry	1. Illumination circuit 2. Body ECU	DI–555* –
Key remainder system does not operate.	1. Key unlock warning switch circuit 2. Body ECU	DI–566* –
Seat belt warning does not operate.	1. Driver buckle switch circuit 2. Body ECU 3. Combination meter	DI–569* – BE–2*

* : See Pub No. RM684E

DI62J–02

CIRCUIT INSPECTION

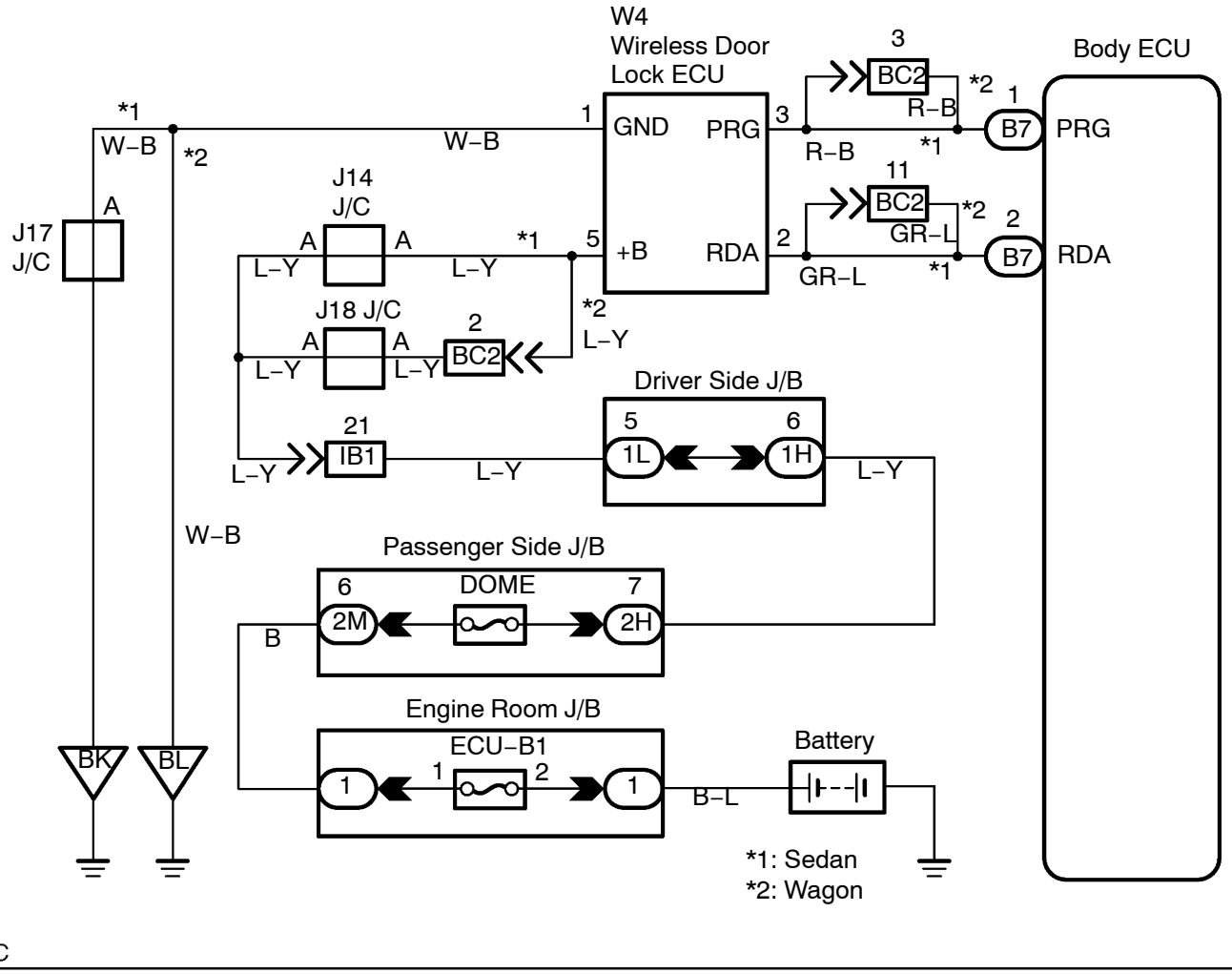
Wireless door lock tuner circuit

CIRCUIT DESCRIPTION

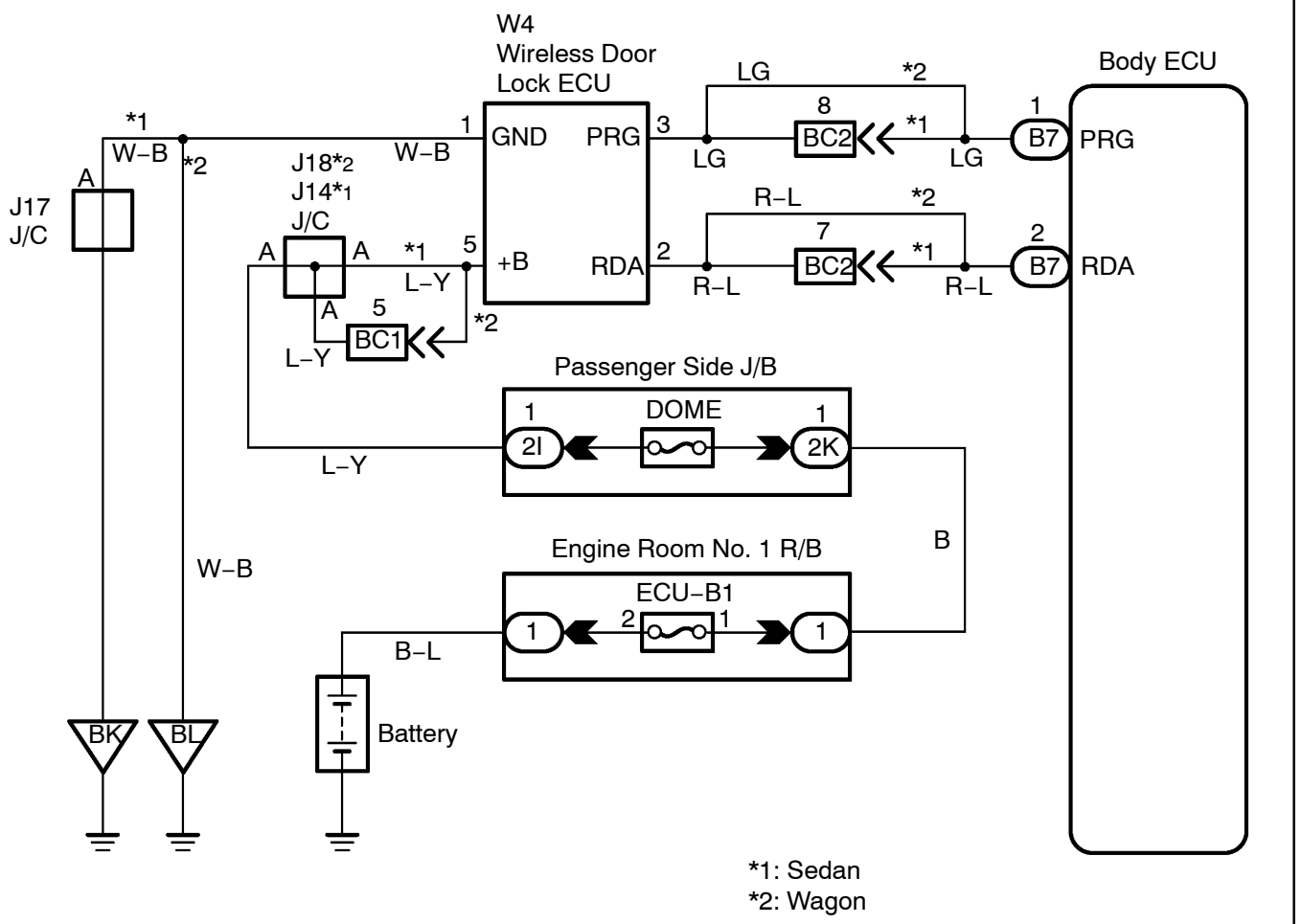
The signal from the transmitter will be input to the body ECU through RDA line. RDA line is diagnosed by the Body ECU, so check DTC also in case of the failure of the wireless function.

WIRING DIAGRAM

LHD Models



RHD Models


W4
Wireless Door
Lock ECU
Body ECU
GND
PRG
+B
RDA
LG
R–L
W–B
L–Y
B–L
B
*1
*2
J17
J/C
J18*2
J14*1
J/C
BC1
BC2
B7
PRG
RDA
Passenger Side J/B
DOME
2I
2K
Engine Room No. 1 R/B
ECU–B1
Battery
BK
BL
*1: Sedan
*2: Wagon
C
I23268

INSPECTION PROCEDURE

1	Check that DTC 42 is not output

NG → Check the RDA line.

OK

2	Check wire harness

PREPARATION:
Disconnect connectors of wireless door lock tuner and Body ECU.
CHECK:
Check continuity between terminals PRG of wireless door lock tuner and PRG of Body ECU.
OK:
Continuity

NG → Repair or replace wire harness

OK

3	Check the wireless door lock tuner

CHECK:
Replace the wireless door lock tuner and check if it recovers normally.
OK:
Must be recovered normally.

NG → Proceed to next circuit inspection shown on problem symptoms table. (See page DI–555)

OK

Failure of the original wireless door lock tuner.

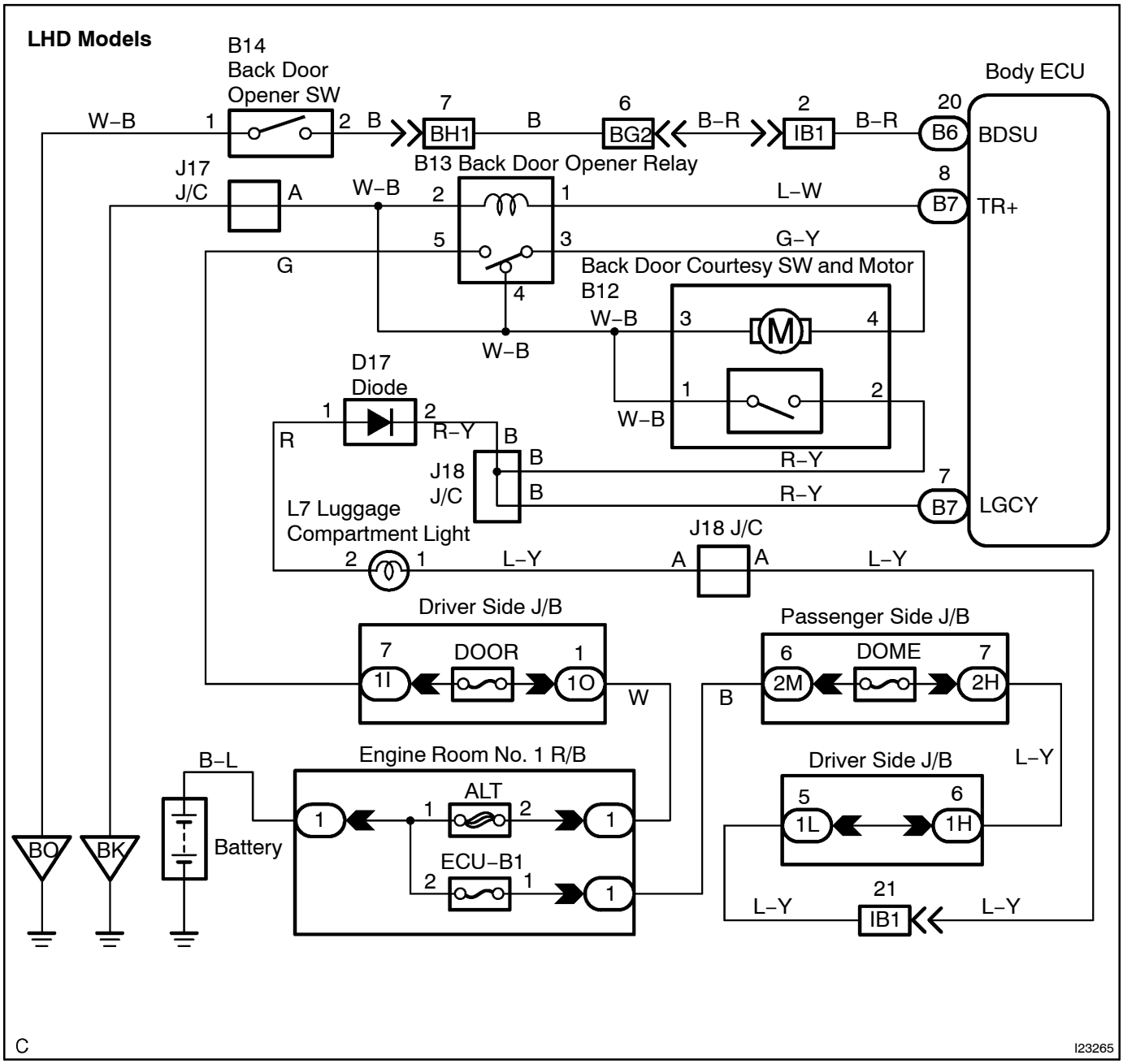
DI62R–02

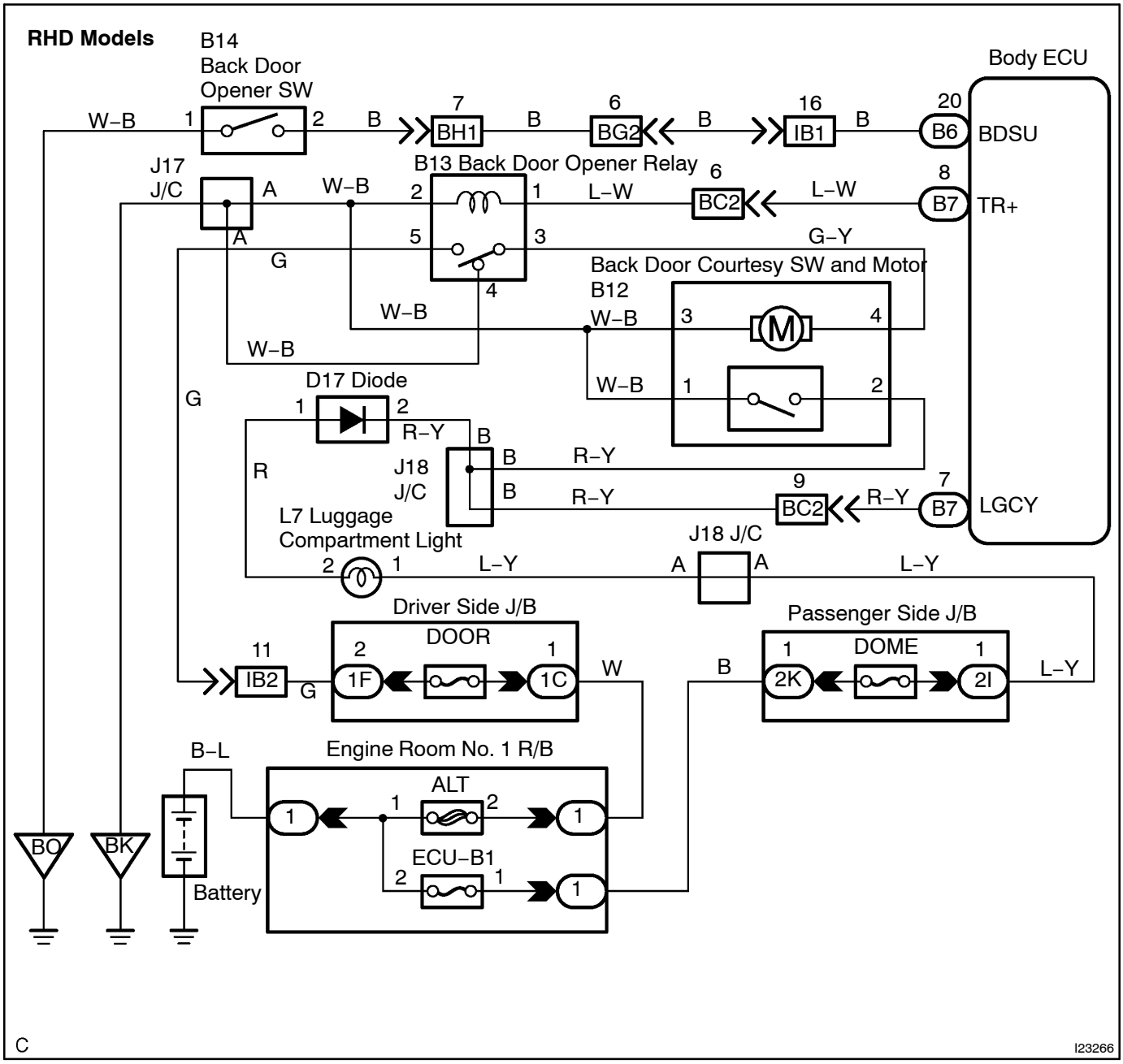
Back door courtesy switch circuit

CIRCUIT DESCRIPTION

The back door courtesy switch goes on when back door is opened and goes off when back door is closed.

WIRING DIAGRAM




RHD Models
B14
Back Door
Opener SW
Body ECU
W–B
1
2
B
7
BH1
6
BG2
16
IB1
20
B6
BDSU
J17
J/C
A
B13 Back Door Opener Relay
L–W
BC2
8
B7
TR+
G–Y
G
Back Door Courtesy SW and Motor
B12
M
3
4
D17 Diode
R–Y
R
J18
J/C
L7 Luggage
Compartment Light
9
LGCY
L–Y
Driver Side J/B
DOOR
11
IB2
1F
1C
W
Passenger Side J/B
DOME
2K
2I
B–L
Engine Room No. 1 R/B
ALT
ECU–B1
Battery
BO
BK
C
I23266

INSPECTION PROCEDURE

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

1	**Check back door courtesy switch using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the back door courtesy switch using DATA LIST.

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See page DI–555)**

NG

2	**Check back door courtesy switch (See page BE–22).**

NG → **Replace the back door courtesy switch.**

OK

3	**Check wire harness and connector between back door courtesy switch and Body ECU.**

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

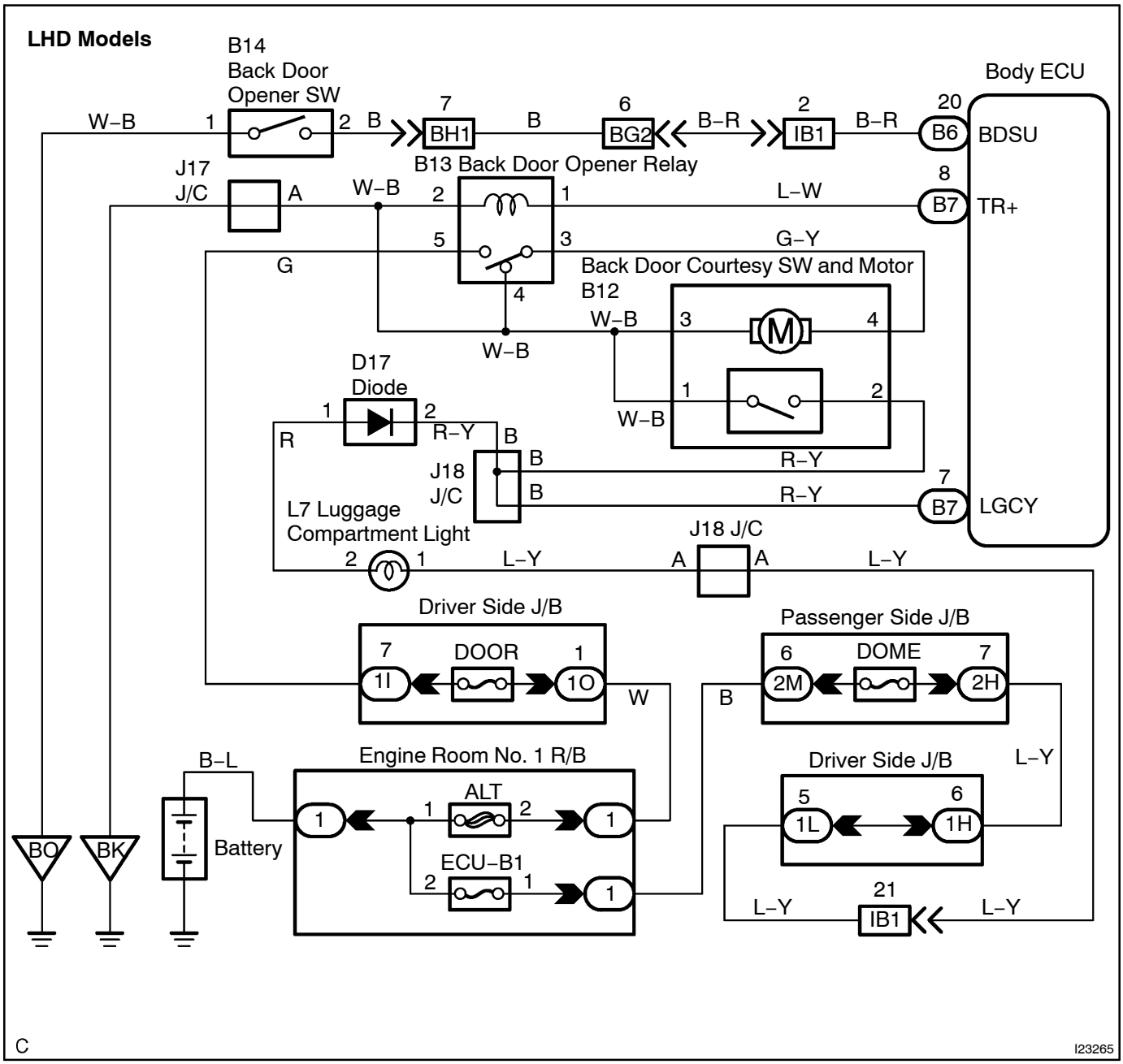
OK

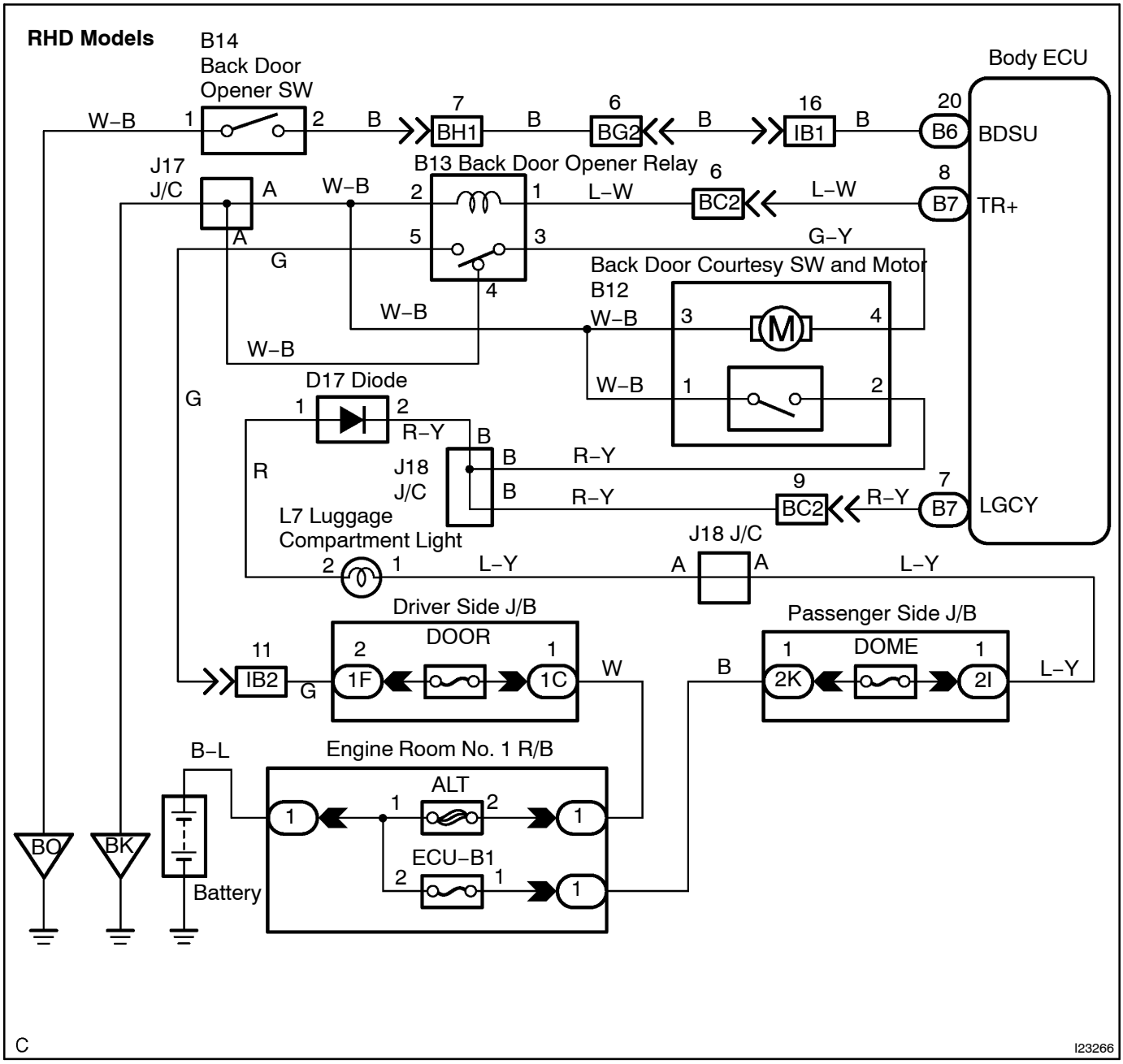
Proceed to next circuit inspection shown on problem symptoms table. (See page DI–555)

DI62S–02

Back door opener relay and motor

WIRING DIAGRAM




RHD Models
B14
Back Door
Opener SW
Body ECU
W–B
1
2
B
7
BH1
6
BG2
16
IB1
20
B6
BDSU
J17
J/C
A
B13 Back Door Opener Relay
6
BC2
L–W
8
B7
TR+
5
3
G–Y
G
4
Back Door Courtesy SW and Motor
B12
M
D17 Diode
R–Y
R
J18
J/C
9
7
LGCY
L7 Luggage
Compartment Light
L–Y
J18 J/C
Driver Side J/B
DOOR
11
IB2
2F
1C
W
Passenger Side J/B
DOME
2K
2I
B–L
Engine Room No. 1 R/B
ALT
ECU–B1
Battery
BO
BK
C
I23266

INSPECTION PROCEDURE

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

1	**Check back door opener motor using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check that the back door opener motor can operate in an ACTIVE TEST.

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See page DI–555)**

NG

2	**Check back door opener motor. (See page BE–43)**

NG → **Replace the back door opener motor.**

OK

3	**Check wire harness and connector between back door opener motor and Body ECU, between back door opener switch and Body ECU, and back door opener relay and Body ECU.**

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

OK

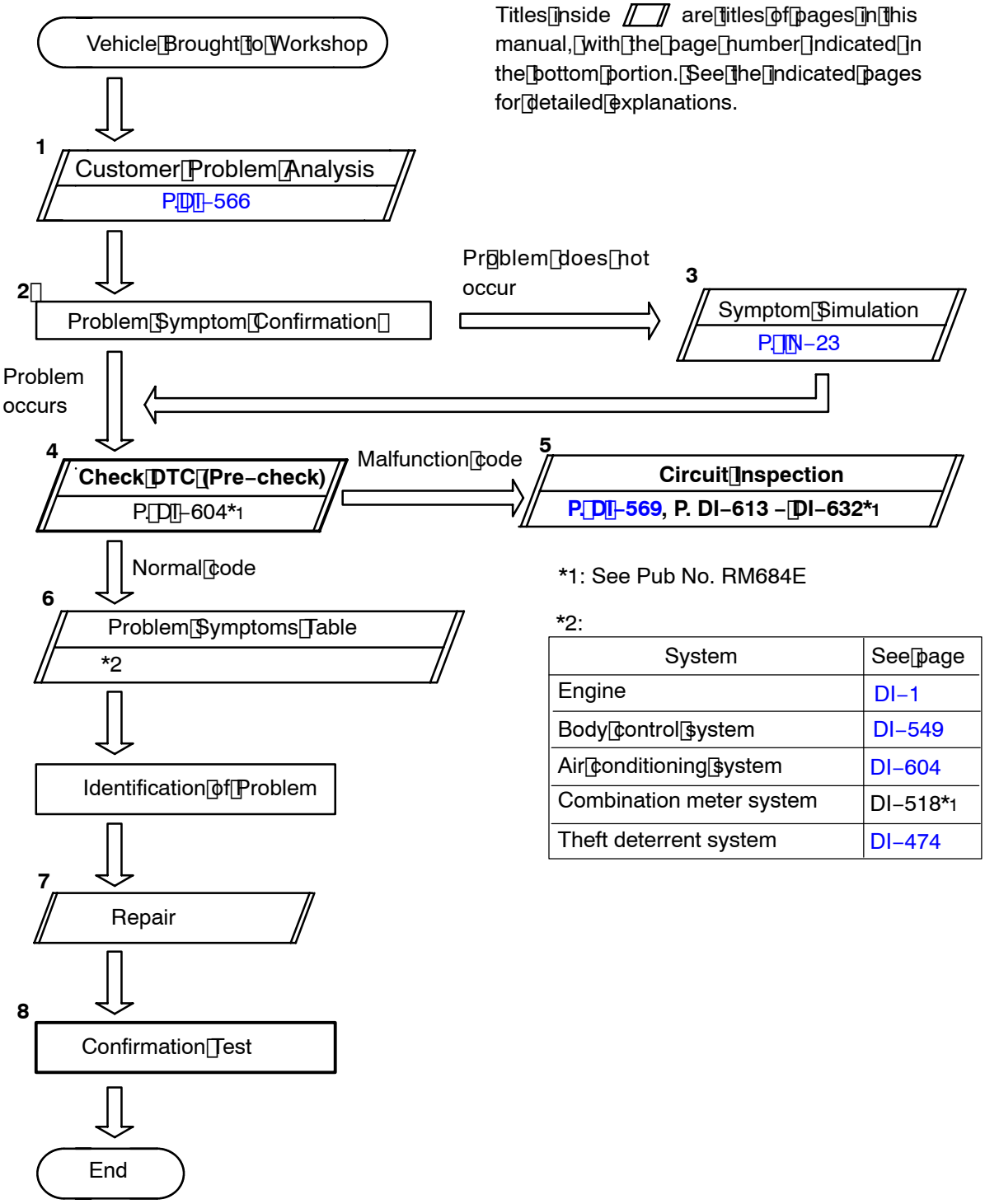
Proceed to next circuit inspection shown on problem symptoms table. (See page DI–555)

MULTIPLEX COMMUNICATION SYSTEM

DI622–03

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.



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

*1: See Pub No. RM684E

*2:

System	See page
Engine	DI–1
Body control system	DI–549
Air conditioning system	DI–604
Combination meter system	DI–518*1
Theft deterrent system	DI–474

Step 4, 8 : Diagnostic steps permitting the use of the hand–held tester.

DI630–01

CUSTOMER PROBLEM ANALYSIS CHECK

MULTIPLEX COMMUNICATION SYSTEM Check Sheet

Inspector's name: _____

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

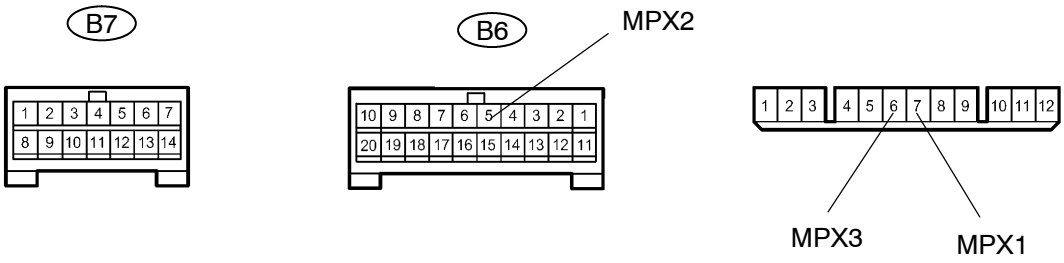
Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/ Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Engine
	☐ Body Control System
	☐ Air Conditioning System
	☐ Combination Meter System
	☐ Theft Deterrent System

DI634–03

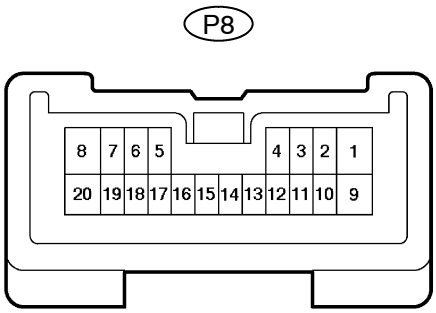
TERMINALS OF ECU

BODY CONTROL ECU



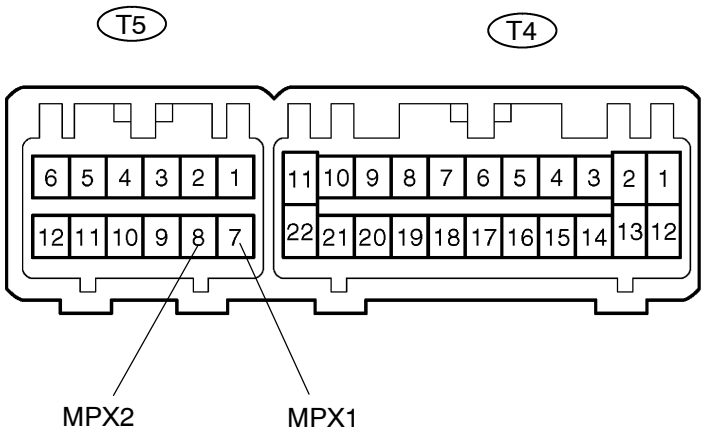
I11362

POWER WINDOW MASTER SWITCH



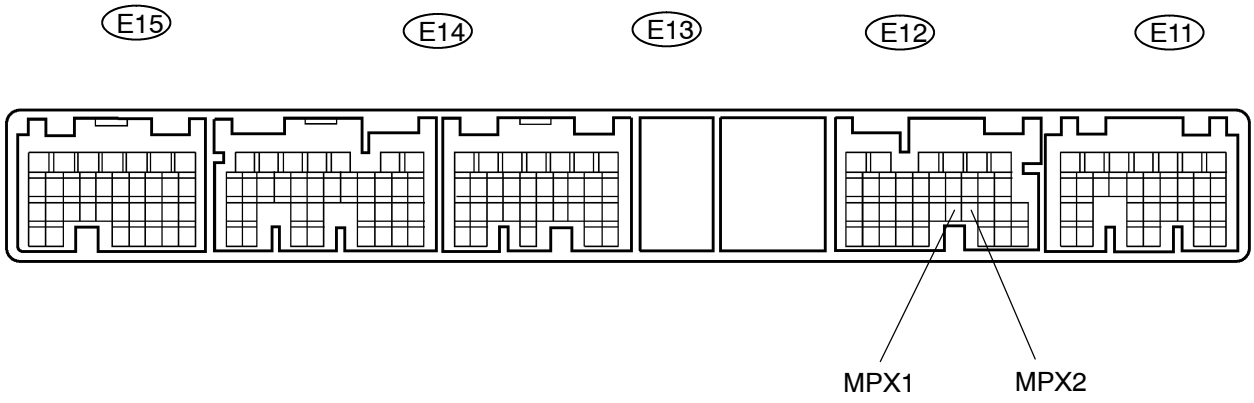
I11502

THEFT DETERRENT ECU



I01920

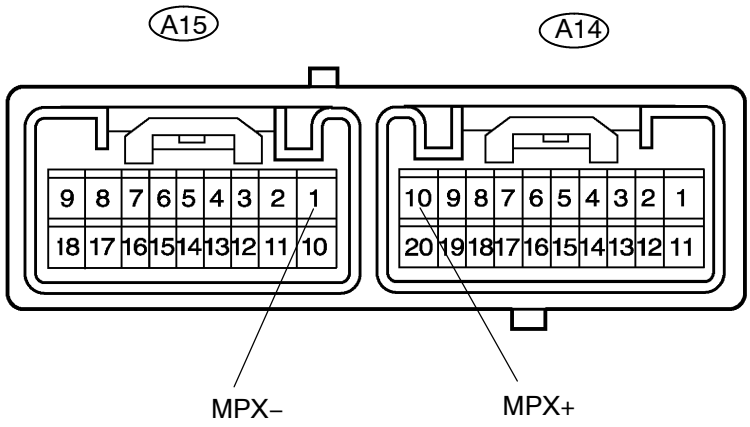
ENGINE AND ECT ECU
2JZ–GE:



C

I23299

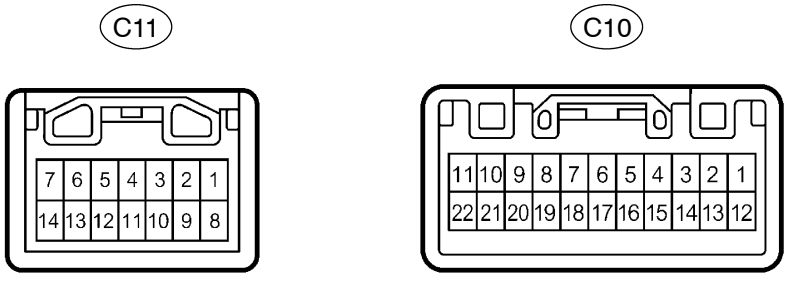
A/C ECU



C

I23300

COMBINATION METER ECU



12

I11363

DI636–02

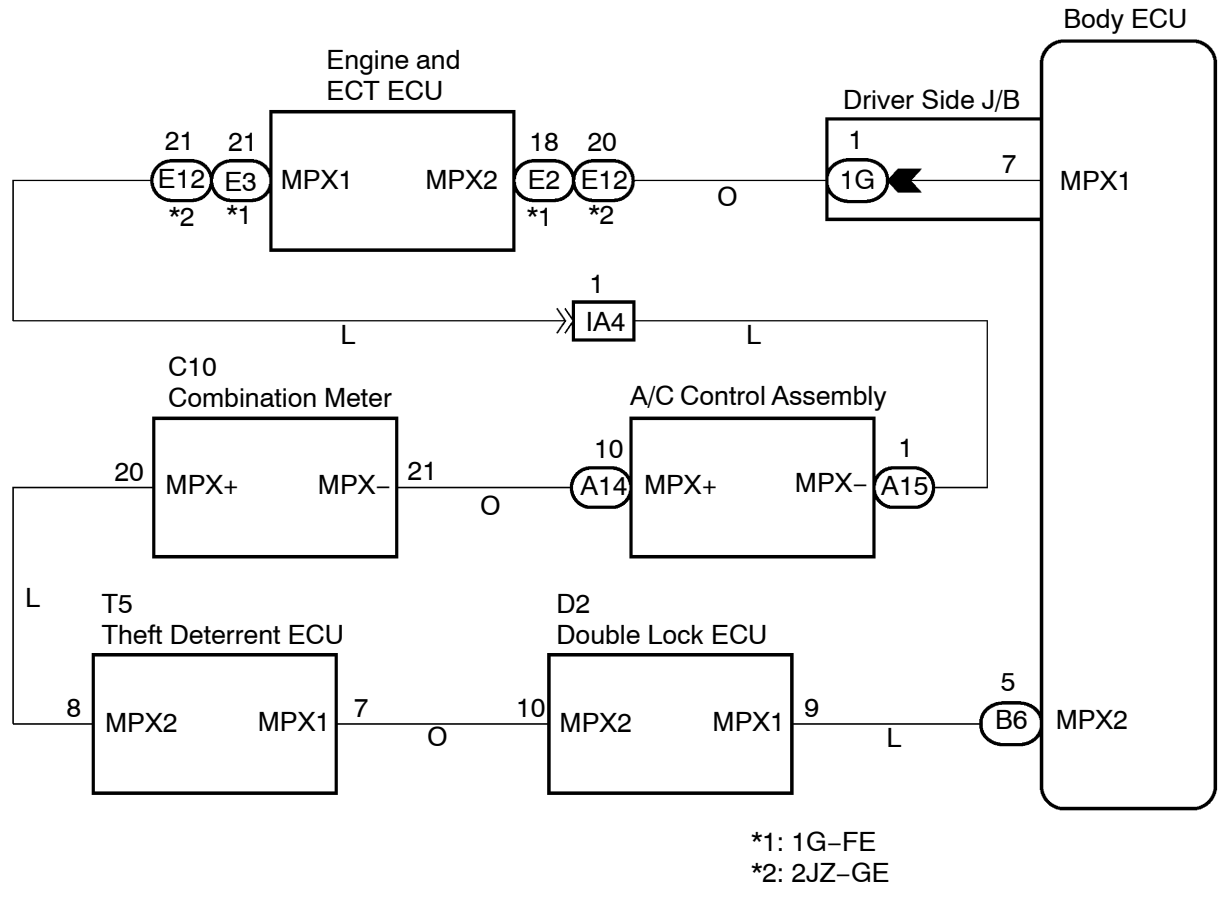
CIRCUIT INSPECTION

DTC	B1214 / 14	Communication bus malfunction (+B short)

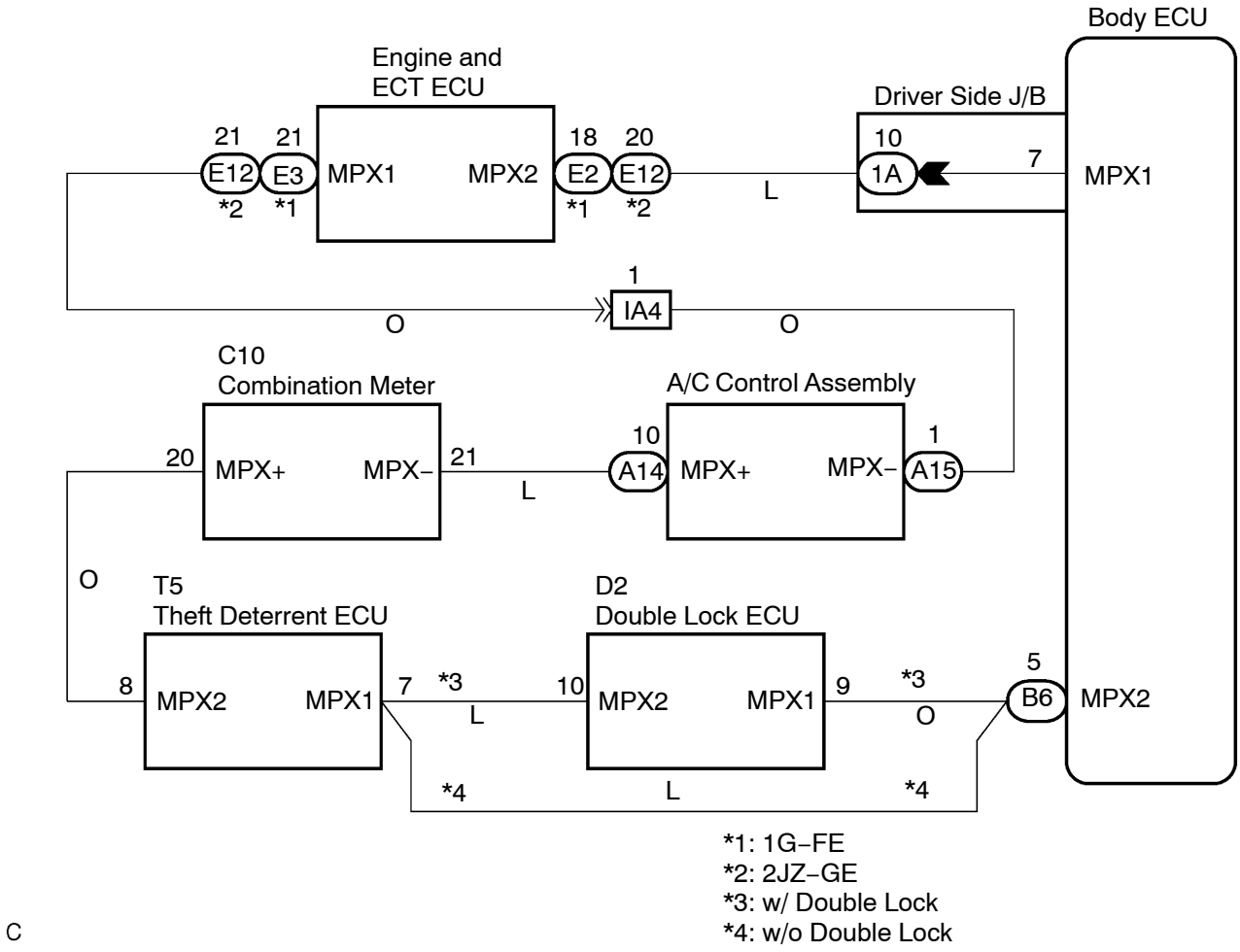
DTC	B1215 / 15	Communication bus malfunction (GND short)

WIRING DIAGRAM

LHD Models

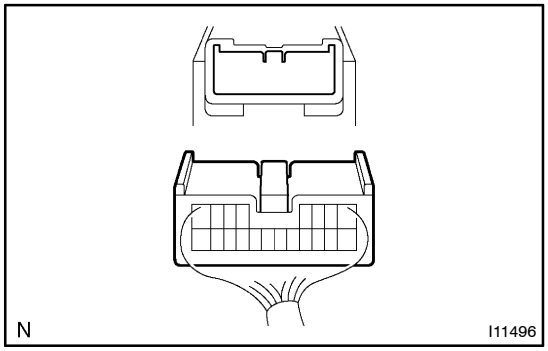


RHD Models


Body ECU
Engine and
ECT ECU
Driver Side J/B
21 21
E12 E3
*2 *1
MPX1
MPX2
18 20
E2 E12
*1 *2
L
10
1A
7
MPX1
1
IA4
O
O
C10
Combination Meter
A/C Control Assembly
20
MPX+
MPX–
21
L
10
A14
MPX+
MPX–
1
A15
O
T5
Theft Deterrent ECU
D2
Double Lock ECU
8
MPX2
MPX1
7
*3
L
10
MPX2
MPX1
9
*3
O
5
B6
MPX2
*4
L
*4
*1: 1G–FE
*2: 2JZ–GE
*3: w/ Double Lock
*4: w/o Double Lock
C
I23298

INSPECTION PROCEDURE

1	**Check the communication circuit inside power window master switch ECU.**

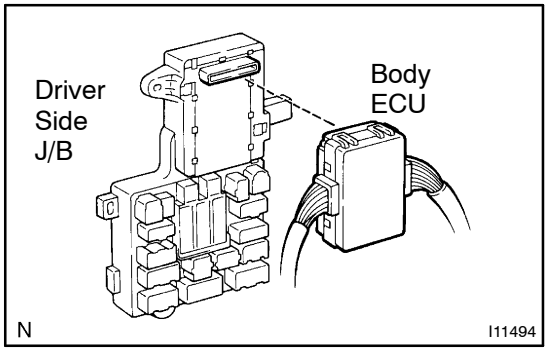


PREPARATION:
Disconnect the connector ”P8” of power window master switch.
CHECK:
Check the DTC.
OK:
Code B1214/14 or B1215/15 is not output

OK	**Replace the power window master switch.**

NG

2	**Check for short circuit between power window master switch and body ECU.**



PREPARATION:
(a) Connect the connector ”P8” of power window master switch.
(b) Disconnect the connector of body ECU.
HINT:
Connector is disconnected by removing Body ECU from driver side junction block.
CHECK:
Check the DTC.
OK:
Code B1214/14 or B1215/15 is not output

OK	**Repair or replace the wireharness between power window master switch and body ECU.**

NG

Replace the body ECU.

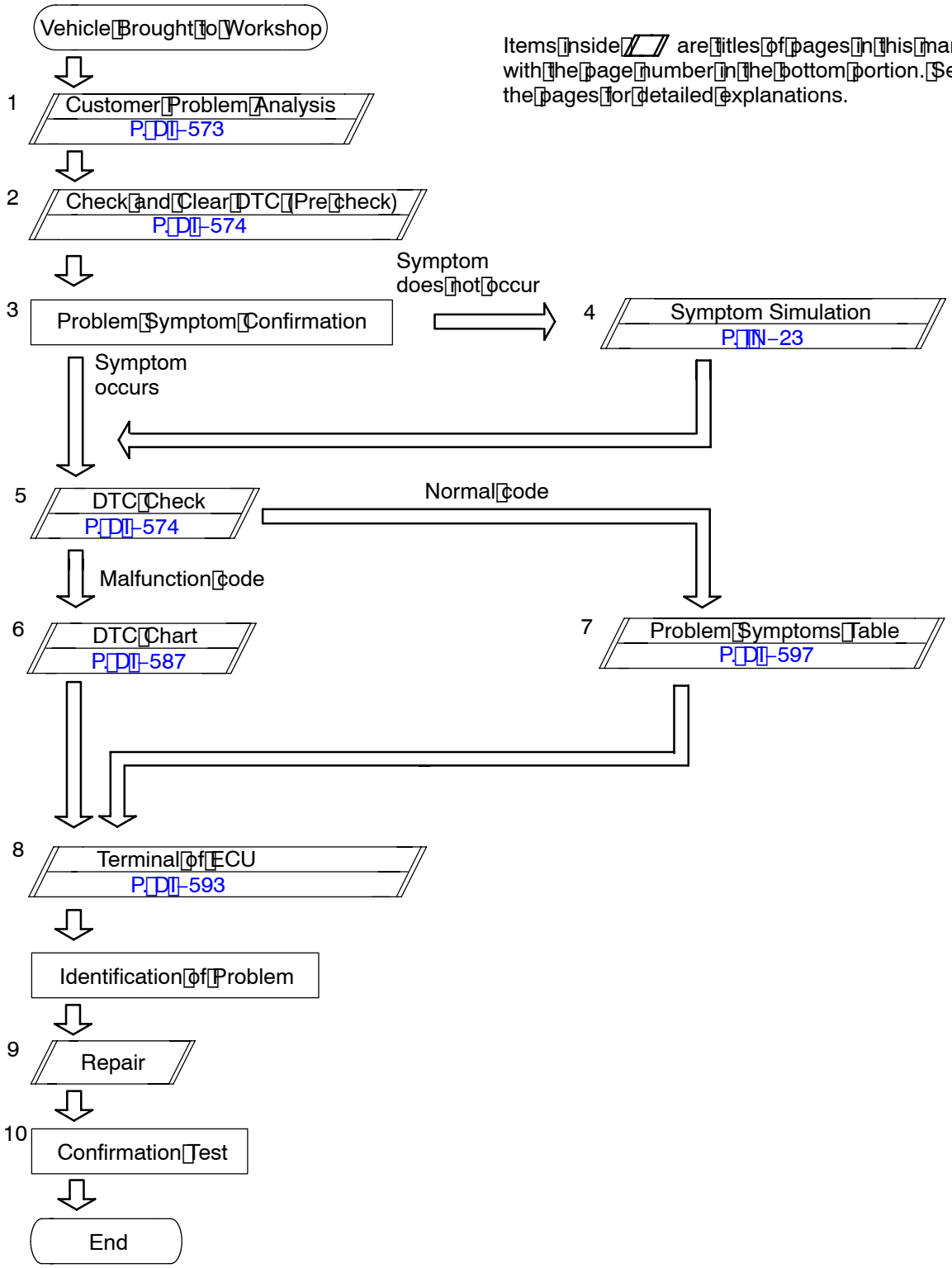
LEXUS NAVIGATION SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI27W–04

HINT:

The ECU of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.



DI27X–04

CUSTOMER PROBLEM ANALYSIS CHECK

LEXUS NAVIGATION SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Constant ☐ Intermittent (Times a day)

Problem Symptom	**Navigation malfunction**	☐ Cursor movement is defective.
		☐ Cursor does not move.
		☐ GPS mark does not appear.
		☐ Map is not displayed.
		☐ Others ( )
	Display malfunction	☐ Screen is dark.
		☐ Screen is white.
		☐ Color is not uniform.
		☐ Screen is in disorder.
		☐ Others ( )
	Control Switch malfunction	☐ Can not operate with panel switches.
		☐ Can not operate with touch switches.
		☐ Others ( )

	Parts name	**1st time malfunction code.**	**2nd time malfunction code.**
DTC Check	Navigation ECU		
	Multi Display		
	Radio receiver assembly		
	Power amplifier		

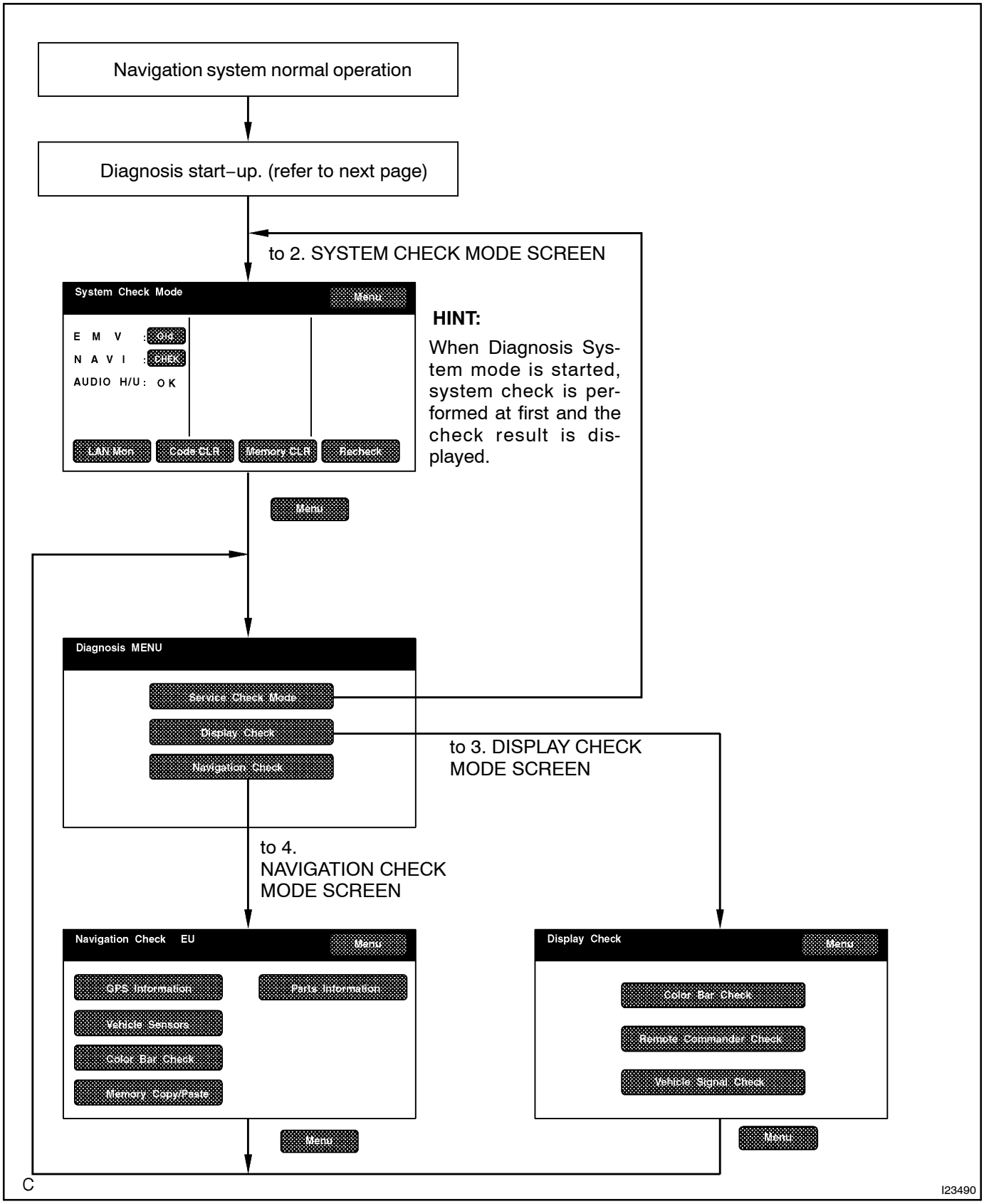
DI9I3–01

PRE–CHECK

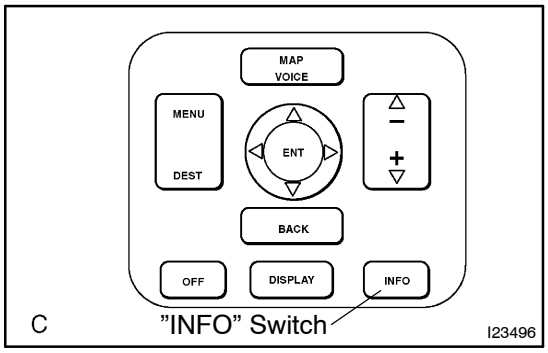
1. DIAGNOSIS SYSTEM MODE

HINT:

Diagnosis System Mode is operated as follows.



(a) DIAGNOSIS START–UP
To start the diagnosis menu, there are 2 ways: using a diagnosis check wire and using a switch.



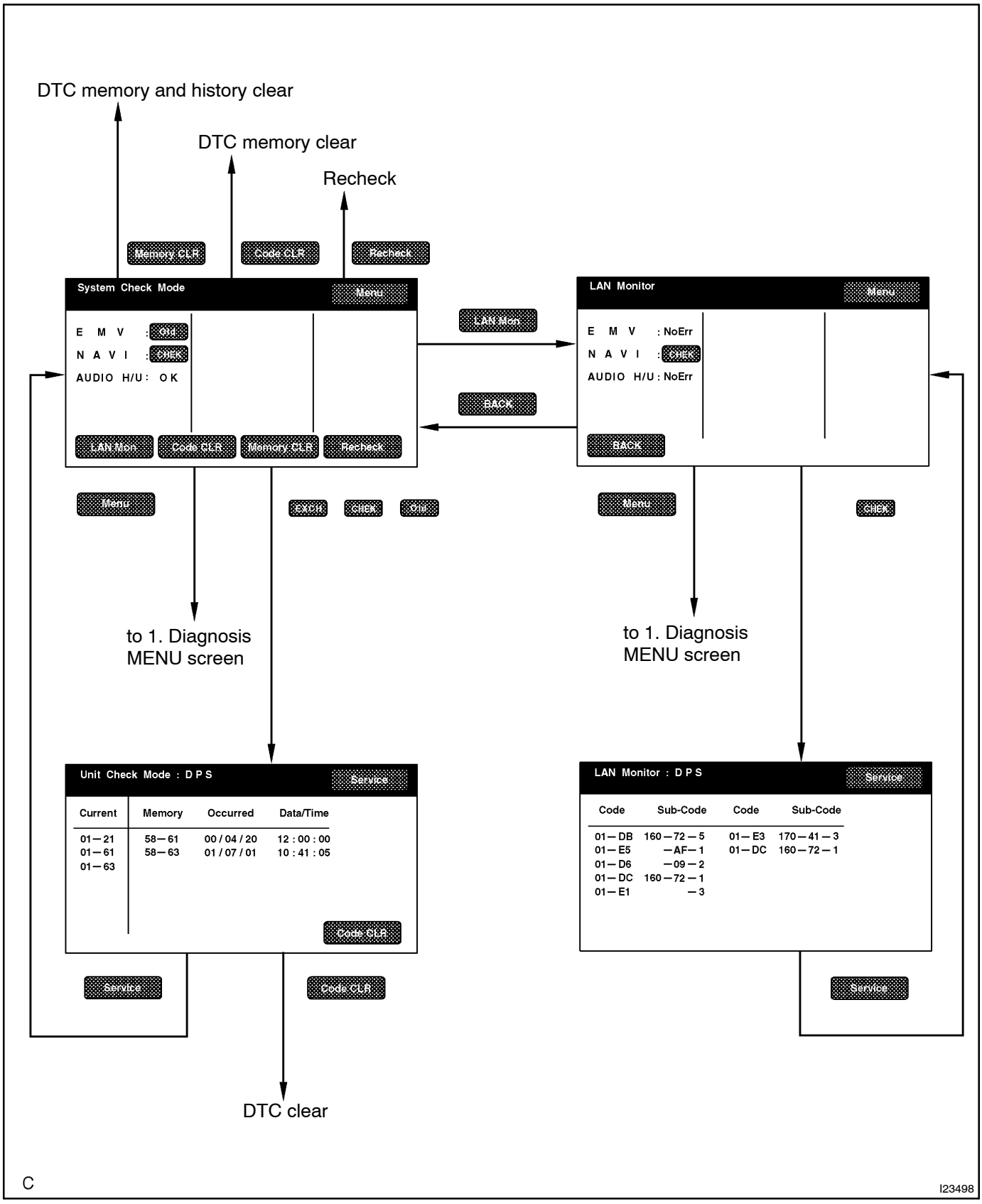
(b) START–UP BY SWITCH OPERATION (light control switch)
(1) Vehicle speed is 0 km/h (0 mph).
(2) Parking brake switch is pressed.
(3) While pressing ”INFO” switch, by turning the light control switch to OFF, TAIL, OFF, TAIL, OFF, TAIL and OFF the system is started up.

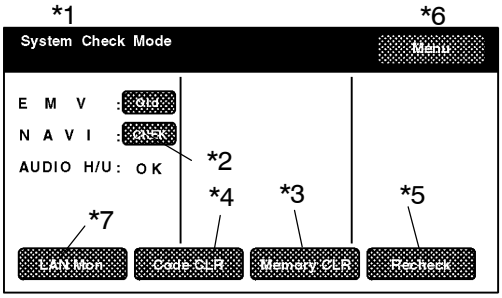
(c) FINISHING DIAGNOSIS SYSTEM MODE
Turn the ignition switch from ACC to OFF to finish the mode. If it is started by switch operation.

2. SERVICE CHECK MODE

HINT:

Service Check Mode is operated as follows.





C I23491

(a) System Check Mode

(1) Start the Diagnosis System.

Display Item	Function
Components Name/*1	List of component names including optional components (15 components max.) are displayed. When the names are not identified, their physical addresses are displayed.
Check Result/*2	Check results are displayed.
Memory Clear switch/*3	Pressing this switch for 3 sec. deletes all the information about master component registration.
DTC Clear switch/*4	Pressing this switch for 3 sec. deletes diagnosis memory of all the components. It deletes Service Check results and the screen displaying the check results.
Recheck/*5	Pressing this switch performs Service Check again.
MENU/*6	Pressing this switch activates the Diagnosis Menu screen.
LAN Monitor Switch/*7	Pressing this switch activates the LAN monitor screen.

HINT:

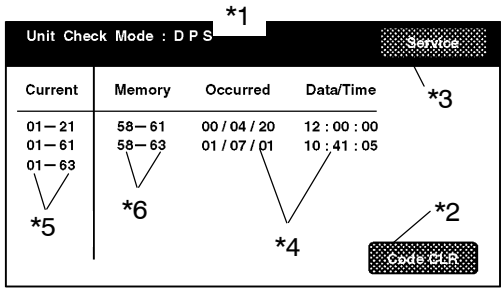
Service Check displays the check results based on the information obtained from each component's response to "System Check Execution" and "Diagnosis Memory Request", and the information of "Current DTC Notification" (the Unit Check that will be displayed on the next screens.).

(2) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
EXCH	One or more DTC requesting for exchange are detected.
CHEK	One or more DTC requesting for check are detected.
NCON	No connection response to Diagnosis System start–up, whereas it has the connection response to the AVC LAN system when the power switch is turned on (when IG is turned to ACC).
Old	One or more DTC are detected because of old version.
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start–up.
No Err	No DTC is identified.

HINT:

- After repair and check, press "Code CLR" for more than 3 sec. to delete diagnosis memory.
- After deleting diagnosis memory, press "Recheck" and make sure "OK" is displayed on the screen.



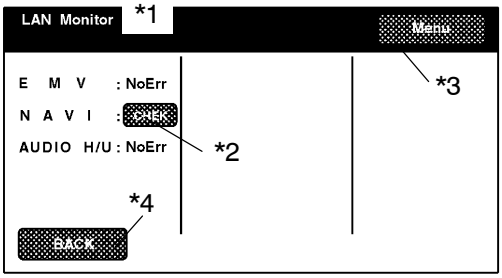
C I23493

(3) ”EXCH”, ”CHEK” and ”Old” can be used as switches to activate ”Unit Check Mode” for detail information. Check troubled parts of the components in these modes by referring to the DTC code list.

Display Item	Description
Components name/*1	Names of components to be checked are displayed.
DTC clear switch/*2	Pressing this switch for 3 sec. deletes DTC memory of the selected diagnosis component.
Service check mode screen switch/*3	Pressing this returns to the Service Check Mode screen.
Date/Time/*4	The date and time stamped at the time of DTC occurrence are displayed in the order of year–month–day–hour–minute–second. (If the date and time data is invalid, it is displayed as a blank.)
Current/ *5	Up to 6 DTC codes detected during the System Check are displayed.
Memory/ *6	DTC memories stored and current DTC Notification are displayed.

HINT:

- Detecting Unit DTC activates the Unit Check Mode on the screen.
- In the Unit Check Mode, DTC which is identified as ”EHCK” in the Service Check, is displayed as classified into Current DTC and Past DTC.



C I23492

(b) LAN Monitor

(1) Start the Diagnosis System.

Display Item	Function
Components Name/*1	List of component names including optional components (15 components max.) are displayed. When the names are not identified, their physical addresses are displayed.
Check Result/*2	Check results are displayed.
MENU/*3	Pressing this switch activates the Diagnosis Menu screen.
BACK/*4	Pressing this switch activates the System Check Mode screen.

HINT:

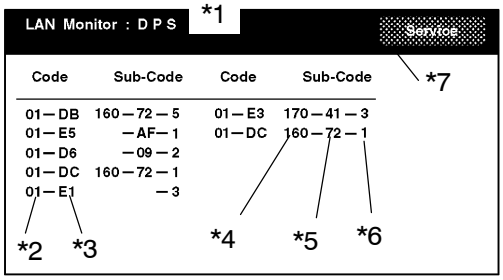
Service Check displays the check results based on the information obtained from each component’s response to ”System Check Execution” and ”Diagnosis Memory Request”, and the information of ”Current DTC Notification” (the LAN Monitor that will be displayed on the next screens.).

(2) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
EXCH	One or more DTC requesting for exchange are detected.
CHEK	One or more DTC requesting for check are detected.
NCON	No connection response to Diagnosis System start–up, whereas it has the connection response to the AVC LAN system when the power switch is turned on (when IG is turned to ACC).
Old	One or more DTC are detected because of old version.
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start–up.
No Err	No DTC is identified.

HINT:

- After repair and check, press ”Code CLR” for more than 3 sec. to delete diagnosis memory.
- After deleting diagnosis memory, press ”Recheck” and make sure ”OK” is displayed on the screen.



C I23494

(3) ”CHEK” can be used as switches to activate ”LAN Monitor” for detail information. Check troubled parts of the components in these modes by referring to the DTC code list.

Display Item	Description
Components name/*1	Names of components to be checked are displayed.
Segment/*2	Logical address codes corresponding to DTC are displayed.
DTC/*3	DTC is displayed.
Sub–Code (address numbers of related components)/*4	Physical address codes memorized together with DTC are displayed.
Sub–code (Connection confirmation number) /*5	Connection confirmation numbers memorized together with DTC are displayed.
Sub–code (Number of occurrence) /*6	The number of occurrence of the same DTC is displayed.
Service check mode screen switch/*7	Pressing this returns to the Service Check Mode screen.
Current/ *12	Up to 6 DTC codes detected during the System Check are displayed.
Memory/ *13	DTC memories stored and current DTC Notification are displayed.

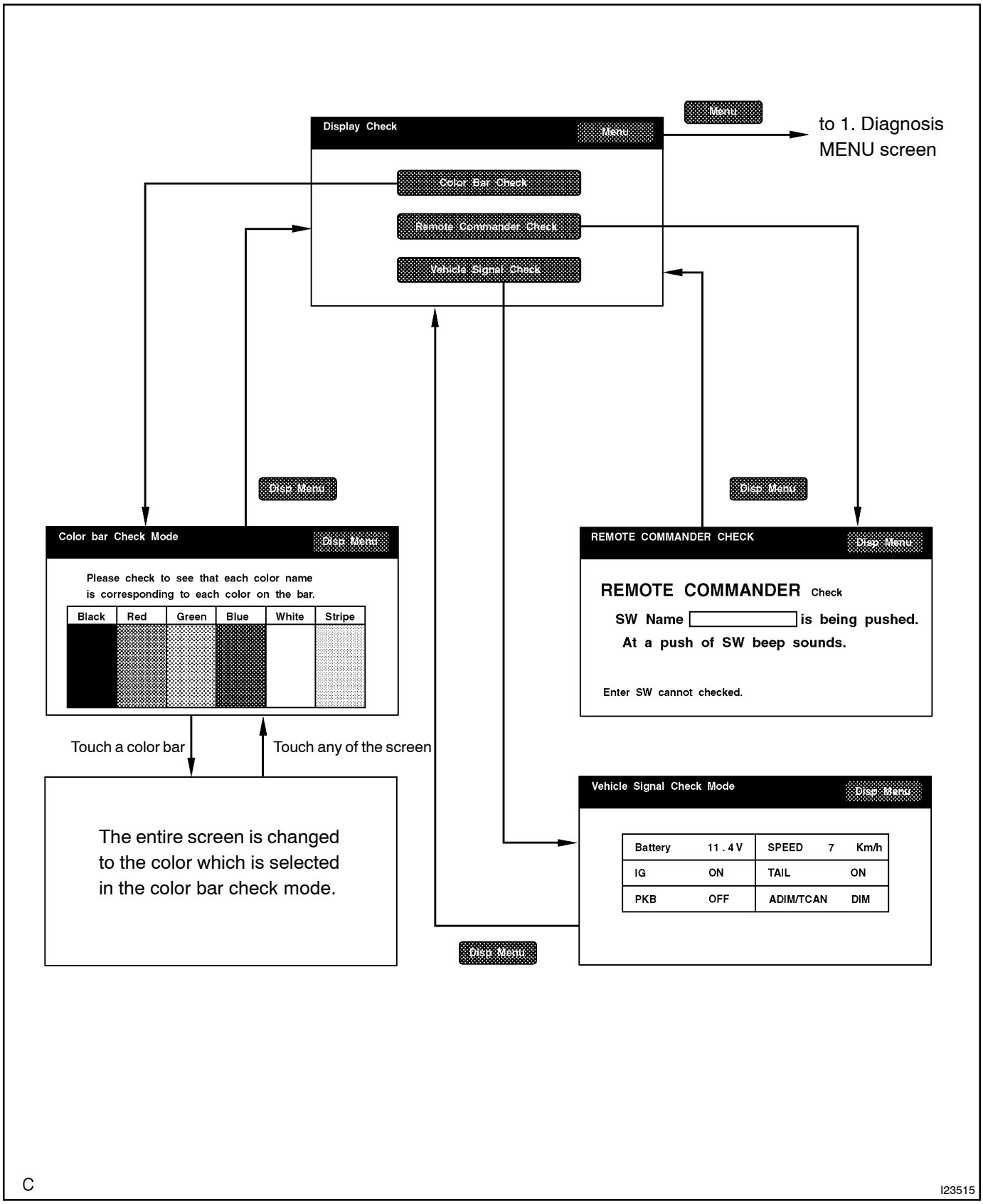
HINT:

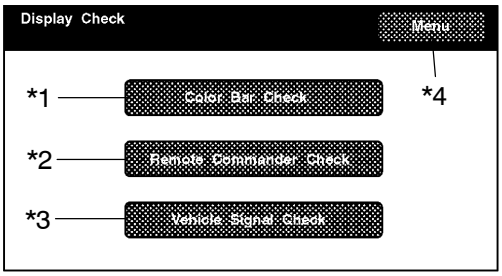
Detecting no LAN DTC activates the LAN Check Mode on the screen.

3. DISPLAY CHECK MODE

HINT:

Display Check Mode is operated as follows.



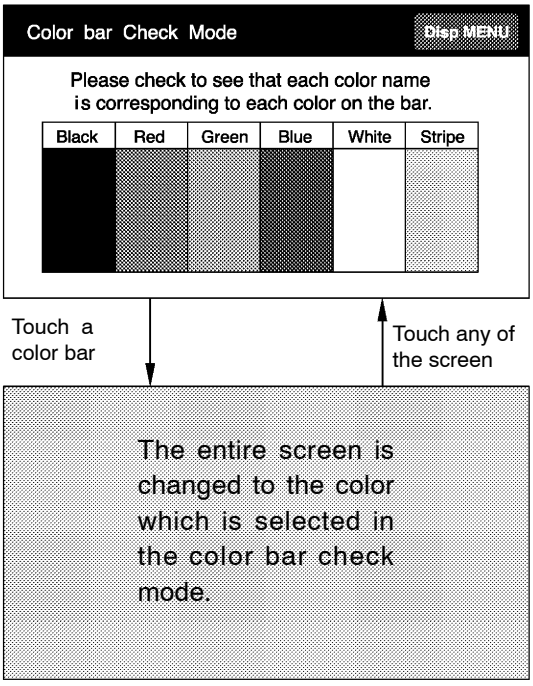


C I23495

(a) Display Check Mode

Display	Contents
Color Bar Check/*1	Color display is checked.
Remote Commander/*2	Operating condition of remote commander display is checked.
Vehicle Signal Check/*3	Status of the vehicle signal which has been loaded into the display is checked.
MENU/*4	Pressing this switch activates the Diagnosis Menu screen.

HINT:
In Display Check Mode, above checks can be performed.

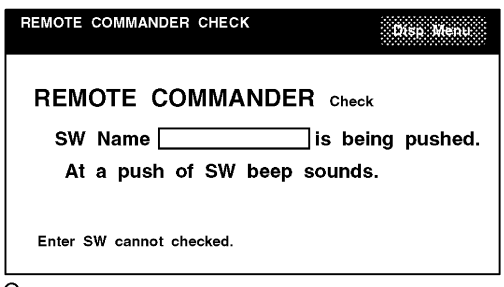


N I23620

(b) Display Color Bar Check
(1) Start the Diagnosis System.
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Color Bar Check”.
(5) Make sure that each color name is corresponding to each color on the bar.

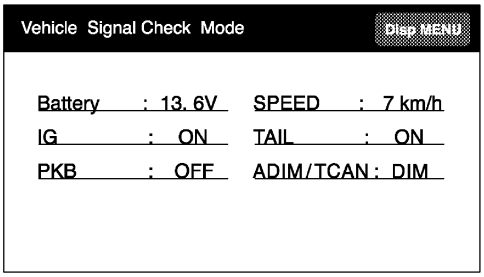
HINT:
Select Black, Red, Green, Blue, White and Stripe to display selected colors and stripe on the entire screen.

(6) Compare with the Color Bar Check in the Navigation Check and make sure that no difference is found.



C I23501

(c) Display Panel Switch Check
(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Remote Commander”.
(5) Press each switch and make sure that it corresponds to the display on the screen.



C I23500

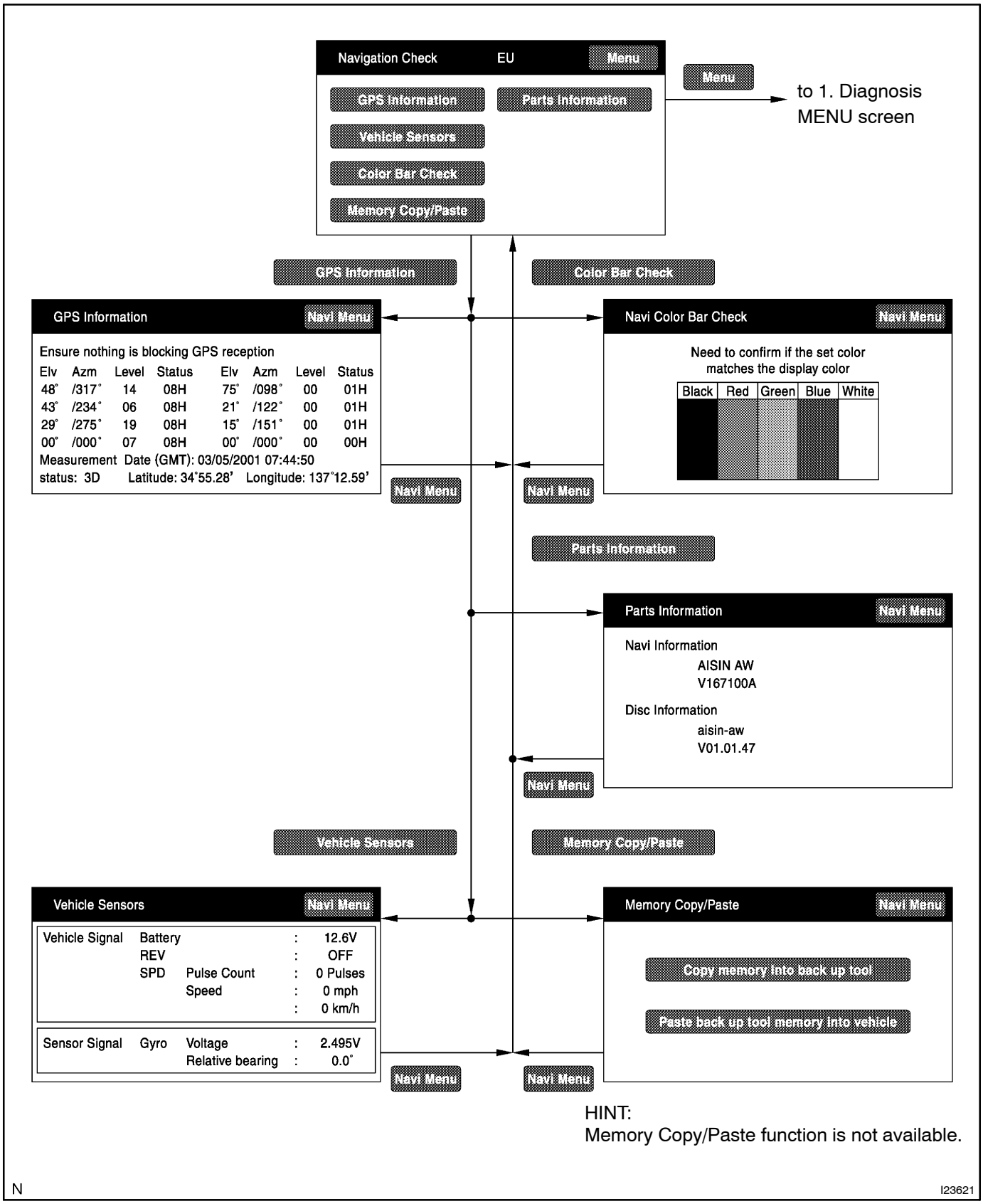
(d) Display Vehicle Signal Check
(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Vehicle Signal Check”.
(5) Check the status of the vehicle signal (Battery, IG, PKB, SPEED, TAIL, ADIM/TCAN) loaded into the display.

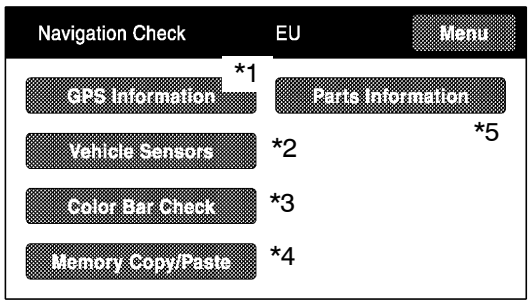
HINT:
Vehicle signal data is updated every 1 second.

4. NAVIGATION CHECK MODE

HINT:

Navigation Check Mode is operated as follows.



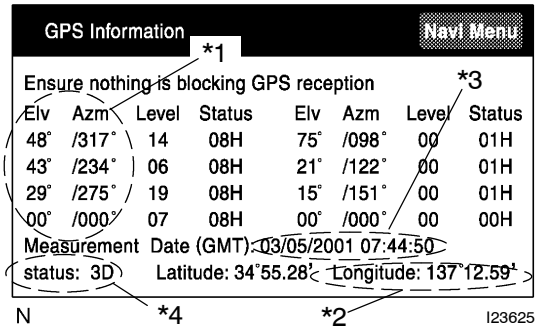


(a) Navigation Check Mode

Display	Description
GPS Information/*1	Information related to GPS is displayed (updated every 1 second.).
Vehicle Sensors/*2	Vehicle signal information to be loaded in the Navigation ECU is displayed (up-dated every 1 second.).
Color Bar Check/*3	Color display of the Navigation ECU is checked. (Compare with the Color Bar Check results in the Display Check.)
Memory Copy / Paste/*4	Using hand–held tester, read and write user data such as a placement of shop, restaurant etc. stored in memory.
Parts Information/*5	Navigation program version and disc version are displayed.

HINT:

- In the Navigation Check mode, the checks mentioned above can be conducted.
- The Navigation ECU operates each Navigation Check screen.



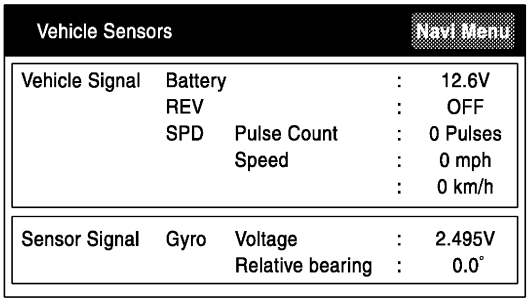
(b) GPS Information

(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Navigation Check”.
(4) Select ”GPS Information”.
(5) Check the GPS–related information.

Display Data	Description
Satellite Information/*1	”Angle of elevation”, ”Azimuth”, ”Level of Signal” and ”Status of Wave Reception” of the Satellite captured by the antenna are displayed (for 8 satellites max.)
Position Data/*2	The latitude and longitude of the current position are displayed in degree, minute and second.
Time Data/*3	Date and time data obtained from the GPS receiver is displayed.

Measurement Status: /*4

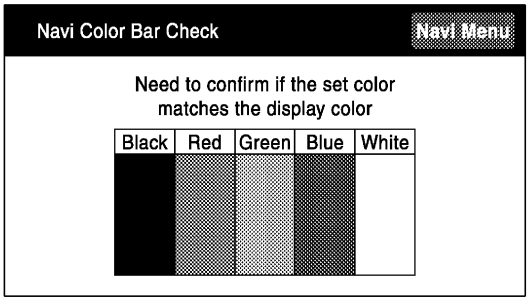
Display	Conditions
2D	Measurement on 2 dimensions
3D	Measurement on 3 dimensions
NG	GPS information cannot be used.
Error	Reception error occurs.
–	Other than the above



N I23624

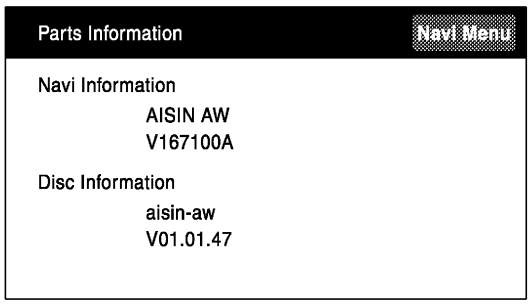
(c) Vehicle Sensors
(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Navigation Check”.
(4) Select ”Vehicle sensors”.
(5) Check the vehicle signals (ACC, REV, SPD) and the output signal of the gyro sensor introduced into the navigation ECU.

Items	Display Method
ACC signal status	Displayed as ON/OFF.
REV signal status	Displayed as ON/OFF.
SPD signal status	The cumulative value of input pulse count and the vehicle speed [km/h] [mph] are displayed. [The cumulative value of input pulse count is set to be 0 when this screen is displayed. When the vehicle starts to drive, it is counted and displayed continually.]
Output signal of the gyro sensor	Voltage [V] and relative azimuthal angle [degree] are displayed. [The position of the vehicle when this screen is displayed is set to be 0 degree in azimuth. Based on this, relative azimuthal angle is measured and displayed continually.]



N I23623

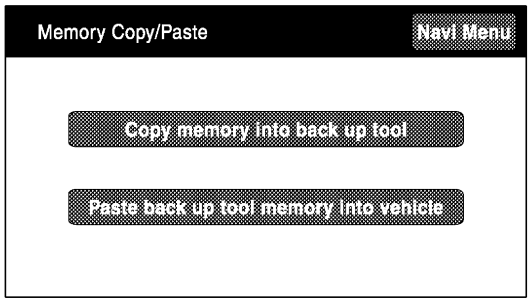
(d) Navigation Color Bar Check
(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Navigation Check”.
(4) Select ”Color Bar Check”.
(5) Make sure that the set color matches the display color.
(6) Compare with the Color Bar Check in the Display Check and make sure that no difference is found.



N I23626

(e) Parts Information

(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Navigation Check”.
(4) Select ”Parts Information”.
(5) Check the program and disc version.



N I23627

(f) Memory/ Copy/ Paste

HINT:

This function is not available.

DI27Z–12

DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three–digit code (shown in hexadecimal) which is given to each component comprising the AVC–LAN. Corresponding to the function, individual symbols are specified.
Logical address	Two–digit code (shown in hexadecimal) which is given to each function comprising the inner system of the AVC–LAN.

1. MULTI–DISPLAY (CRT DISPLAY) DISPLAY (Physical address: 110)

HINT:

- *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting an engine.
- *2: This code is stored when 180 sec. has passed after the power supply connector is pulled out after engine start.
- *3: This code may be stored when the engine key is turned again after engine start.
- *4: This code may be stored when the engine key is turned again 1 min. after engine start.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
21	ROM Error	Abnormal condition of ROM is detected.	Replace multi–display (CRT display) display (CRT display) display.
22	RAM Error	Abnormal condition of RAM is detected.	Replace multi–display (CRT display) display (CRT display) display.
D5 *1	Registered component disconnected	Component shown by sub–code is or was disconnected from system with ignition switch in ACC or ON. Communication with component shown by sub–code is not ensured when engine is started.	• Check harness for power supply of component shown by sub–code. • Check harness for communication system of component shown by sub–code.
D8 *2	No response to connection check	Component shown by sub–code is or was disconnected from system after engine is started.	• Check harness for power supply of component shown by sub–code. • Check harness for communication system of component shown by sub–code.
D9 *1	Last Mode Error	Component operated (sound and/or image was provided) before engine stop is or was disconnected with ignition switch in ACC or ON.	• Check harness for power supply of component shown by sub–code. • Check harness for communication system of component shown by sub–code.
DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation	• Check harness for power supply system of component shown by sub–code. • Check harness for communication system of component shown by sub–code. • If error occurs again, replace component shown by auxilxary code
DB *1	Mode Status Error	Dual alarm is detected.	• Check harness for power supply system of component shown by sub–code. • Check harness for communication system of component shown by sub–code.
DC *4	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.

DE *3	Slave Reset (Momentary Interruption)	After engine start, slave component has been disconnected. DB	• Check harness for power supply system of component shown by sub–code. • Check harness for communication system of component shown by sub–code.
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

(b) Logical address: 34 (Front monitor)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
10	Error in Picture Circuit	Error in power supply system for picture circuit (abnormal voltage) is detected.	Replace multi–display (CRT display) display.
11	Back–light Error (No current)	Decline in power output from inverter circuit for back–light.	Replace multi–display (CRT display) display.
12	Back–light Error (Excess current)	Excess power output from inverter circuit for back–light.	Replace multi–display (CRT display) display.

2. NAVIGATION ECU (Physical address: 178)

HINT:

- *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- *2: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.
- *3: This code may be stored when the engine key is turned 1 min. again after engine start.
- *4: This code may be stored when the engine key is turned again after engine start.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, multi–display (CRT display) display was disconnected.	• Check harness for power supply system of multi–display (CRT display) display. • Check harness for communication system of multi–display (CRT display) display. • Check harness for power supply system of navigation ECU. • Check harness for communication system of navigation ECU.
D7 *2	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, multi–display (CRT display) display was disconnected. D6	• Check harness for power supply system of multi–display (CRT display) display. • Check harness for communication system of multi–display (CRT display) display. • Check harness for power supply system of navigation ECU. • Check harness for communication system of navigation ECU.
DC *3	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.

DD *4	Master Reset (Momentary Interruption)	Component that is to be master has been disconnected after engine start.	• Check harness for power supply system of multi–display (CRT display) display. • Check harness for communication system of multi–display (CRT display) display. • If error occurs frequently, replace multi–display (CRT display) display.
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
E2	ON/OFF Instruction Parameter Error	Error is detected in ON/OFF control command from multi–display (CRT display) display.	Replace multi–display (CRT display) display.
E3 *1	Registration Request Transmission	• Registration Request command is output from slave component. • Registration Request command is output from sub–master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	• Check harness for power supply of multi–display (CRT display) display. • Check harness for communication system of multi–display (CRT display) display. • Check harness for communication system between multi–display (CRT display) display and radio and player.
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

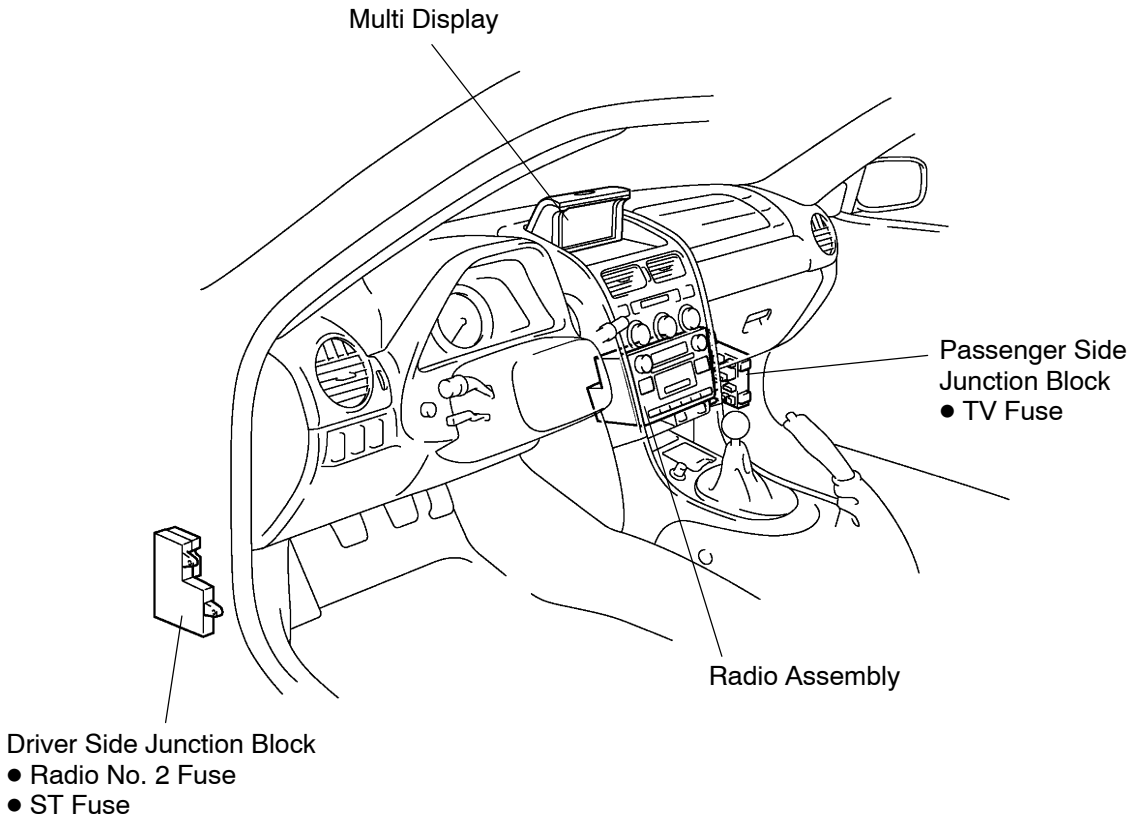
(b) Logical address: 58 (Navigation ECU)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
10	Gyro Error	Error in gyro sensor is detected. (Abnormal value in voltage output from sensor is detected for more than specified time.)	Replace navigation ECU.
11	GPS Receiver Error	Operation error of GPS receiver is detected.	At an outdoor site with a clear view, operate to display GPS data. If GPS mark is not properly displayed after 15 min. or more, replace navigation ECU.
40	GPS Antenna Error	Open condition of GPS antenna is detected. (Open circuit, connection failure of connectors, etc.)	Inspect antenna and replace if necessary.
41	Power Supply Error of GPS Antenna	Abnormal voltage of GPS antenna cable or short circuit is detected.	• Inspect GPS antenna and replace if necessary. (When no continuity is identified between connector’s core and sealed part, GPS antenna is normal.) • If GPS antenna is normal, replace navigation ECU.
42	Map Disc Error	Data cannot be read for a certain time due to scratches or dirt on disc surface or insertion of wrong disc.	Inspect disc and replace if necessary. (Visually check disc surface and wipe it with soft cloth.)
43	Vehicle Signal Error	Input error of vehicle signal is detected. (When no vehicle signal has been input for a certain time.)	• Inspect wire harness. • If wire harness is normal, replace navigation ECU.

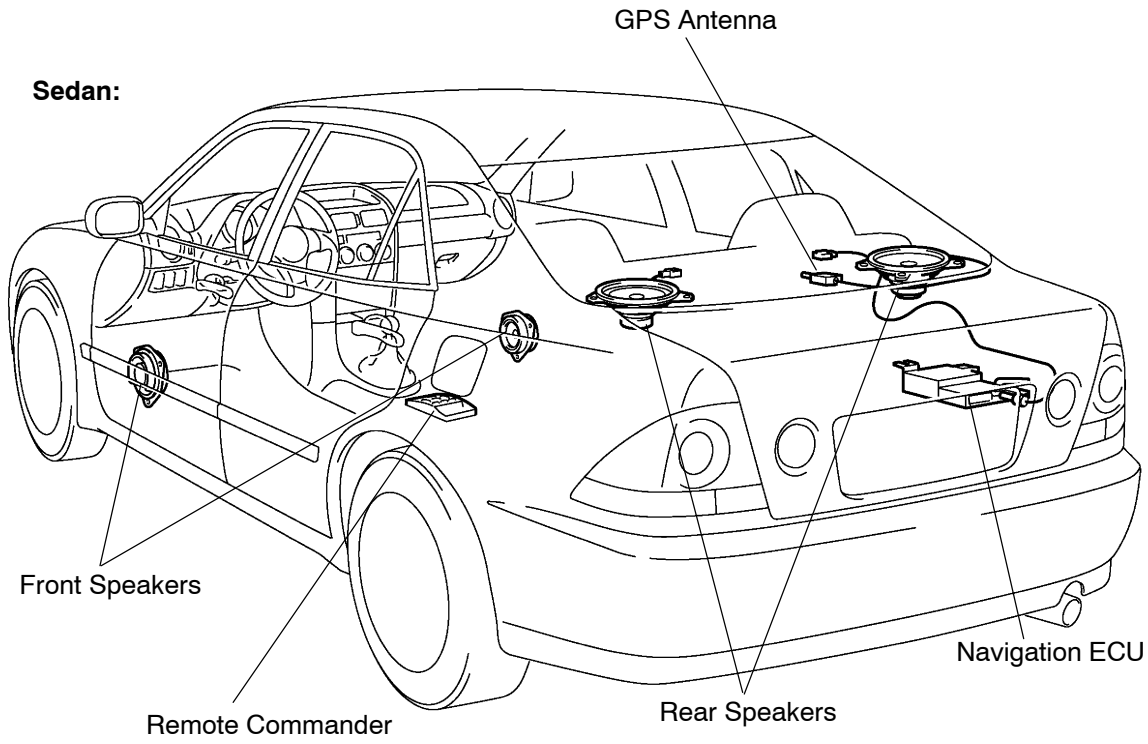
44	Player Error	Malfunction of player continues for a certain length of time.	• Check if disc can be inserted/taken out or not. If not, replace navigation ECU. • If it can be inserted/taken out and this code is output, replace navigation ECU.
45	Player Temp. Too High	Readout cannot be dome because temperature around player's pickup (reading part) is too high.	• With ignition switch OFF, leave in cool shaded place for a while and recheck. • If same code detected, replace navigation ECU.

DI9I4–01

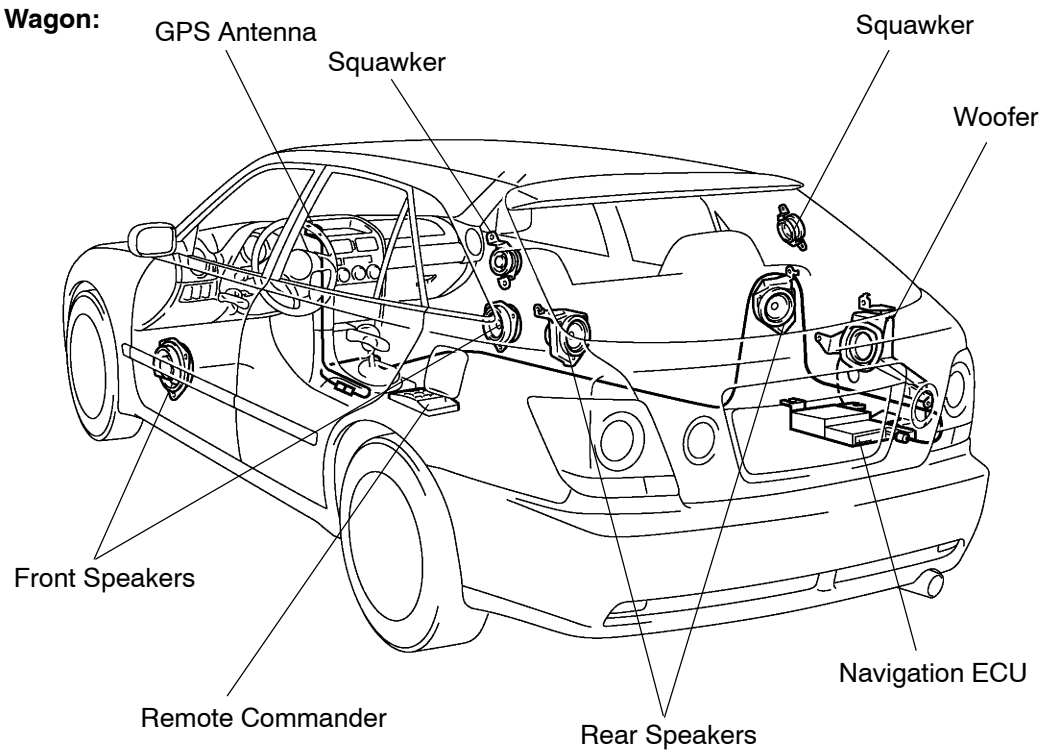
PARTS LOCATION



Sedan:



I23481


Wagon:
GPS Antenna
Squawker
Squawker
Woofer
Front Speakers
Navigation ECU
Remote Commander
Rear Speakers

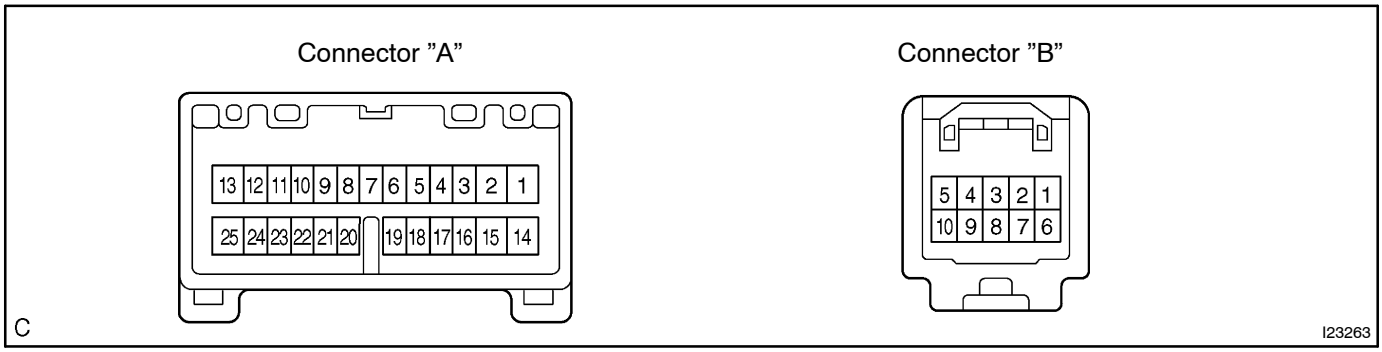
C

I23254

DI63F–02

TERMINALS OF ECU

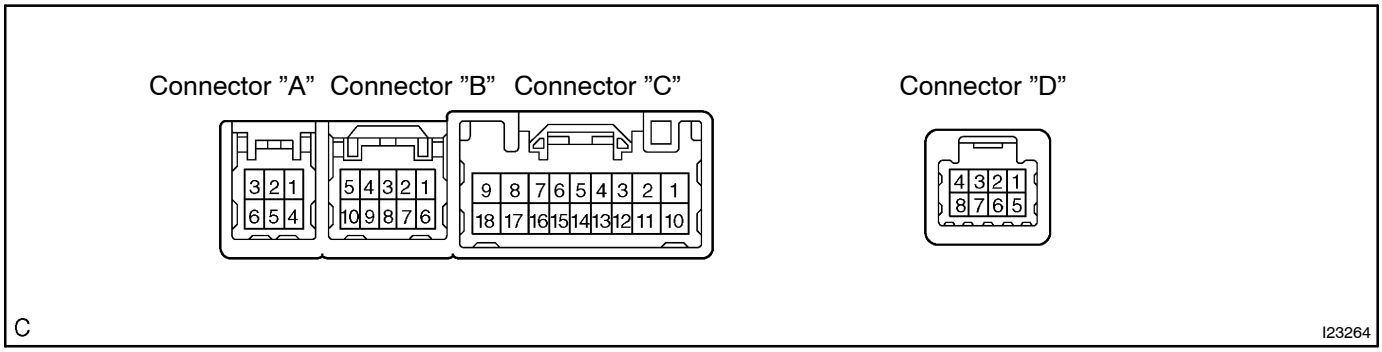
1. MULTI DISPLAY



Terminals (Symbols)	Condition	Specified value	Problem symptom when open circuit is detected. / Problem symptom when short circuit is detected.
A1 – A25 (+B – GND1)	Constant	Battery voltage	Screen is in disorder.
A3 – A25 (IG – GND1)	Ignition switch ON	Battery voltage	Navigation system does not operate.
A4 – A25 (SPD – GND1)	Input signal displayed	–	Navigation operation is available during driving, or a cursor on present site does not move.
A5 (GTX+)	System checking	–	Screen is in disorder. / Navigation system does not operate.
A7 – A25 (DR – GND1)	System checking	–	Screen is in disorder. / Navigation system does not operate.
A10 – A25 (RE1 – GND1)	Ignition switch position ACC	Approx. 3 V	Controller does not operate.
A14 – A25 (ACC – GND1)	Ignition switch position ACC	Battery voltage	Screen is in disorder / Fuse is blown.
A15 – A25 (ST1 – GND1)	Ignition switch ON	Battery voltage	Navigation system does not operate.
A16 – A25 (TC – GND1)	Ignition switch position OFF and connect terminals TC and CG of DLC3.	Continuity	Screen ins in disorder. / Constant screen is normal.
A17 – A25 (PKB – GND1)	Input signal displayed	–	The system can not enter diagnosis system mode. / Normal.
A18 (GTX–)	System checking	–	Screen is in disorder. / Navigation system does not operate.
A22 – Body ground (SGD1 – Body ground)	Constant	Continuity	Normal.
A25 – Body ground (GND1 – Body ground)	Diagnosis display check screen is white.	Continuity	Normal.

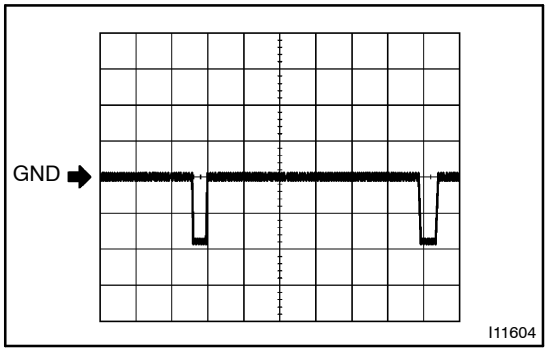
B1 – A25 (VR – GND1)	Constant	Approx. 2.5 V	Screen is in disorder.
			Navigation system does not operate.
B2 – A25 (R – GND1)	Diagnosis display check screen is white.	Using an oscilloscope *2	Screen color turns to light blue.
B3 – A25 (B – GND1)	Ignition switch position ACC	Using an oscilloscope *2	Screen color turns to yellow.
B5 (CTX+)	System checking	–	Screen is in disorder.
			Navigation system does not operate.
B6 – A25 (VG – GND1)	Constant	Continuity	Normal.
B7 – A25 (G – GN1)	Diagnosis display check screen is white.	Using an oscilloscope *2	Screen color turns to pink.
B8 – A25 (SYNC – GND1)	Navigation screen is display.	Using an oscilloscope *1	Screen noise or other types of noise occur.
B10 (CTX–)	System checking	–	Screen is in disorder.
			Navigation system does not operate.

2. NAVIGATION ECU



Terminals (Symbols)	Condition	Specified value	Problem symptom when open circuit / Problem symptom when short circuit
B1 – Body ground (VR – Body ground)	Constant	Continuity	Normal
B2 – C17 (R – GND)	Diagnosis display check screen is while	Using an oscilloscope *2	Screen color turns to light blue.
B3 – C17 (B – GND)	Diagnosis display check screen is while	Using an oscilloscope *2	Screen color turns to light yellow.
B5 – B10 (TX+ – TX–)	Ignition switch position ACC	Approx. 3 V	Controller does not operate.
B6 – Body ground (VG – Body ground)	Constant	Continuity	Normal
B7 – C17 (G – GND)	Diagnosis display check screen is while	Using an oscilloscope *2	Screen color turns to pink.
B8 – C17 (SYNC – GND)	Diagnosis display check screen is while	Using an oscilloscope *1	Screen is in disorder.
B10 – Body ground (TX– – Body ground)	Constant	Continuity	Normal.
C1 – C17 (AUI+ – GND)	Speaker sounding.	5 – 7 V	Driver side speaker does not sound.
C2 – C17 (AUO+ – GND)	Speaker sounding.	5 – 7 V	Driver side speaker does not sound.
C4 (MUTE)	Speaker sounding.	–	Screen noise or other types of noise occur. / Driver side speaker does not sound.
C5 (SPD)	Input signal displayed	–	Navigation operation is available during driving, or a cursor on present site does not move.
C9 – C17 (+B – GND)	Constant	Battery voltage	Screen is in disorder. / Fuse is blown.
C10 – C17 (AUI– – GND)	Speaker sounding.	5 – 7 V	Diver side speaker does not sound.
C11 – C17 (AUO– – GND)	Speaker sounding.	5 – 7 V	Driver side speaker does not sound.

C15 (MUTE)	Speaker sounding.	–	Screen noise or other types of noise occur.
			Driver side speaker does not sound.
C17 – Body ground (GND – Body ground)	Constant	Continuity	Normal.
C18 – C17 (ACC – GND)	Ignition switch position ACC.	Battery voltage	Screen is in disorder.
			Fuse is blown.
D1 – C17 (SW– – GND)	Ignition switch OFF	0 V	Switch illumination dose not light up and switch can be operation.
D3 – C17 (MIC+ – GND)	Ignition switch position ACC	Approx. 5 V	No voice can be heard from cellular phone and voice recognition cannot be done.
D4 – C17 (MACC – GND)	Ignition switch position ACC	Approx. 5 V	No voice can be heard from cellular phone and voice recognition cannot be done.
D5 – C17 (MIC– – GND)	Ignition switch position ACC	Approx. 5 V	No voice can be heard from cellular phone and voice recognition cannot be done.
D6 – Body ground (SGND – Body ground)	Constant	Continuity	Normal.
D7 (SNSE)	–	–	–
D8 – C17 (SW+ – GND)	Ignition switch position ACC	Approx. 5 V	Switch illumination dose not light up and switch can be operation.

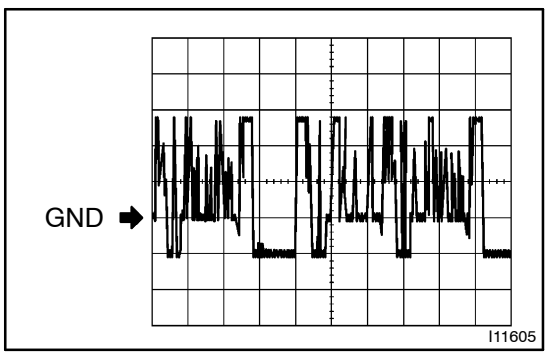


Oscilloscope

Wave *1

HINT:

- Terminal SYNC, EXSYNG ↔ GND1
- Gauge set 500 mV/DIV 10 μs/DIV
- Condition: Screen is display



Wave *2

HINT:

- Terminal R, G, B, E*–R, E*–G, EX–B ↔ GND1
- Gauge set 200 mV/DIV 10 μs/DIV
- Condition: Screen changing

DI282-10

PROBLEM SYMPTOMS TABLE

HINT:

Inspect the input/output voltage of the terminals which are described in the column of Terminal in the table. Inspect other terminals which are not described referring to "Terminal of ECU".

Symptom	Suspect Area	See page
The screen is dark, nothing shines on the screen.	1. Multi display 2. Wire harness and connector	DI–593 IN–34
Nothing appears on the screen. (Back light lights up.)	1. Multi display (Terminal R, G, B) 2. Navigation ECU (Connector C Terminal ACC, +B Connector B Terminal R, G, B) 3. Wire harness and connector	DI–593 DI–593 DI–593 IN–34
The screen is white.	1. Multi display (Terminal R, G, B) 2. Navigation ECU (Connector B Terminal R, G, B) 3. Wire harness and connector	DI–593 DI–593 IN–34
The screen is in disorder. (Synchronizing disorderly.)	1. Multi display (Terminal SYNC) 2. Navigation ECU (Connector B Terminal SYNC) 3. Wire harness and connector	DI–593 DI–593 IN–34
The color on the screen is unusual.	1. Multi display (Terminal R, G, B) 2. Navigation ECU (Connector B Terminal R, G, B) 3. Wire harness and connector	DI–593 DI–593 IN–34
Remote commander switch does not work.	1. Remote commander 2. Cradle 3. Display ECU 4. Wire harness	– – DI–593 IN–34
GPS mark does not appear at any time and at any place.	1. Navigation ECU (Diagnosis check) 2. Wire harness and connector	DI–593 IN–34
A cursor on present site does not move.	1. Navigation ECU (SPD signal is checked on the "CAR SIGNAL INFORMATION" during diagnosis check.) 2. Wire harness and connector	DI–593 IN–34
Movement of cursor on present site is always unusual.	1. Navigation ECU	DI–593
Even though the battery has not been removed, the route and destination are not displayed.	1. Navigation ECU (Connector C Terminal "+B") 2. Wire harness and connector	DI–593 IN–34
Navigation voice can not be heard at all from the driver's side speaker.	1. Navigation ECU (Volume adjustment)	DI–593
No sound except the navigation voice can be heard at all from the driver's side speaker.	1. Navigation ECU (Connector "C" Terminal "AUI+", "AUI–", "AUO+", "AUO–") 2 Wire harness and connector	DI–593 IN–34
No sound can be heard at all from the driver's side speaker.	1. Driver's side speaker 2. Wire harness and connector	– IN–34
No map is Multi displayed on the screen.	1. Navigation ECU (Diagnosis check)	DI–593

DI63G–02

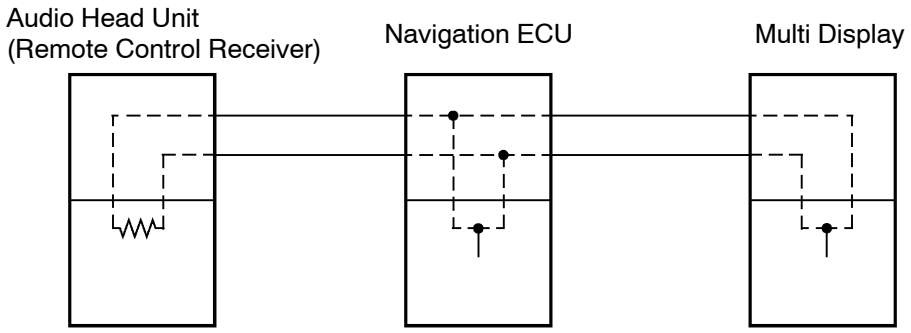
CIRCUIT INSPECTION

AVC–LAN (Communication bus) Circuit

CIRCUIT DESCRIPTION

Each unit of LEXUS navigation system connected with AVC–LAN (communication bus) transfers the signal of each switch by communication.
When +B short and GND short occur in this AVC–LAN, LEXUS navigation system will not function normally as the communication is discontinued.
In this AVC–LAN, Navigation ECU becomes the master of the communication, and the audio head unit has a resistance necessary for transmitting the communication.
Multi Display is connected between Navigation ECU and Audio head unit, LEXUS navigation system has the structure that makes communication impossible without Navigation ECU, Multi Display or Audio head unit.

AVC–LAN

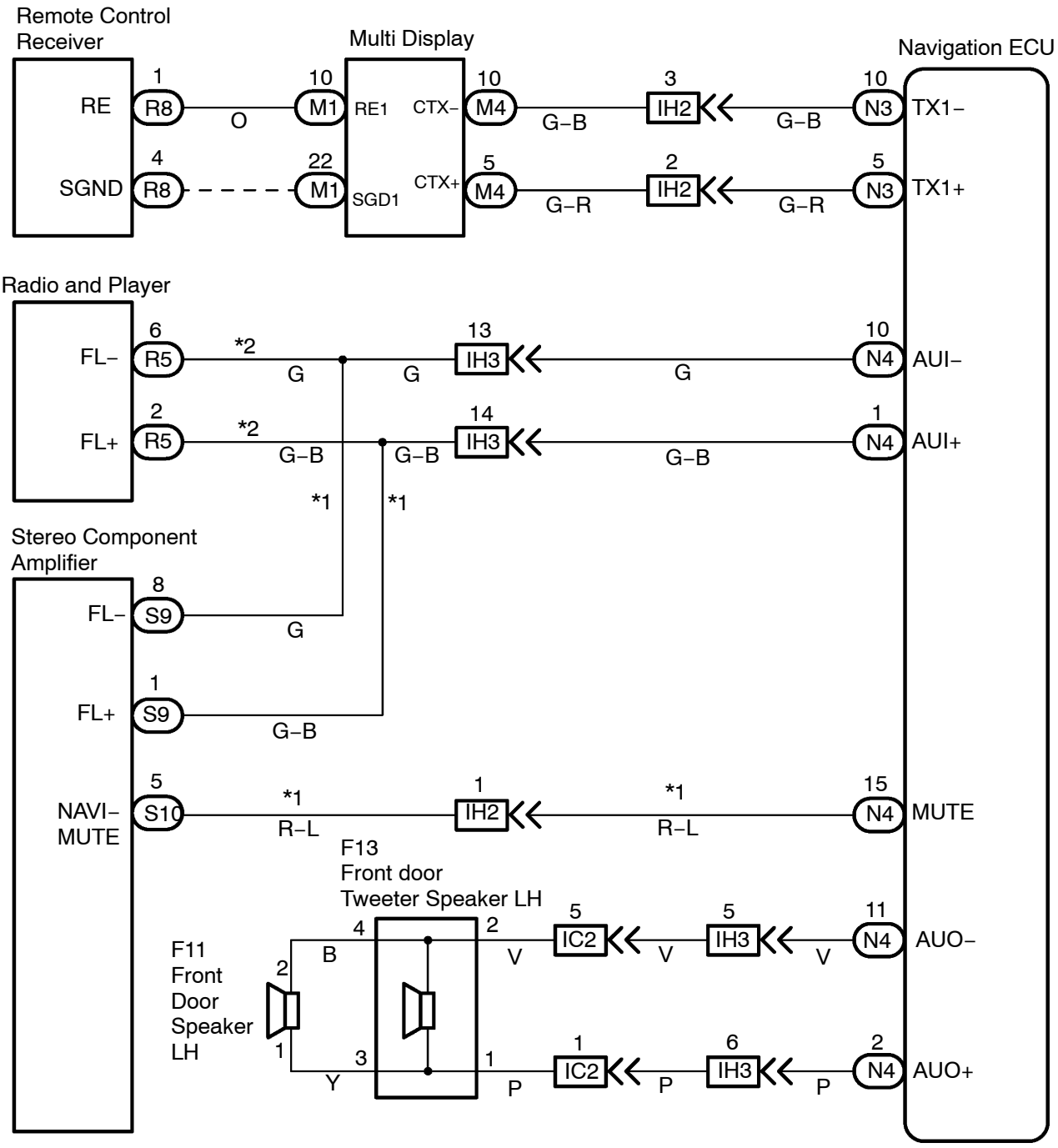


N

I11572

WIRING DIAGRAM

LHD Models

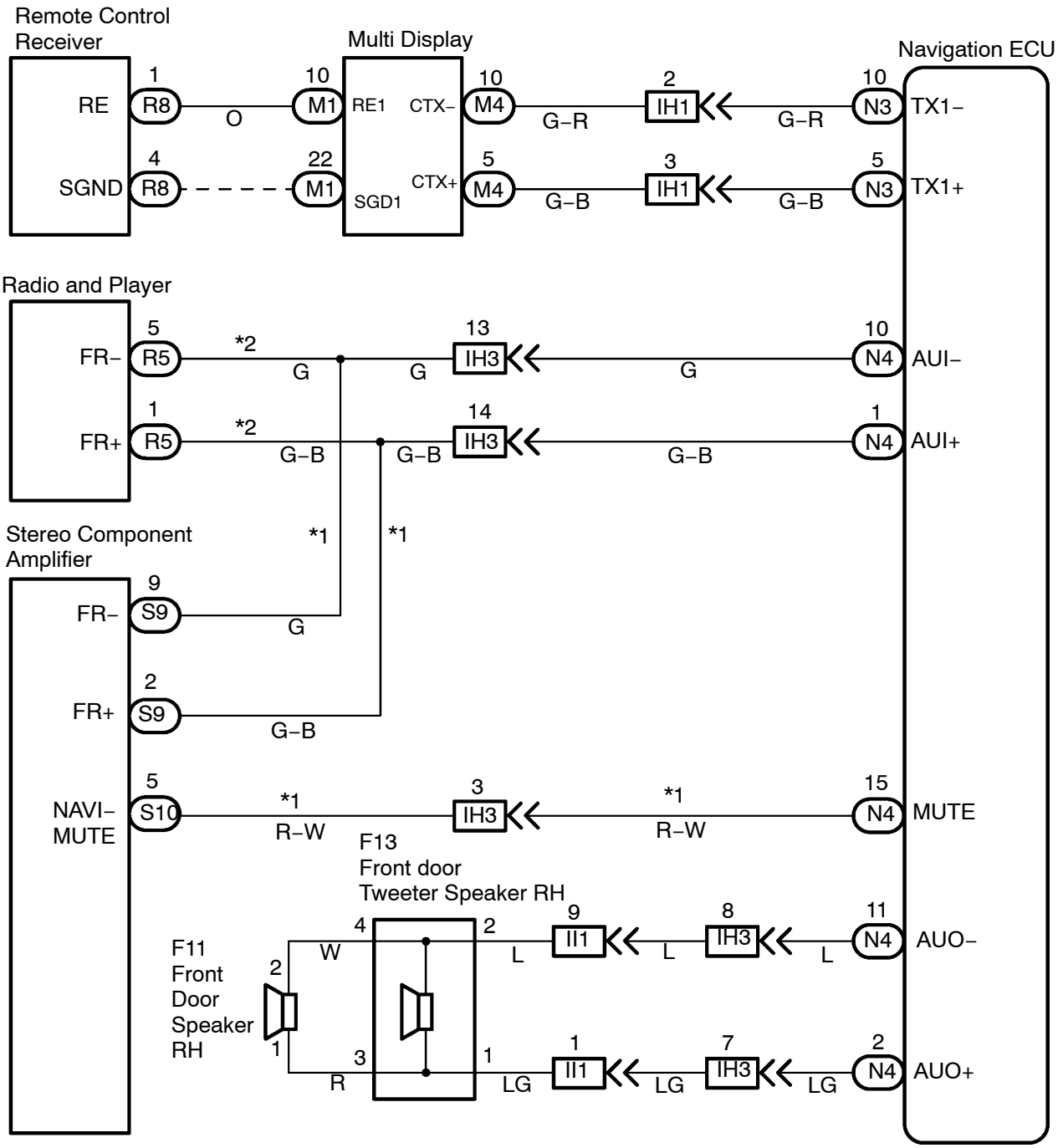


*1: 8 Speaker, 9 Speaker
*2: 6 Speaker

C

I23261

RHD Models



*1: 8 Speaker, 9 Speaker
*2: 6 Speaker

C

I23261

INSPECTION PROCEDURE

1	Disconnect the connector "S8" of power amplifier and check if AVC–LAN will be recovered normally.

CHECK:
Check that the display will change by pressing either of the Panel switch or Touch switch on the display.
HINT:
It can be judged that AVC–LAN is recovered if the display is changed.

OK	Replace the power amplifier

NG

2	Check wire harness and connector between radio and player and Navigation ECU. (See page IN–34)

NG	Repair or replace wire harness or connector between radio and player and Navigation ECU.

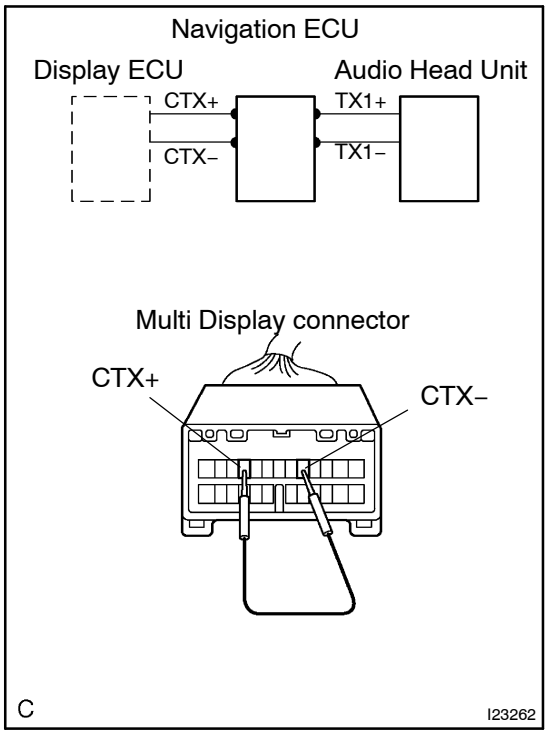
OK

3	Check wire harness and connector between Multi Display and Navigation ECU. (See page IN–34)

NG	Repair or replace wire harness or connector between Multi Display and Navigation ECU.

OK

4	Skip Display ECU and check AVC–LAN.



PREPARATION:

(a) Connect all the connectors except ”M1” of the Multi Display.

(b) Using 2 SSTs (Diagnosis check wire P/N 09893–12040), connect the terminal CTX+ of connector ”M1” and CTX+ of connector ”M1” of Multi Display.

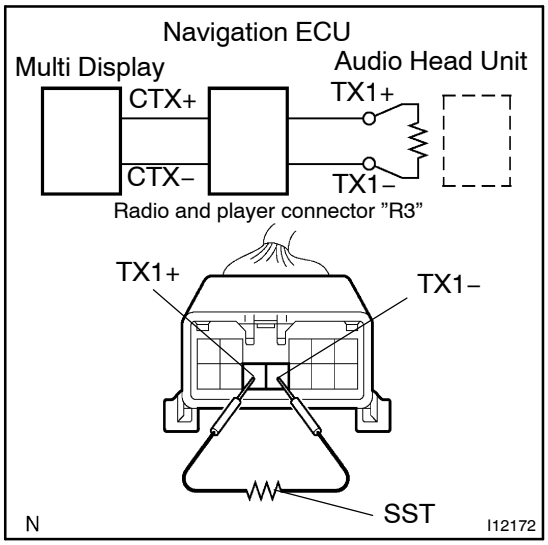
CHECK:

Operate radio and player (CD, Cassette tape, etc.) and check that the sound comes out from the speaker.
(Check that AVC–LAN is recovered.)

OK → **Replace the Multi Display.**

NG

5	Skip radio and player and check AVC–LAN.



PREPARATION:

(a) Connect Multi Display connector.
(b) Disconnect radio and player "F" connector.
(c) Using SST (Navigation Check Wire P/N 09843–18050), connect the terminal TX1+ to terminal TX1– of "F" connector of radio and player.

CHECK:

Operate the panel switch and the touch switch of the display and check that the navigation functions.
(Check that AVC–LAN is recovered.)

OK → **Replace the radio and player.**

NG

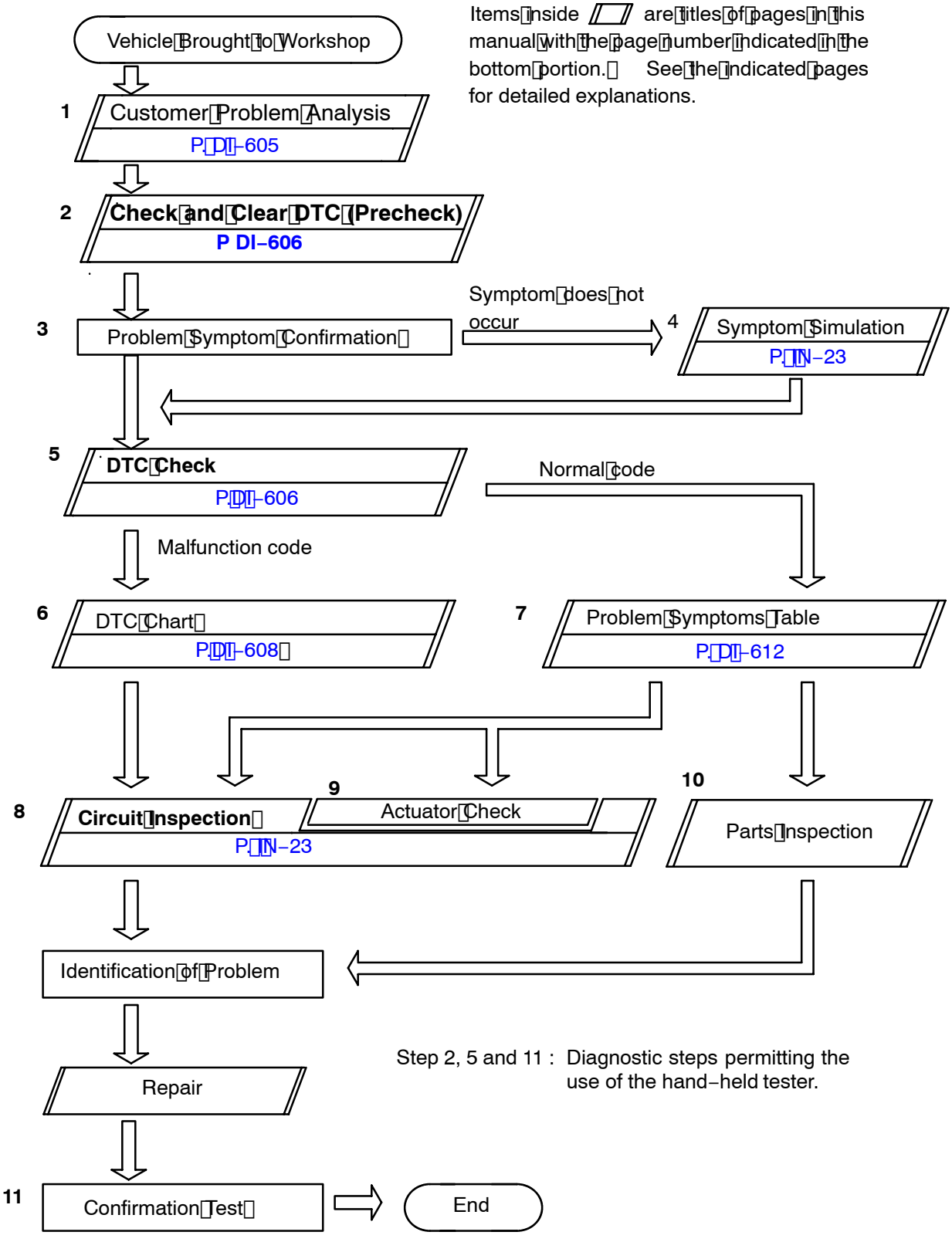
Replace the Navigation ECU.

AIR CONDITIONING SYSTEM

DI602–03

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.



DI603–01

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

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

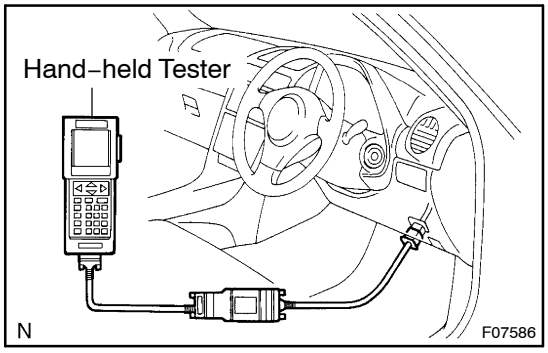
Date of Problem Occurrence	/ /
How Often does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)
Weather	☐ Fine ☐ Cloudy ☐ Snowy ☐ Various / Other
Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F °C)

Symptoms	**Air Flow Control is Faulty**	☐ Blower motor does not operation ☐ Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	☐ Cabin temperature does not go down ☐ Cabin temperature does not rise ☐ Response is slow
	Air Inlet Control is Faulty	☐ Cannot change between FRS and REC (Always Fresh or always Recirculating)
	Vent Control is Faulty	☐ Mode will not chage ☐ Will not enter the desired mode

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

DI9GU–01

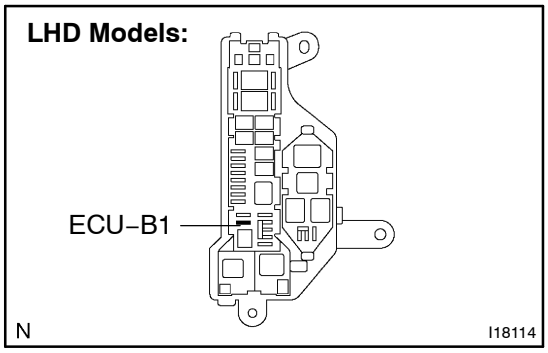
PRE–CHECK



1. DTC CHECK USING HAND–HELD TESTER

(a) Hook up the hand–held tester to the DLC3.

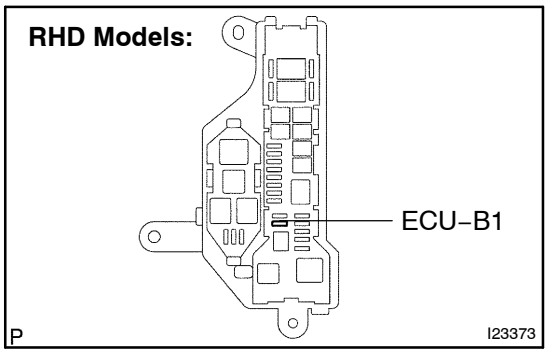
(b) Read the diagnostic trouble codes by following the prompts on the tester screen.
Please refer to the hand–held tester operator's manual for further details.



2. CLEARING DTC

(a) Pull out the ECU–B1 fuse in engin room J/B for 10 sec. or longer to clear diagnostic the DTC's memory.

(b) After reinserting the fuse, check that the normal code is output.



3. ACTUATOR CHECK

(a) Connect the hand–held tester to the DLC 3.
(b) Turn the ignition switch to ON and hand held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.
(d) Check the temperature and air flow visual and by hand.

Step No.	Pattern No.	Conditions				
		Blower motor	Air flow vent	Air inlet damper	Magnetic clutch	Air mix damper
1	0	OFF	FACE	FRESH	OFF	Cool side (–10% open)
2	1	1	↑	↑	↑	↑
3	2	17	↑	RECIRC / FRESH (54.5 % OPEN)	ON	↑
4	3	↑	↑	↑	↑	↑
5	4	↑	↑	↑	↑	Cool / Hot (50% open)
6	5	↑	BI–LEVEL	↑	↑	↑
7	6	↑	FOOT*1	↑	↑	Hot side (110% open)
8	7	↑	FOOT*2	↑	↑	↑
9	8	↑	FOOT/DEF	↑	↑	↑
10	9	31	DEF	↑	↑	↑

(*1): There is leakage from defroster.
(*2): There is no leakage from defroster.

DI605–06

DIAGNOSTIC TROUBLE CODE CHART

If malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.)

DTC No. (See page)	Detection Item	Trouble Area	Memory
B1400	Normal	–	–
B1411 (DI–614)	Room temperature sensor circuit	• Room temp. sensor • Harness or connector between room temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B1412 (DI–617)	Ambient temperature sensor circuit	• Ambient temp. sensor • Harness or connector between ambient temp. sensor and engine (and ECT) ECU • Harness or connector between engine (and ECT) ECU and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B1413 (DI–620)	Evaporator temperature sensor circuit	• Evaporator temp. sensor • Harness or connector between evaporator temp. sensor and A/C amplifier • A/C amplifier	○ (8.5 min. or more)
B1421 *3 (DI–623)	Solar sensor circuit	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • A/C amplifier	– ○ (8.5 min. or more)
B1422 *4 (DI–626)	All conditions below are detected for 3 sec. or more (a) Engine speed: 450 rpm or more (b) Ratio between engine and compressor rpm deviates 20% or more in comparison to normal operation.	• Compressor drive belt • Compressor lock sensor • Compressor • Harness and connector between A/C amplifier and compressor, compressor lock sensor • A/C amplifier • Engine (and ECT) ECU	–
B1423 (DI–629)	Open in pressure sensor circuit Abnormal refrigerant pressure [below 196 kPa (2.0 kgf/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)]	• Pressure switch • Harness or connector between pressure switch and engine (and ECT) ECU. • Harness or connector between engine (and ECT) ECU and A/C amplifier • Refrigerant pipe line • A/C amplifier • Compressor	–
B1431 (DI–632)	Air mix damper position sensor circuit	• Air mix damper position sensor • A/C amplifier • Harness or connector between air mix damper position sensor and A/C amplifier	○ (1 min. or more)
B1432/32 (DI–635)	Air inlet damper position sensor circuit	• Air inlet damper position sensor • A/C amplifier • Harness or connector between air mix damper position sensor and A/C amplifier	○ (1 min. or more)
B1433 (DI–638)	Air outlet damper position sensor circuit	• Air outlet damper position sensor circuit • A/C amplifier • Harness or connector between air mix damper position sensor and A/C amplifier	○ (1 min. or more)

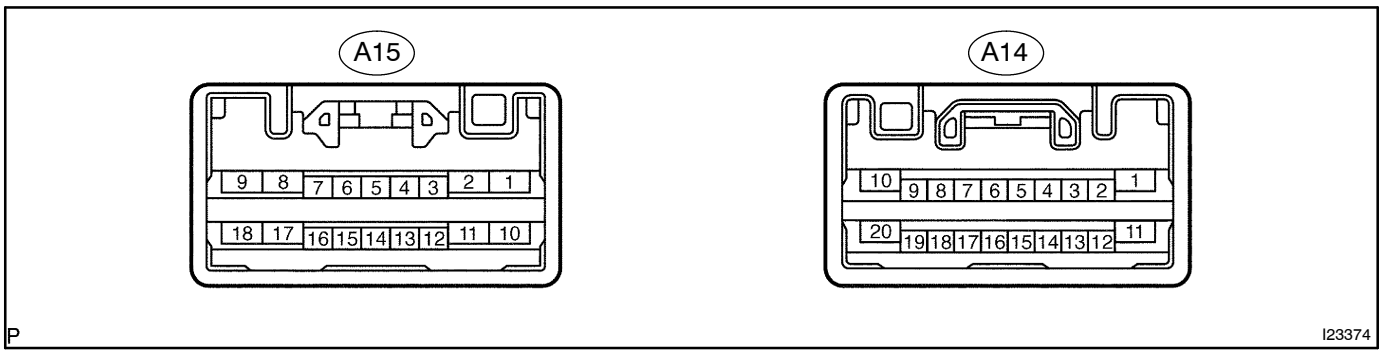
B1441/41 (DI–641)	Air mix damper control servomotor circuit	• Air mix damper control servomotor • Air mix damper position sensor • Harness or connector between A/C amplifier and air mix position sensor • Harness and connector between A/C amplifier and mix damper control servomotor • A/C amplifier	○ (15 secs. or more)
B1442/42 (DI–644)	Air inlet damper control servomotor	• Air inlet damper control servomotor • Air inlet damper position sensor • Harness or connector between A/C amplifier and air inlet position sensor • Harness and connector between A/C amplifier and inlet damper control servomotor • A/C amplifier	○ (15 secs. or more)
B1443/43 (DI–647)	Air outlet damper control servomotor circuit	• Air outlet damper control servomotor • Air outlet damper position sensor • Harness or connector between A/C amplifier and air outlet position sensor • Harness and connector between A/C amplifier and outlet damper control servomotor • A/C amplifier	○ (15 secs. or more)
99	Multiplex communication circuit	Open in multiplex communication circuit	–

HINT:

- *1: If the room temp. is approx. –20°C (–4°F) or lower, DTC B1411 may be output even though the system is normal.
- *2: If the ambient temperature is approx. –50°C (–58°F) or lower, a DTC may be output even though the system is normal.
- *3: If the check is being performed in a dark place, DTC B1421 (solar sensor circuit abnormal) could be displayed. In this case, perform DTC check again while shining a light, such as an inspection light, on the solar sensor. If DTC B1421/21 is still displayed, there could be trouble in the solar sensor circuit.
- *4: Compressor lock (DTC B1422) is indicated only for a current malfunction (See page DI–626). To confirm DTC B1422, preform the following steps.
  (1) With the engine ON, enter the DTC check mode.

DI606–04

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
HAZD ↔ GND (A14–1 ↔ A15–18)	G–W ↔ W–B	IG ON. Hazard switch: ON	Continuity
		IG ON. Hazard switch: OFF	No Continuity
AIF ↔ GND (A14–2 ↔ A15–18)	R–W ↔ W–B	IG ON. Air inlet selector: FRESH	Below 1.0 V
		IG ON. Air inlet selector: RECIRC	No voltage
AOD ↔ GND (A14–3 ↔ A15–18)	L–R ↔ W–B	IG ON. Mode selector: FACE	Below 1.0 V
		IG ON. Mode selector: DEF	10 – 14 V
TS ↔ SG (A14–5 ↔ A14–20)	GR–L ↔ BR–W	IG ON. Solar sensor subject to electric light	0.8 – 4.3 V
		IG ON. Solar sensor is covered by a cloth	Below 0.8 V
TPM ↔ SG (A14–6 ↔ A14–20)	R–Y ↔ BR–W	IG ON. Mode selector: FACE	3.5 – 4.5 V
		IG ON. Mode selector: DEF	0.5 – 1.5 V
TE ↔ SG (A14–7 ↔ A14–20)	B–R ↔ BR–W	IG ON. Evaporator temp.: 0 °C (32 °F)	2.0 – 2.4 V
		IG ON. Evaporator temp.: 15 °C (59 °F)	1.4 – 1.8 V
S5 ↔ SG (A14–8 ↔ A14–20)	GR–R ↔ BR–W	IG ON.	4.5 – 5.5 V
MPX+ ↔ GND (A14–10 ↔ A15–18)	O ↔ W–B (*1) L ↔ W–B (*2)	IG ON.	Pulse generation
AIR ↔ GND (A14–11 ↔ A15–18)	Y–G ↔ W–B	IG ON. Air inlet selector: FRESH	Below 1.0 V
		IG ON. Air inlet selector: RECIRC	10 – 14 V
AOF ↔ GND (A14–12 ↔ A15–18)	P–L ↔ W–B	IG ON. Mode selector: FACE	10 – 14 V
		IG ON. Mode selector: DEF	Below 1.0 V
AMC ↔ GND (A14–13 ↔ A15–18)	P–B ↔ W–B	IG ON. Temperature control: Max. Hot	Below 1.0 V
		IG ON. Temperature control: Max. Cool	10 – 14 V
AMH ↔ GND (A14–14 ↔ A15–18)	LG–R ↔ W–B	IG ON. Temperature control: Max. Hot	10 – 14 V
		IG ON. Temperature control: Max. Cool	Below 1.0 V
TP ↔ SG (A14–15 ↔ A14–20)	V–W ↔ BR–W	IG ON. Temperature control: Max. Hot	0.5 – 1.5 V
		IG ON. Temperature control: Max. Cool	3.5 – 4.5 V
TPI ↔ SG (A14–16 ↔ A14–20)	GR–R ↔ BR–W	IG ON. Air inlet selector: RECIRC	3.5 – 4.5 V
		IG ON. Air inlet selector: FRESH	0.5 – 1.5 V
TR ↔ SG (A14–17 ↔ A14–20)	L–W ↔ BR–W	IG ON. Cabin temp.: 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Cabin temp.: 40 °C (104 °F)	1.2 – 1.6 V
SG ↔ Body Ground (A14–20 ↔ Body Ground)	BR–W ↔ Body Ground	Always	Continuity
MPX– ↔ GND (A15–1 ↔ A15–18)	L ↔ W–B (*1) O ↔ W–B (*2)	IG ON.	Pulse generation
PKB ↔ GND (A15–3 ↔ A15–18)	Y–R ↔ W–B	IG ON. Brake warning light: ON	Below 1.0 V
		IG ON. Brake warning light: OFF	10 – 14 V

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
PWR ↔ GND (A15–4 ↔ A15–18)	L–W ↔ W–B	IG ON. Pattern select switch: PWR	Below 1.0 V
		IG ON. Pattern select switch: Except PWR	10 – 14 V
P–S/B ↔ GND (A15–5 ↔ A15–18)	P–G ↔ W–B (*1) P–B ↔ W–B (*2)	IG ON. Passenger seat belt warning: Flash	Below 1.0 V
		IG ON. Passenger seat belt warning: OFF	10 – 14 V
MHTR ↔ GND (A15–6 ↔ A15–18)	G–O ↔ W–B (*1) W–L ↔ W–B (*2)	IG ON. Defogger switch: ON	10 – 14 V
		IG ON. Defogger switch: OFF	Below 1.0 V
ACC ↔ GND (A15–7 ↔ A15–18)	GR ↔ W–B	IG ACC.	10 – 14 V
		IG OFF.	Below 1.0 V
+B ↔ Body ground (A15–8 ↔ Body ground)	R–Y ↔ Body Ground	Always	10 – 14 V
HR ↔ Body Ground (A15–10 ↔ Body Ground)	L ↔ Body Ground	IG ON.	Below 1.0 V
		IG OFF.	10 – 14 V
WIP ↔ GND (A15–11 ↔ A15–18)	L–R ↔ W–B	IG ON. Wiper switch: ON	Pulse generation
BLW ↔ GND (A15–12 ↔ A15–18)	V ↔ W–B	IG ON. Operate blower motor	Pulse generation
SNOW ↔ GND (A15–13 ↔ A15–18)	B–Y ↔ W–B	IG ON. Pattern select switch: SNOW	Below 1.0 V
		IG ON. Pattern select switch: Except SNOW	10 – 14 V
REOST ↔ GND (A15–14 ↔ A15–18)	W–G ↔ W–B	Light control switch: ON	Below 1.0 V
		Light control switch: OFF	No voltage
ILL+ ↔ GND (A15–15 ↔ A15–18)	G ↔ W–B	Light control switch: ON	10 – 14 V
		Light control switch: OFF	Below 1.0 V
IG ↔ GND (A15–16 ↔ A15–18)	B–R ↔ W–B	IG ON.	10 – 14 V
		IG OFF.	Below 1.0 V
GND ↔ Body ground (A15–18 ↔ Body ground)	W–B ↔ Body Ground	Always	Continuity

*1:LHD models
*2:RHD models

DI607–06

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate	1. A/C amplifier 2. ACC power source circuit	IN–34 DI–656
Air Flow Control: No blower operation	1. ACC power source circuit 2. Heater main relay circuit 3. Blower motor circuit 4. A/C amplifier	DI–656 DI–659 DI–663 IN–34
Air Flow Control: No blower control	1. Heater main relay circuit 2. Blower motor circuit 3. A/C amplifier 4.Solar sensor circuit	DI–659 DI–663 IN–34 DI–623
Air Flow Control: Insufficient air flow	Blower motor circuit	DI–663
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Air mix damper position sensor circuit 7. Air mix damper control servomotor circuit 8. Room temp. sensor circuit 9. Ambient temp. sensor circuit 10. A/C amplifier	AC–23 * AC–16 * AC–3 * DI–666 DI–629 DI–632 DI–641 DI–614 DI–617 IN–34
Temperature Control: No warm air comes out	1. Air mix damper position sensor circuit 2. Air mix damper control servomotor circuit 3. Room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Evaporator temp. sensor circuit 6. A/C amplifier	DI–632 DI–641 DI–614 DI–617 DI–620 IN–34
Temperature Control: Output air is warmer or cooler that the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Evaporator temp. sensor circuit 9. Air mix damper position sensor circuit 10. Air mix damper control servomotor circuit 11. Air inlet damper position sensor circuit 12. Air inlet damper control servomotor circuit 13. Condenser 14. Evaporator 15. Heater radiator 16. Expansion valve 17. A/C amplifier	AC–23 * AC–16 * AC–3 * CO–21 DI–623 DI–614 DI–617 DI–620 DI–632 DI–641 DI–635 DI–644 AC–48 * – – – IN–34

Symptom	Suspect Area	See page
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Air mix damper position sensor circuit 4. Air mix damper control servomotor circuit 5. A/C amplifier	DI–614 DI–617 DI–632 DI–641 IN–34
No air inlet control	1. Air inlet damper position sensor circuit 2. Air inlet damper control servomotor circuit 3. A/C amplifier	DI–635 DI–644 IN–34
No air flow mode	1. Air outlet damper position sensor circuit 2. Air outlet damper control servomotor circuit 3. A/C amplifier	DI–638 DI–647 IN–34
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. A/C amplifier	DI–666 IN–34
Set temp. value displayed does not change up with operation of temp. control switch.	A/C amplifier	IN–34
DTC not recorded. Set mode is cleared when IG switch is turned off.	1. Back–up power source circuit 2. A/C amplifier	DI–650 IN–34

*: LEXUS IS200 Repair Manual Pub. No. RM684E

DI608–04

CIRCUIT INSPECTION

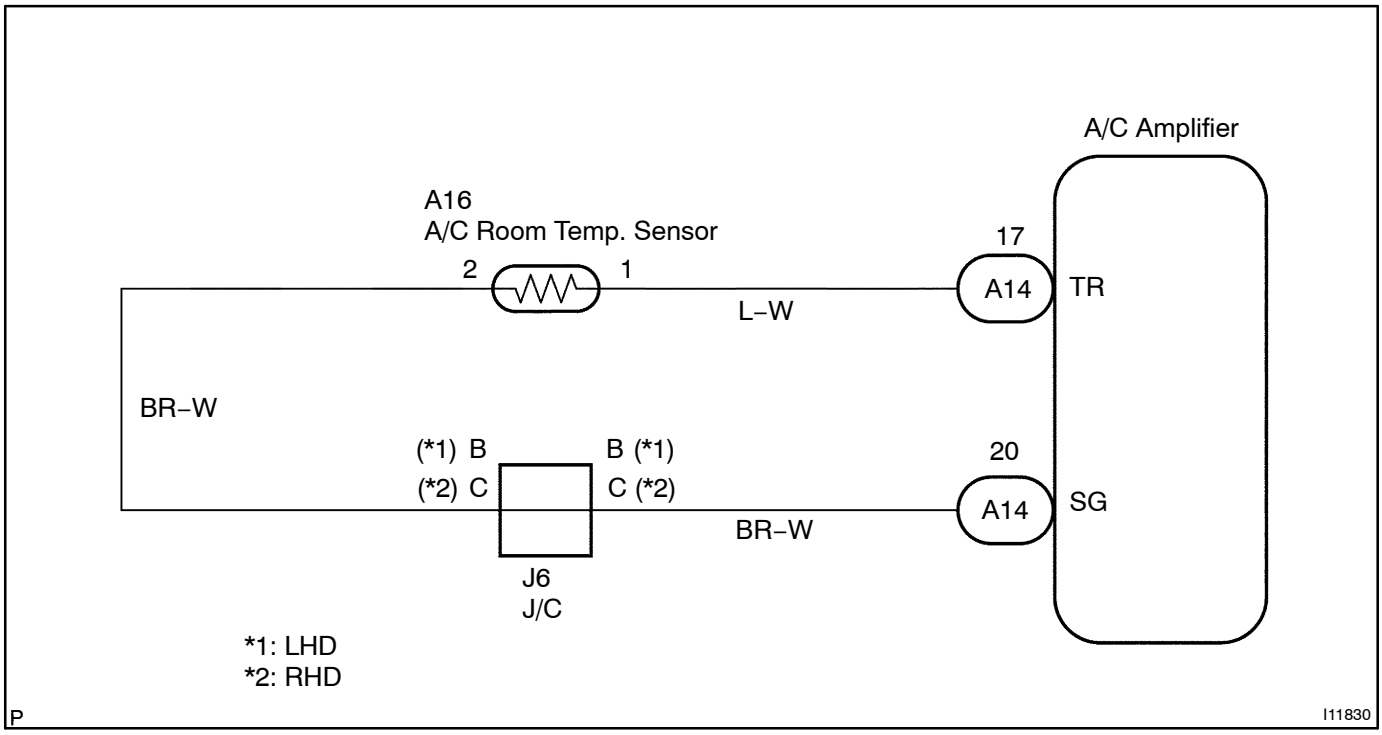
DTC	B1411	Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier.

DTC No.	Detection Item	Trouble Area
B1411	Open or short in room temperature sensor circuit.	• Room temperature sensor. • harness or connector between room temperature sensor and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

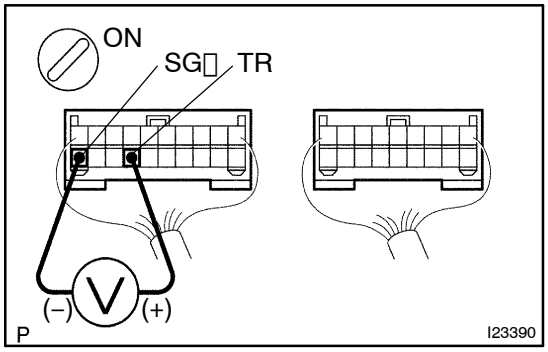
1	**Check room temp. sensor using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the room temp. sensor using DATA LIST.

OK ⇒ **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals TR and SG of A/C amplifier connector.**



PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Measure voltage between terminals TR and SG of A/C amplifier connector at each temperature.

OK:

Voltage:
at 25°C (77°F): 1.8 – 2.2 V
at 40°C (104°F): 1.2 – 1.6 V

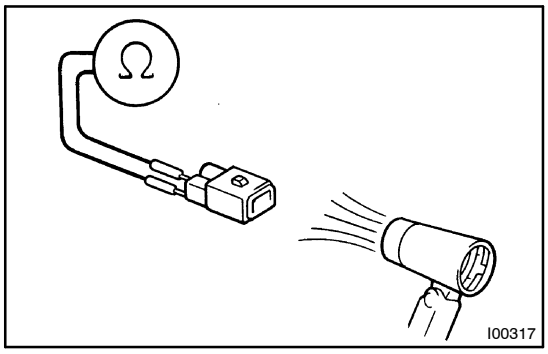
HINT:
As the temperature increases, the voltage decreases.

NG ⇒ **Go to step 3.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1411 is displayed, check and replace A/C amplifier.

3	**Check room temperature sensor.**



PREPARATION:
Remove room temperature sensor.
CHECK:
Measure resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.
OK:

Resistance:
at 25°C (77°F): 1.65 – 1.75 KΩ
at 50°C (122°F): 0.55 – 0.65 KΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace room temperature sensor.**

OK

4	**Check harness and connector between A/C amplifier and room temperature sensor (See page IN–34).**

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

OK

Check and replace A/C amplifier.

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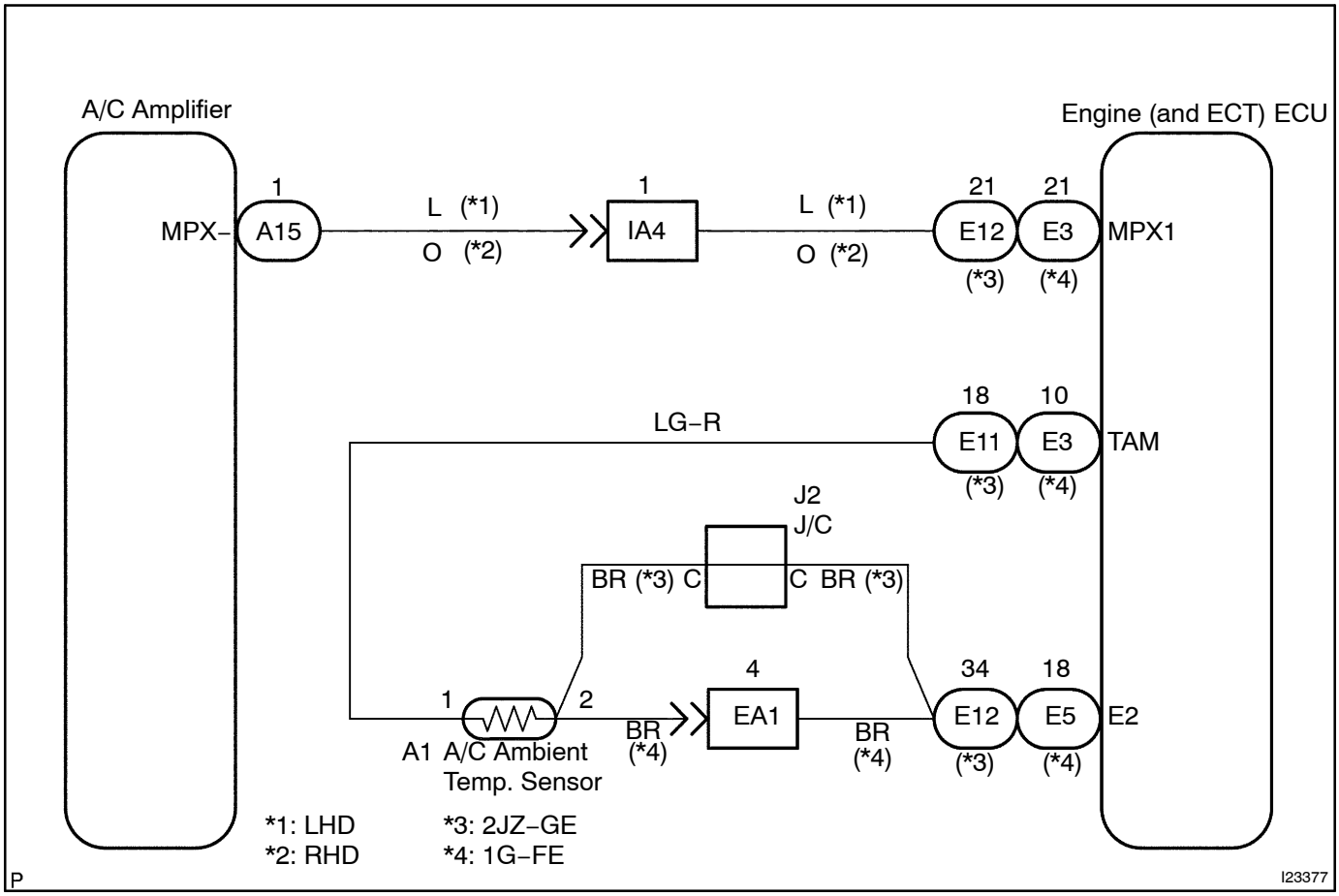
DTC	B1412	Ambient Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the A/C amplifier.

DTC No.	Detection Item	Trouble Area
B1412	Open or short in ambient temperature sensor circuit.	• Ambient temperature sensor. • Harness or connector between ambient temperature sensor and engine (and ECT) ECU • Harness or connector between engine (and ECT) ECU and A/C amplifier • Engine (and ECT) ECU • A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

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

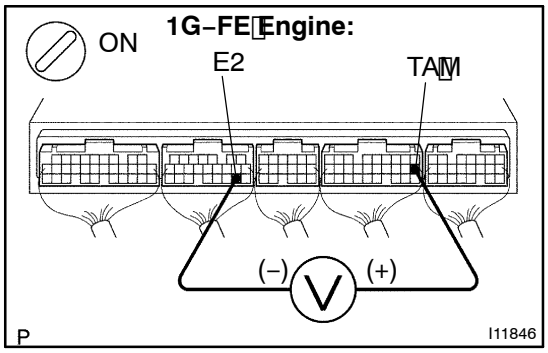
1	**Check ambient temp. sensor using hand–held tester.**

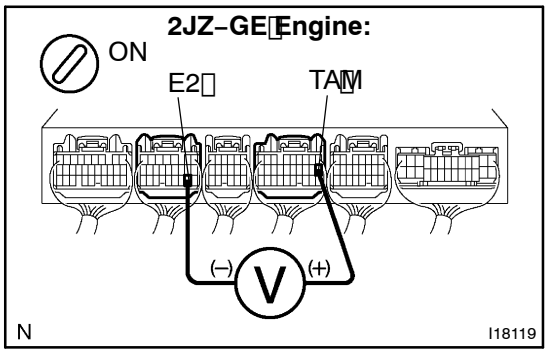
PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the ambient temp. sensor using DATA LIST.

OK ⇒ **Check and replace engine (and ECT) ECU.**

NG

2	**Check voltage between terminals TAM and E2 of engine (and ECT) ECU.**





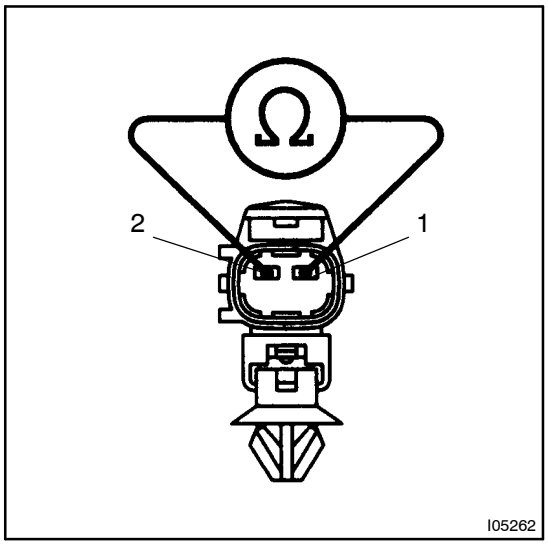
PREPARATION:
Remove engine (and ECT) ECU with connectors still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Measure voltage between terminals TAM and E2 of engine (and ECT) ECU connector at each temperature.
OK:
Voltage:
at 25°C (77°F): 1.35 – 1.75 V
at 40°C (104°F): 0.85 – 1.25 V
HINT:
As the temperature increases, the voltage decreases.

NG ⇒ **Go to step 3.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1412 is displayed, check and replace engine (and ECT) ECU and A/C amplifier.

3	**Check ambient temperature sensor.**



PREPARATION:
Disconnect ambient temperature sensor.
CHECK:
Measure resistance between terminals 1 and 2 of ambient temperature sensor connector at each temperature.
OK:

Resistance:
at 25°C (77°F): 1.6 – 1.8 kΩ
at 50°C (122°F): 0.5 – 0.7 kΩ

HINT:
As the temperature increases, the resistance decreases.
NOTICE:
When installing the ambient temperature sensor, be sure to connect the sensor connector before connecting the battery.

NG → **Replace ambient temperature sensor.**

OK

4	**Check harness and connector between engine (and ECT) ECU and ambient temperature sensor (See page IN–34).**

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

OK

5	**Check harness and connector between engine (and ECT) ECU and A/C amplifier (See page IN–34).**

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

OK

Check and replace engine (and ECT) ECU or A/C amplifier.

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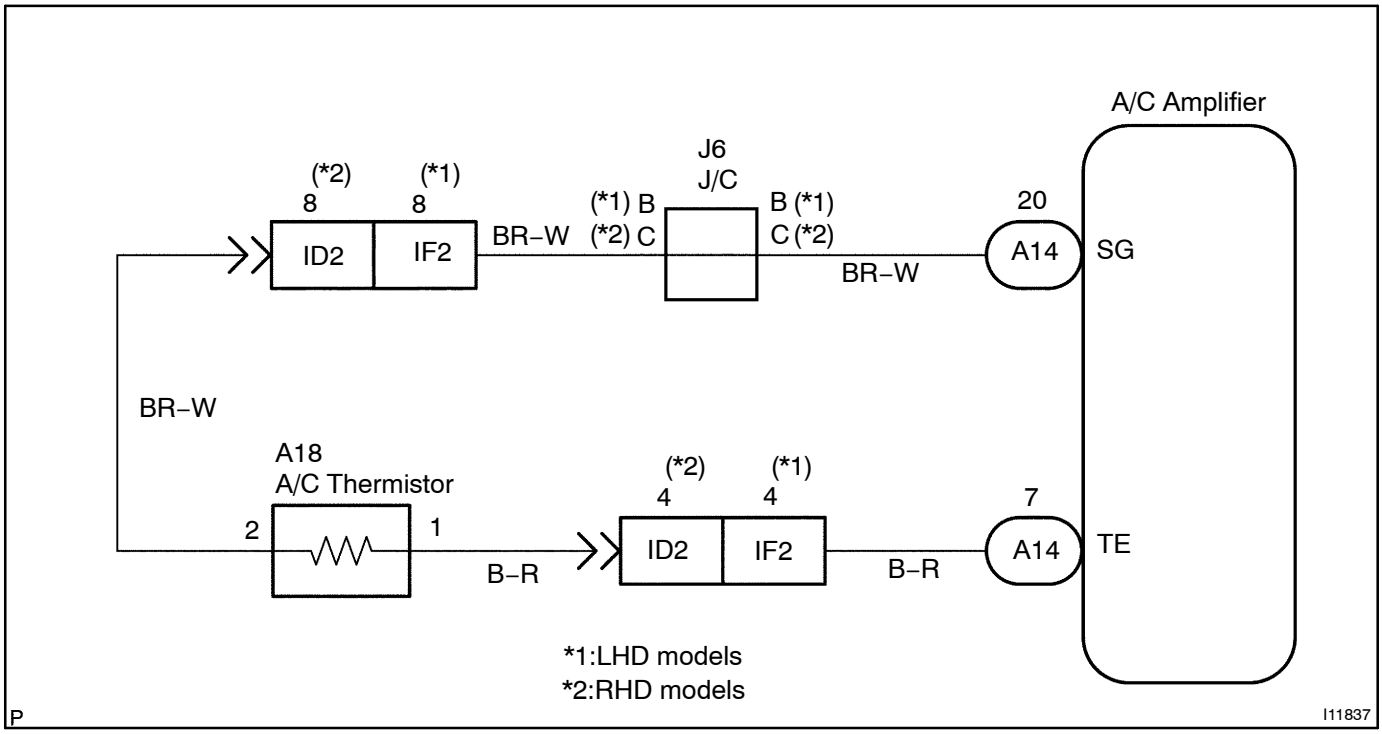
DTC	B1413	Evaporator Temperature Sensor circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the A/C unit and sends the appropriate signals to the A/C amplifier.

DTC No.	Detection Item	Trouble Area
B1413	Open or short in evaporator temperature sensor circuit.	• Evaporator temperature sensor. • Harness or connector between evaporator temperature sensor and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

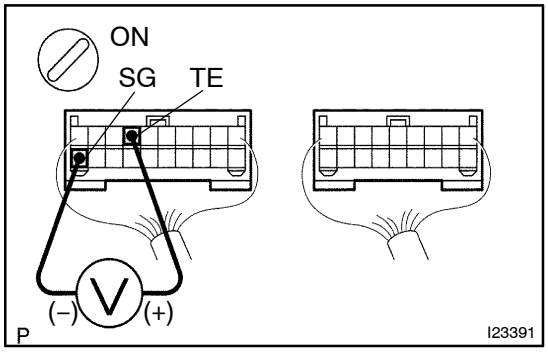
1	**Check evaporator temp. sensor using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the evaporator temp. sensor using DATA LIST.

OK → **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals TE and SG5 of A/C amplifier connector.**



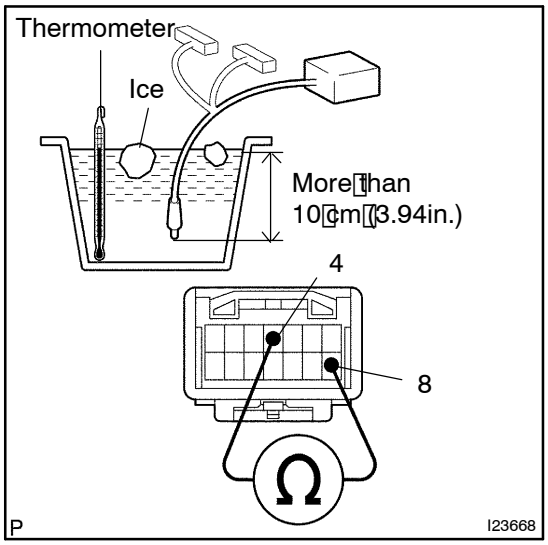
PREPARATION:
Remove the A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Measure voltage between terminals TE and SG of A/C amplifier connector at each temperature.
OK:
Voltage:
at 0°C (32°F): 2.0 – 2.4 V
at 15°C (59°F): 1.4 – 1.8 V
HINT:
As the temperature increases, the voltage decreases.

NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1413 is displayed, check and replace A/C amplifier.

3	**Check evaporator temperature sensor.**



PREPARATION:
Remove evaporator temperature sensor.
CHECK:
Measure resistance between terminals 4 and 8 of evaporator temperature sensor connector at each temperature.
OK:

Resistance:
at 0°C (32°F): 4.5 – 5.2 kΩ
at 15°C (59°F): 2.0 – 2.7 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG	**Replace evaporator temperature sensor.**

OK

4	**Check harness and connector between A/C amplifier and evaporator temperature sensor (See page IN–34).**

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

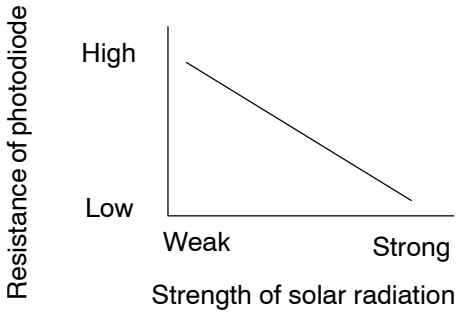
OK

Check and replace A/C amplifier.

DI60B–04

DTC	B1421	Solar Sensor Circuit

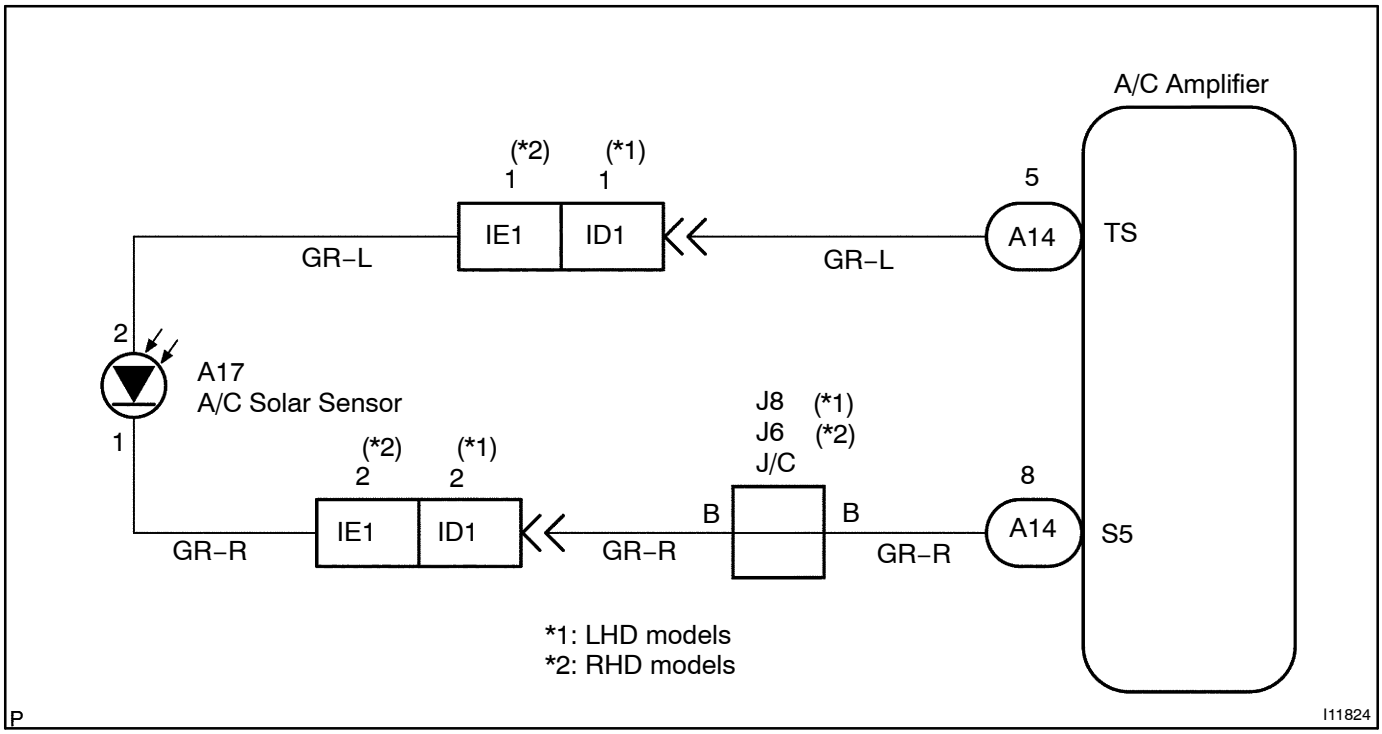
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C amplifier.

DTC No.	Detection Item	Trouble Area
B1421	Open or short in solar sensor circuit. Please note that display of diagnostic trouble code B1421 is not abnormal when the sensor is not receiving solar radiation.	• Solar sensor. • Harness or connector between solar sensor and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

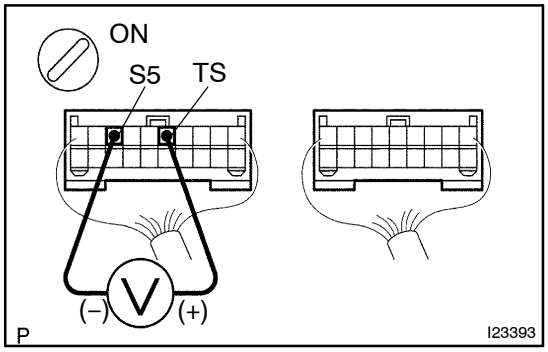
1	**Check solar sensor using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the solar sensor using DATA LIST.

OK ⇒ **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals S5 and TS of A/C amplifier connector.**



PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Measure voltage between terminals S5 and TS of A/C amplifier connector when the solar sensor is subjected to an electric light, and when the sensor is covered by a cloth.

OK:

Condition	Voltage
Sensor subjected to electric light	0.8 – 4.3 V
Sensor covered by a cloth	Below 0.8 V

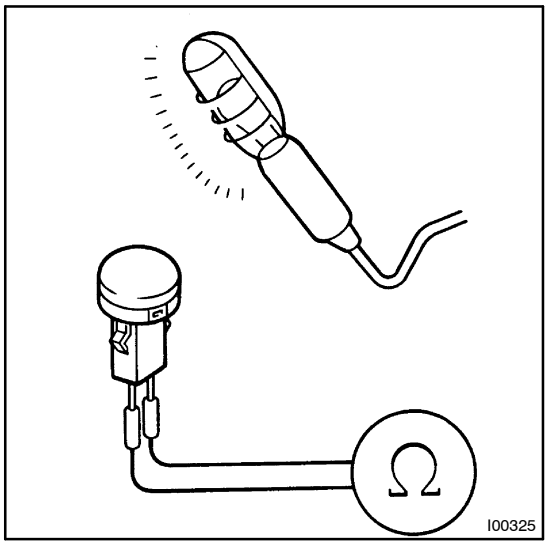
HINT:
As the inspection light is moved away from the sensor, the voltage increases.

NG ⇒ **Go to step 3.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1421 is displayed, check and replace A/C amplifier.

3	Check solar sensor.



PREPARATION:
Remove solar sensor.
CHECK:
(a) Cover the sensor with a cloth.
(b) Measure resistance between terminals 1 and 2 of solar sensor connector.
HINT:
Connect positive (+) lead of ohmmeter to terminal 1 and negative (–) lead to terminal 2 of the solar sensor.
OK:
Resistance: ∞ Ω (no continuity)
PREPARATION:
(a) Remove the cloth from the solar sensor and subject the sensor to electric light.
(b) Measure resistance.
OK:
Resistance: Approx. 10 kΩ (continuity)
HINT:
As the electric light is moved away from the sensor, the resistance increases.

NG	Replace solar sensor.

OK

4	Check harness and connector between A/C amplifier and solar sensor (See page IN–34).

NG	Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

DI9GW–01

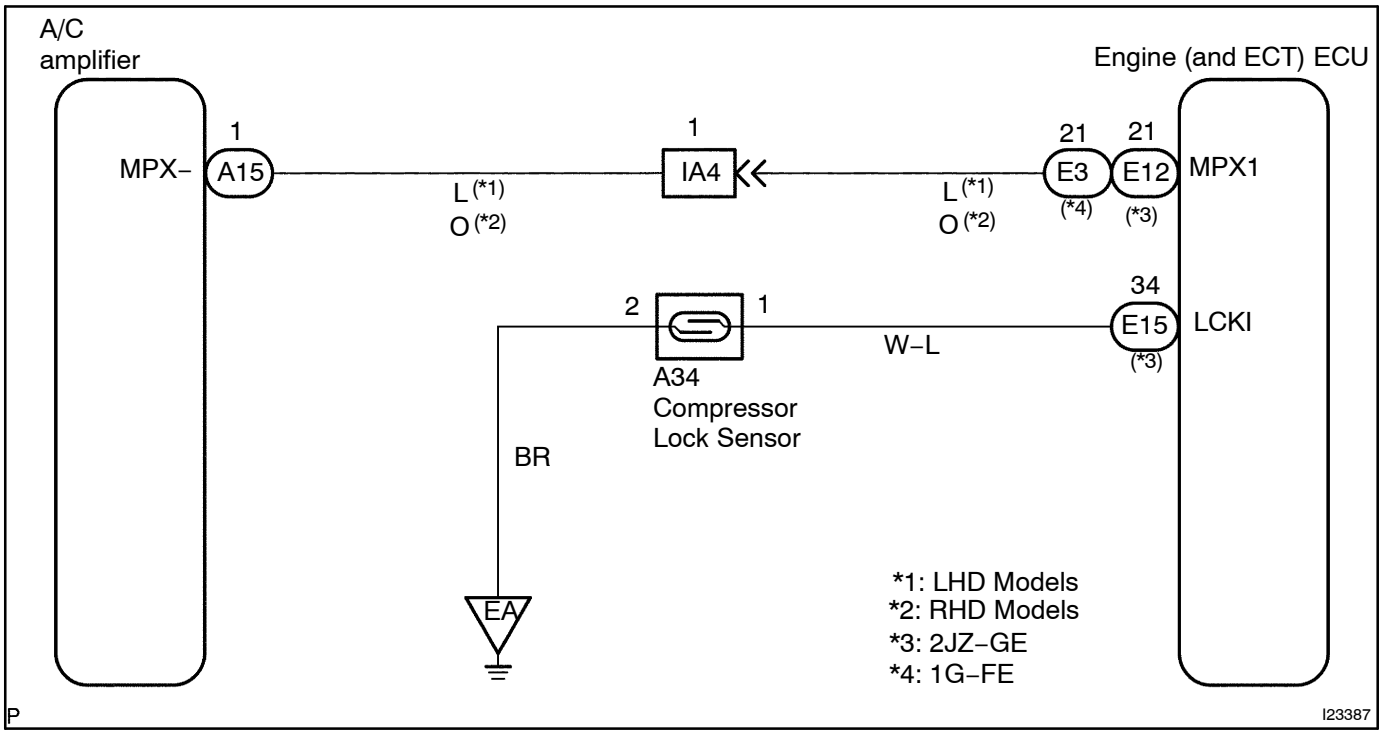
DTC	B1422	Compressor Lock Sensor Circuit

CIRCUIT DESCRIPTION

This sensor sends 1 pulse per engine revolution to the engine (and ECT) ECU.
If the number ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the engine (and ECT) ECU turns the compressor OFF. And, the indicator flashes at about 1 second intervals.

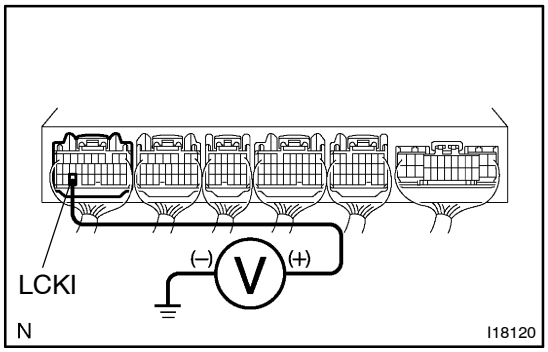
DTC No.	Detection Item	Trouble Area
B1422	All conditions below are detected for 3 secs. or more (a) Engine speed : 450rpm or more (b) Ratio between engine and compressor speed deviates 20% or more in comparison to normal operation.	• Compressor. • Compressor drive belt. • Compressor lock sensor. • Harness and connector between compressor and engine (and ECT) ECU. • Harness and connector between engine (and ECT) ECU and A/C amplifier. • Engine (and ECT) ECU. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal LCKI of engine (and ECT) ECU and body ground.



CHECK:

(a) Start engine.
(b) Blower dial to AUTO.
(c) Measure voltage between terminal LCKI of engine (and ECT) ECU connector and body ground when A/C switch is ON.

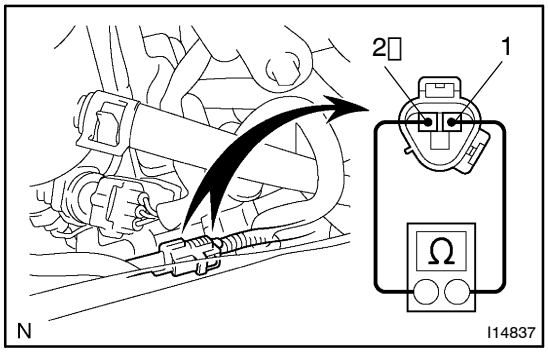
OK:

Voltage: 10 – 14 V

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).

NG

2	Check compressor lock sensor.



PREPARATION:

Disconnect compressor lock sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of compressor lock sensor connector.

OK:

Resistance:
at 20°C (68°F): 990 – 1210 Ω
at 100°C (212°F): 1280 – 1550 Ω

NG	Replace compressor lock sensor.

OK

3	Check harness and connectors between engine (and ECT) ECU and compressor lock sensor (See page IN–34).

NG	Repair or replace harness or connector.

OK

4	Check harness and connectors between engine (and ECT) ECU and A/C amplifier (See page IN–34).

NG → Repair or replace harness or connector.

OK →

Check and replace engine (and ECT) ECU.

DI9GX–01

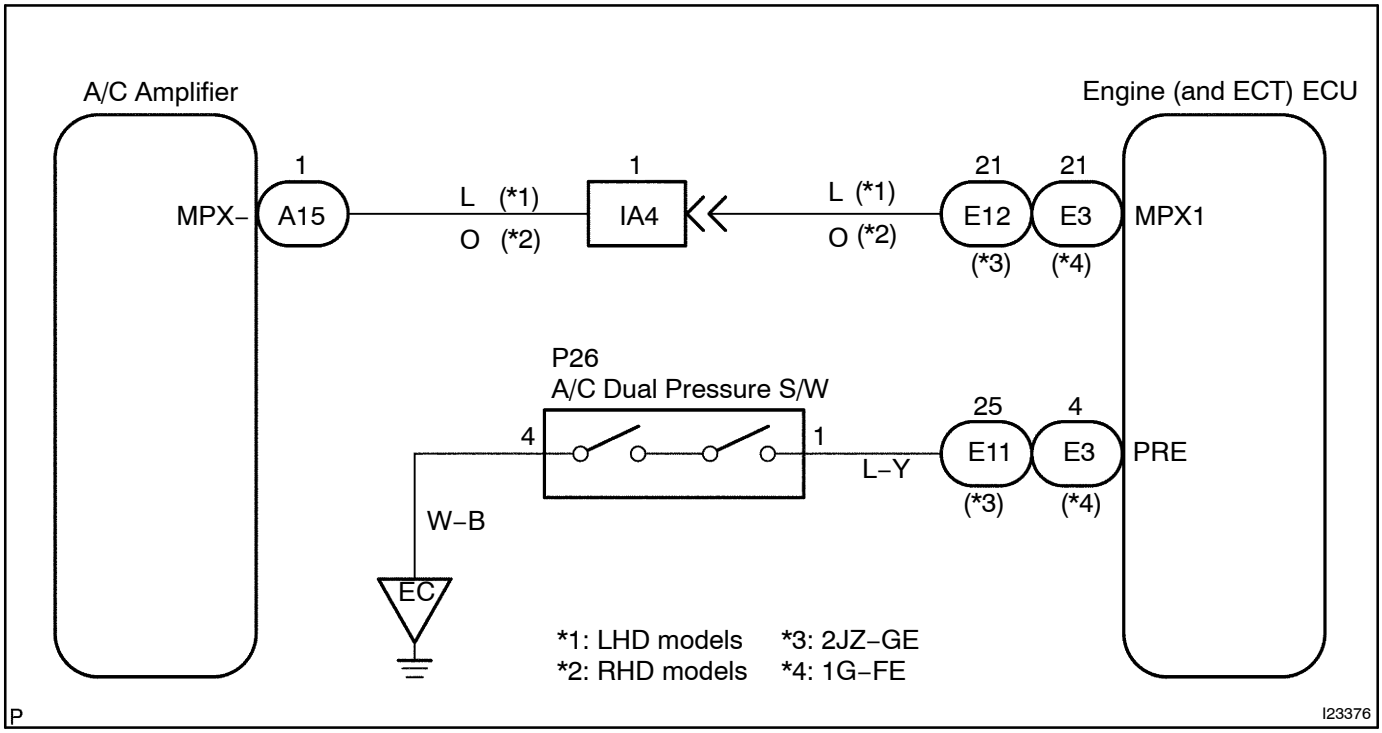
DTC	B1423	Pressure Switch Circuit

CIRCUIT DESCRIPTION

The pressure switch sends the appropriate signals to the engine (and ECT) ECU when the A/C refrigerant pressure drops too low or rises too high. When the engine (and ECT) ECU receives these signals, it outputs signals via the engine (and ECT) ECU to switch OFF the compressor relay and turns the magnetic clutch OFF.

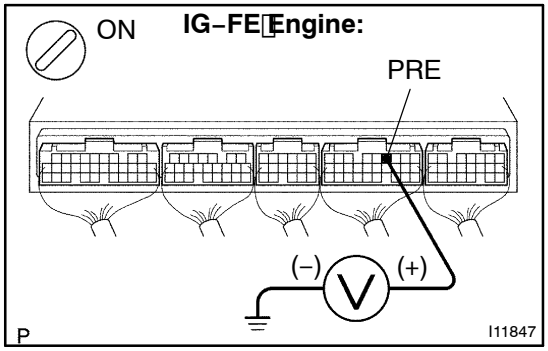
DTC No.	Detection Item	Trouble Area
B1423	• Open in pressure sensor circuit. • Abnormal refrigerant pressure. below 181 kPa (2.0 kg/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)	• Pressure switch. • Harness or connector between pressure switch and engine (and ECT) ECU • Harness or connector engine (and ECT) ECU and A/C amplifier • Refrigerant pipe line. • Engine (and ECT) ECU

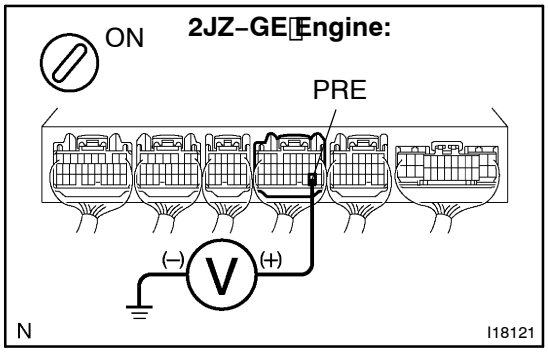
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal PRE of engine (and ECT) ECU and body ground.





PREPARATION:

Install the manifold gauge set.

CHECK:

(a) Turn ignition switch to ON.

(b) Check voltage between terminal PRE of engine (and ECT) ECU connector and body ground when refrigerant pressure is changed.

OK:

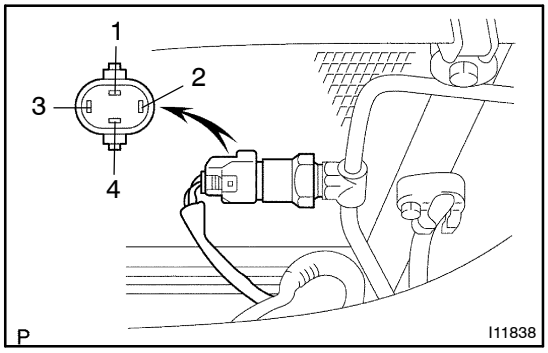
The voltage changes with refrigerant pressure, as shown in the diagram below.

Low Pressure Cut Side	Reference: High Pressure Cut Side
ON (0V) 225 kPa 196 kPa OFF (12V)	ON (0V) 2,550 kPa 3,140 kPa OFF (12V)

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).**

NG

2	Check pressure switch.



PREPARATION:

Disconnect pressure switch connector.

CHECK:

(a) Turn ignition switch to ON.

(b) Check continuity between terminals 1 and 4 of pressure switch when refrigerant pressure is changed.

OK:

The continuity changes with refrigerant pressure as shown below.

Low Pressure Cut Side	Reference: High Pressure Cut Side
ON (continuity) 211 kPa 181 kPa OFF (continuity)	ON (continuity) 2,550 kPa 3,140 kPa OFF (continuity)

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

OK

3	Check harness and connector between engine (and ECT) ECU and pressure switch, pressure switch and body ground (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check harness and connector between engine (and ECT) ECU and A/C amplifier. (See page IN–34)

NG → Repair or replace harness or connector.

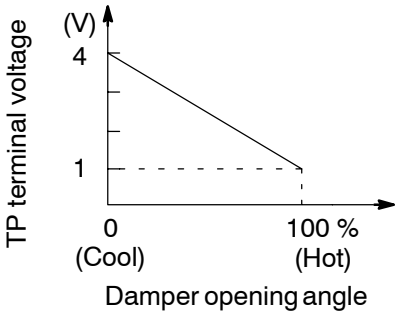
OK

Check and replace engine (and ECT) ECU.

DI9GY–01

DTC	B1431	Air Mix Damper Position Sensor Circuit

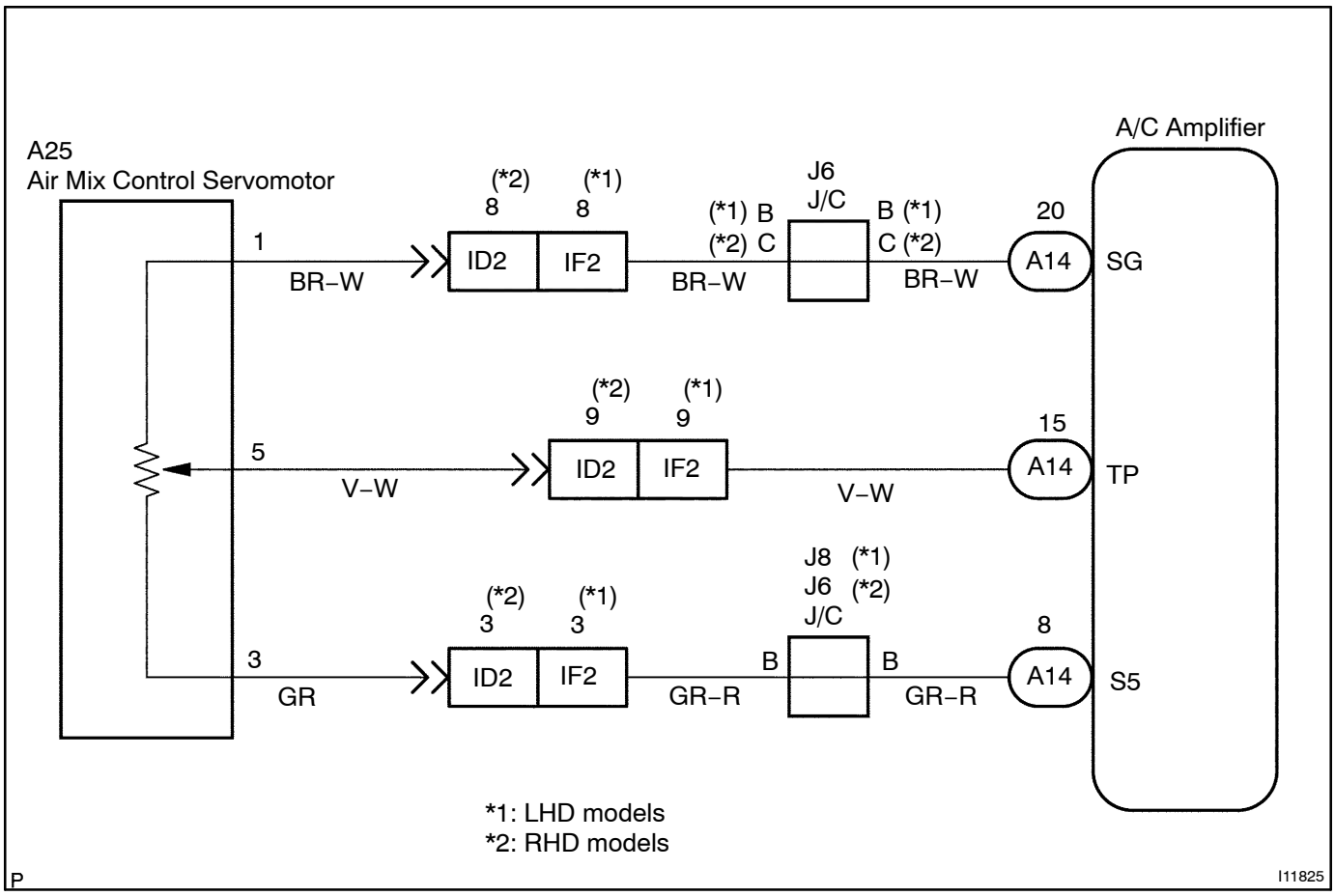
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C amplifier.
The position sensor is built into the air mix damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
B1431	Short to ground or power source circuit in air mix damper position sensor circuit.	• Air mix damper position sensor. • Harness or connector between air mix damper control servomotor assembly and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

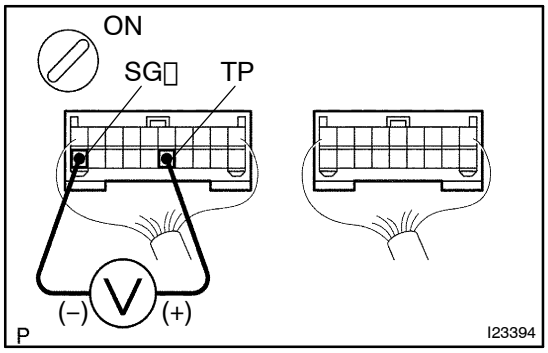
1	**Check air mix damper position using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the current position of air mix damper and the target position of air mix damper.
OK:
The current position and target position are almost similar.

OK ⇨ **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals TP and SG of A/C amplifier connector.**



PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Change the set temperature to activate the air mix damper control servomotor, and measure the voltage between terminals TP and SG of A/C amplifier connector each time when the set temperature is changed.
OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. warm	0.5 – 1.5 V

HINT:
As the set temperature increases, the voltage decreases.

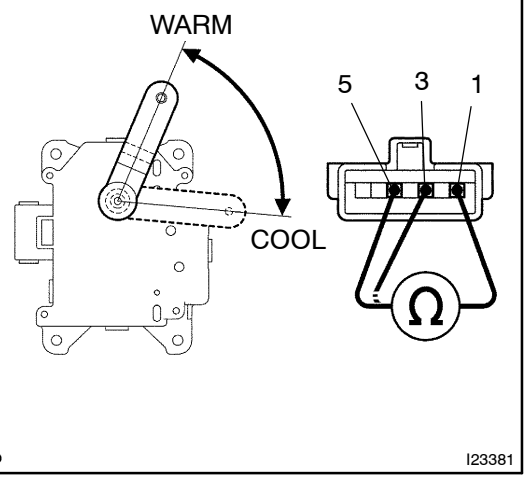
NG ⇨ **Go to step 3.**

Ok

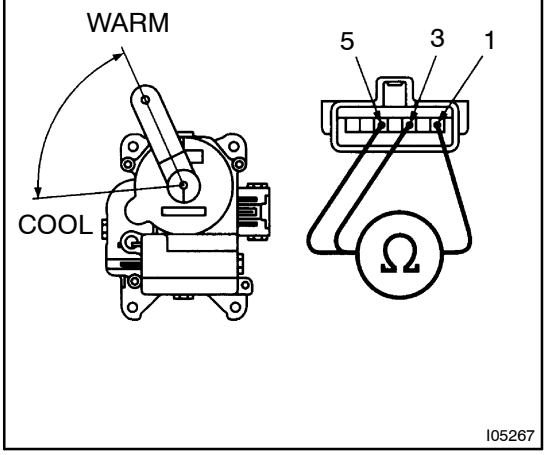
Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1431 displayed, check and replace A/C amplifier.

3	Check air mix damper position sensor.

LHD Models:



RHD Models:



PREPARATION:

Remove the air mix damper control servomotor.

CHECK:

Measure resistance between terminals 1 and 3 of air mix damper control servomotor assembly connector.

OK:

Resistance: 4.2 – 7.8 kΩ

CHECK:

While operating air mix damper control servomotor, following the procedure on page DI–641, measure resistance between terminals 1 and 5 of air mix damper control servomotor assembly connector.

OK:

Position	Resistance
Max. cool	3.6 – 6.8 kΩ
Max. warm	0.5 – 1.1 kΩ

HINT:

As the air mix damper control servomotor moves from cool side to hot side, the resistance decreases.

NG → **Replace air mix damper control servomotor assembly.**

OK

4	Check harness and connector between A/C amplifier and air mix damper control servomotor assembly (See page IN–34).

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

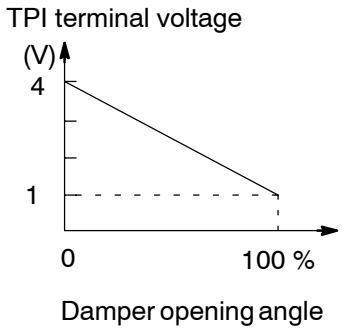
OK

Check and replace A/C amplifier.

DI9GZ–01

DTC	B1432	Air Inlet Damper Position Sensor Circuit

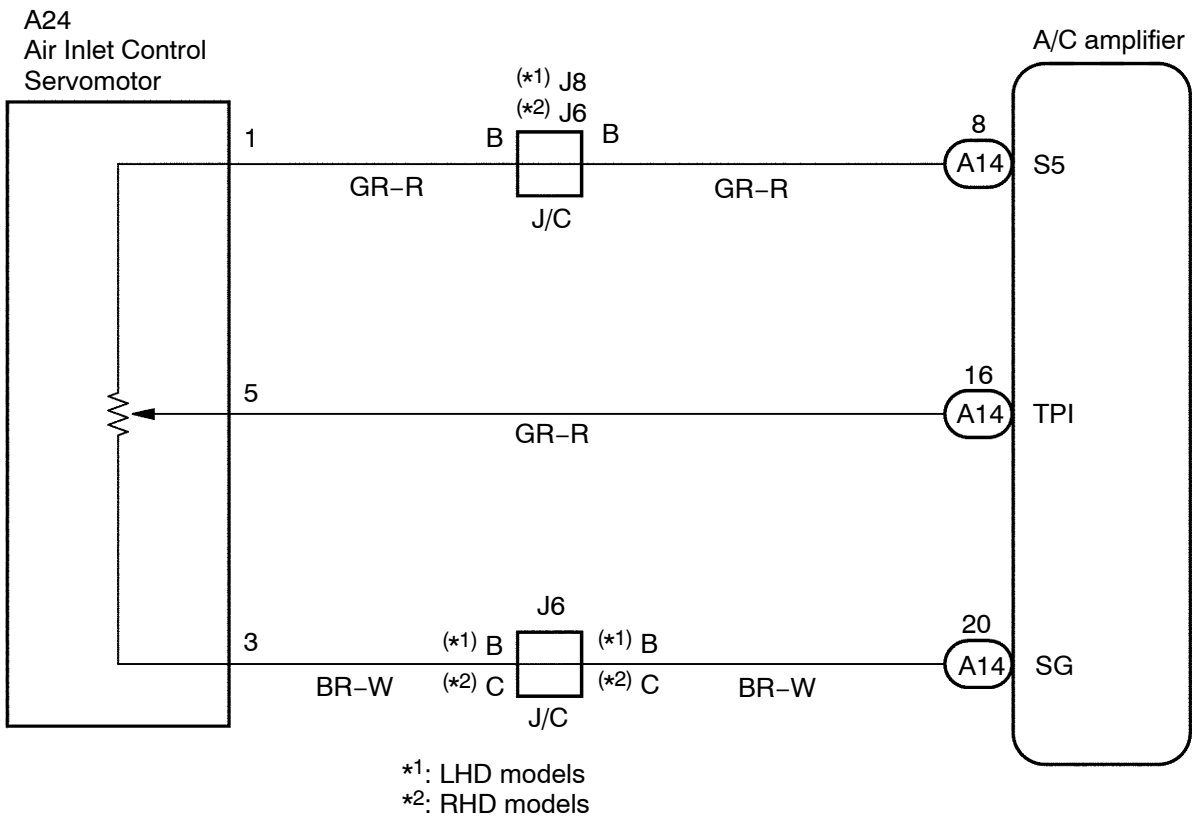
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet damper and sends the appropriate signals to the A/C amplifier.
The position sensor is built into the air inlet damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
B1432	Short to ground or power source circuit in air inlet damper position sensor circuit.	• Air inlet damper position sensor. • Harness or connector between air inlet damper control servomotor assembly and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check air inlet damper position using hand–held tester.**

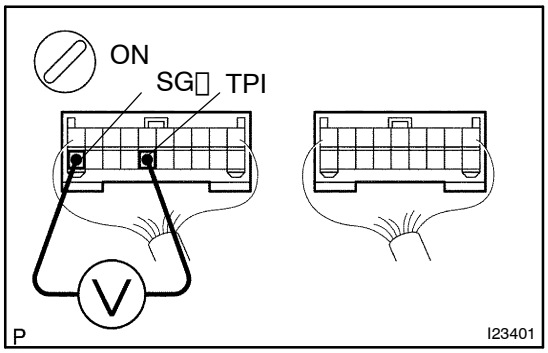
PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the current position of air inlet damper and the target position of air inlet damper.
OK:

The current position and target position are almost similar.

OK ⟩ **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals TPI and SG of A/C amplifier connector.**



PREPARATION:
Remove A/C amplifier with connectors still connected.
CHECK:
(a) Turn ignition switch ON.
(b) Press REC/FRS switch to change air inlet between fresh and recirculation air, and measure voltage between terminals TPI and SG of A/C amplifier when the air inlet damper control servomotor operates.
OK:

FRS–REC Switch	Voltage
REC	3.5 – 4.5 V
FRS	0.5 – 1.5 V

HINT:
As the air inlet damper control servomotor is moved form REC side to FRS side, the voltage decreases.

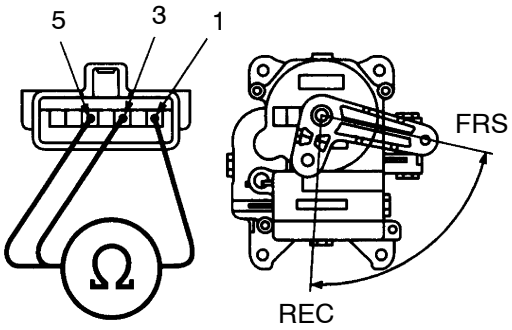
NG ⟩ **Go to step 3.**

OK

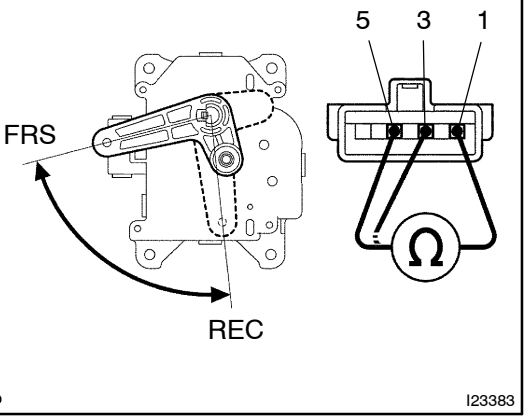
Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1432/32 is displayed, check and replace A/C amplifier.

3	Check air inlet damper position sensor.

LHD Models:



RHD Models:



PREPARATION:

Remove the air inlet damper control servomotor.

CHECK:

Measure resistance between terminals 1 and 3 of air inlet damper control servomotor assembly connector.

OK:

Resistance: 4.2 – 7.8 kΩ

CHECK:

While operating air inlet damper control servomotor, following the procedure on page DI–644, measure resistance between terminals 1 and 5 of air inlet damper control servomotor assembly connector.

OK:

Resistance

Damper Position	Resistance
REC side	3.1 – 5.8 kΩ
FRS side	0.8 – 1.6 kΩ

HINT:

As the air inlet damper control servomotor moves from REC side to FRS side, the resistance decreases.

NG	Replace air inlet damper control servomotor assembly.

OK

4	Check harness and connectors between A/C amplifier and air inlet damper control servomotor assembly (See page IN–34).

NG	Repair or replace harness or connector.

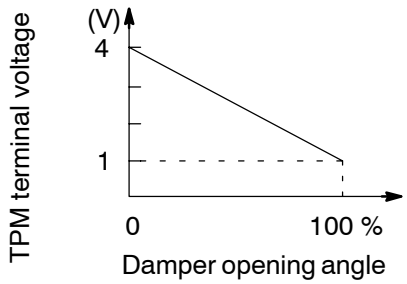
OK

Check and replace A/C amplifier.

DI9H0–01

DTC	B1433	Air Outlet Damper Position Sensor Circuit

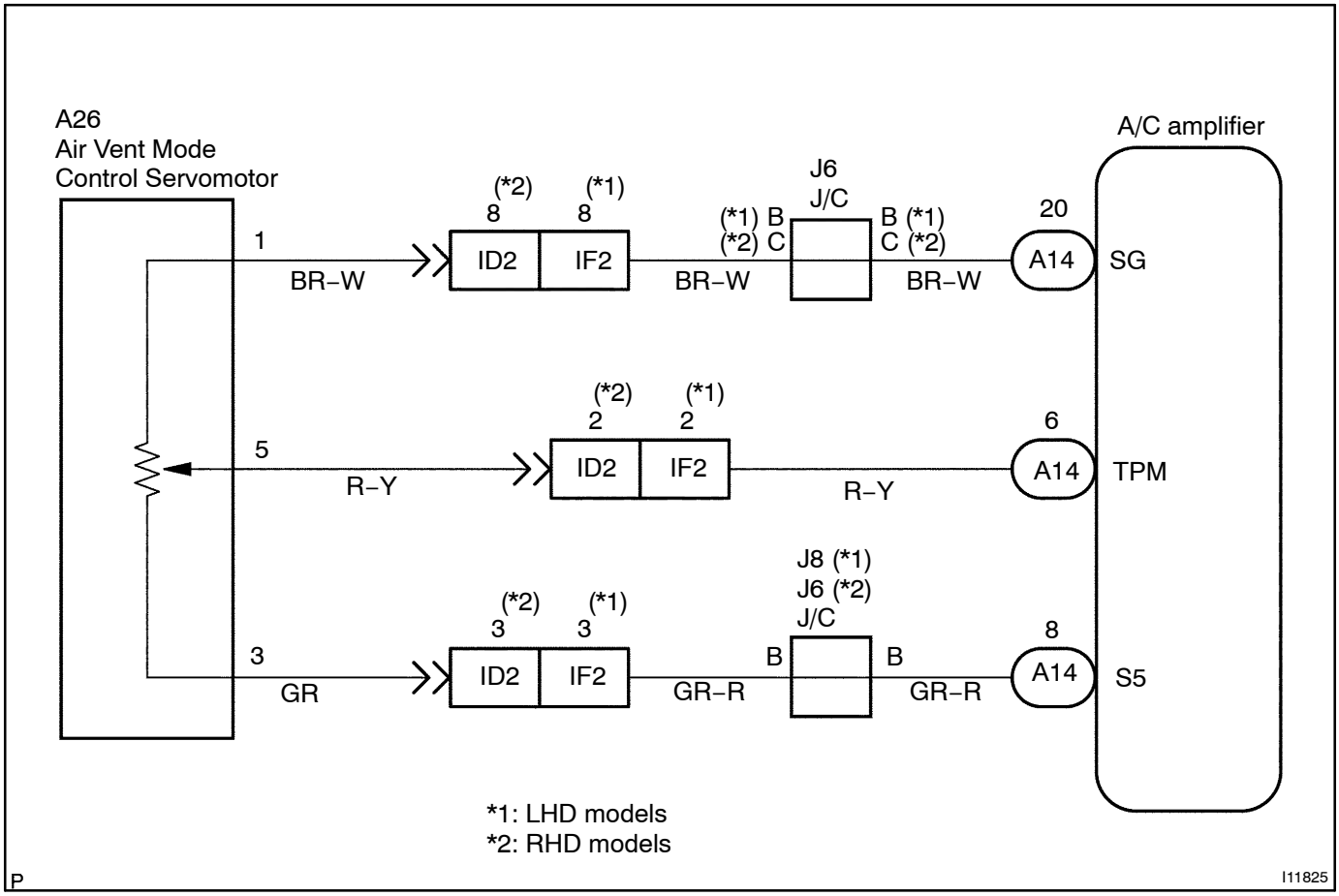
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C amplifier.
The position sensor is built into the air outlet damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
B1433	Short to ground or power source circuit in air outlet damper position sensor circuit.	• Air outlet damper position sensor. • Harness or connector between air outlet damper control servomotor assembly and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand–held tester, start the inspection from step1 and in case of not using the hand–held tester, start from step2.

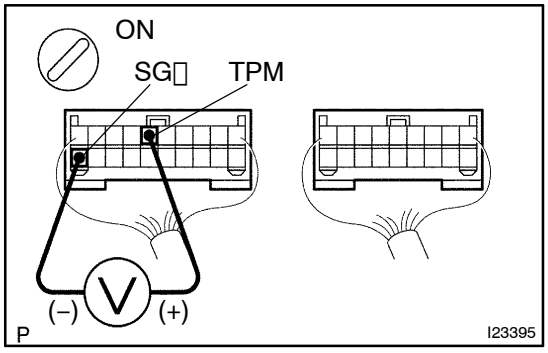
1	**Check air outlet damper position using hand–held tester.**

PREPARATION:
Connect the hand–held tester to the DLC3.
CHECK:
Check the current position of air outlet damper and the target position of air outlet damper.
OK:
The current position and target position are almost similar.

OK → **Check and replace A/C amplifier.**

NG

2	**Check voltage between terminals TPM and SG of A/C amplifier connector.**



PREPARATION:
(a) Remove A/C amplifier with connectors still connected.
(b) Turn ignition switch to ON.
CHECK:
Measure the voltage between terminals TPM and SG of A/C amplifier.
OK:

Mode selector	Voltage
FACE	3.5 – 4.5 V
DEF	0.5 – 1.5 V

HINT:
As the air outlet damper control servomotor is moved from FACE side to DEF side, the voltage decreases gradually without interruption.

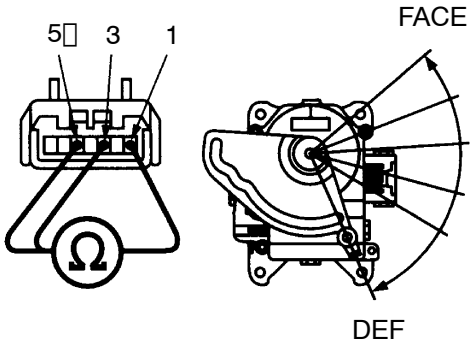
NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–612). However, if DTC B1434 is displayed, check and replace A/C amplifier.

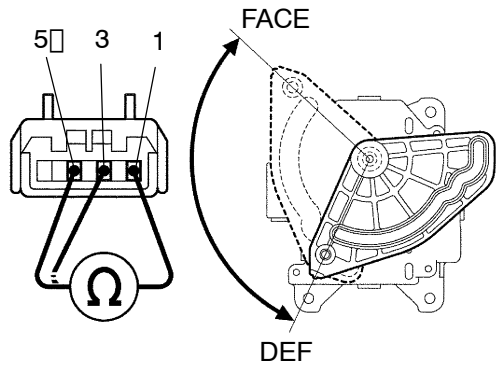
3	Check air outlet damper position sensor.

LHD Models:



I05271

RHD Models:



P I23385

PREPARATION:

Remove the air outlet servomotor.

CHECK:

Measure resistance between terminals 1 and 3 of air outlet servomotor assembly connector.

OK:

Resistance: 4.2 – 7.8 kΩ

CHECK:

While operating air outlet damper control servomotor as in the procedure on page DI–647, measure resistance between terminals 3 and 5 of air outlet damper control servomotor.

OK:

Resistance:

Damper Position	Resistance
DEF	0.5 – 1.1 kΩ
FACE	3.6 – 6.8 kΩ

HINT:

As the air outlet servomotor moves from DEF side to FACE side, the resistance decreases gradually without interruption.

NG → **Replace air outlet damper control servomotor assembly.**

OK

4	Check harness and connector between A/C amplifier and air outlet damper control servomotor assembly (See page IN–34).

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

OK

Check and replace A/C amplifier.

DI26G–04

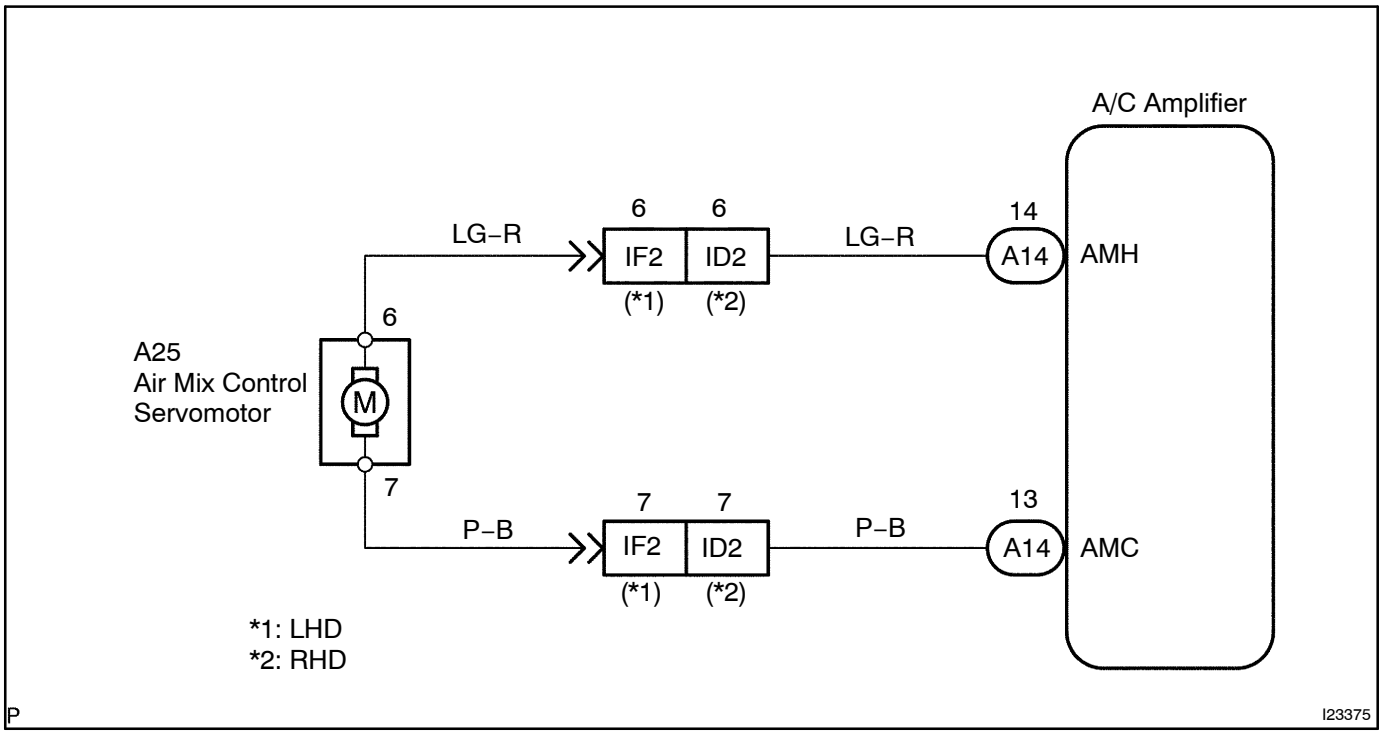
DTC	B1441	Air Mix Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air mix damper control servomotor is controlled by the A/C amplifier and moves the air mix damper to the desired position.

DTC No.	Detection Item	Trouble Area
B1441	Air mix damper position sensor value does not change even if A/C amplifier operates air mix damper control servomotor.	• Air mix damper control servomotor. • Air mix damper position sensor. • Harness or connector between A/C amplifier and A/M damper control servomotor, A/M damper position sensor. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Actuator check.**

PREPARATION:

(a) Warm up the engine.

(b) Set to the actuator check mode (See page DI–606).

CHECK:

Check the operation of the air mix damper and the condition of the blower.

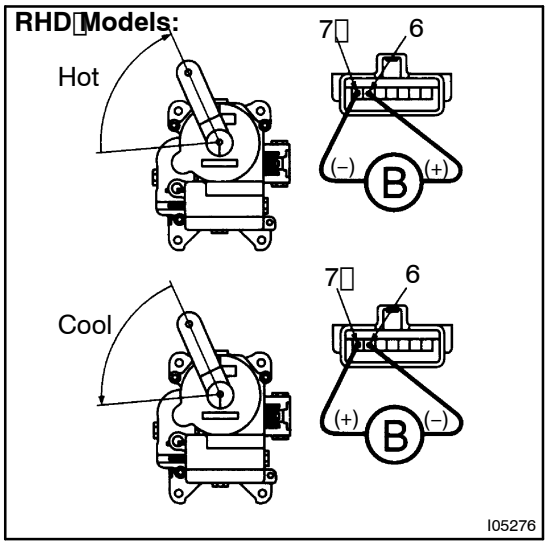
OK:

Display Code	Air Mix Damper	Condition
0 – 3	100% (Fully closed)	Cool air comes out
4 – 5	50%	
6 – 9	100% (Full opened)	Warm air comes out

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).**

NG

2	Check air mix damper control servomotor.



PREPARATION:

Remove the air mix damper control servomotor.

CHECK:

Connect positive (+) lead to terminal 6 and negative (–) lead to terminal 7.

OK:

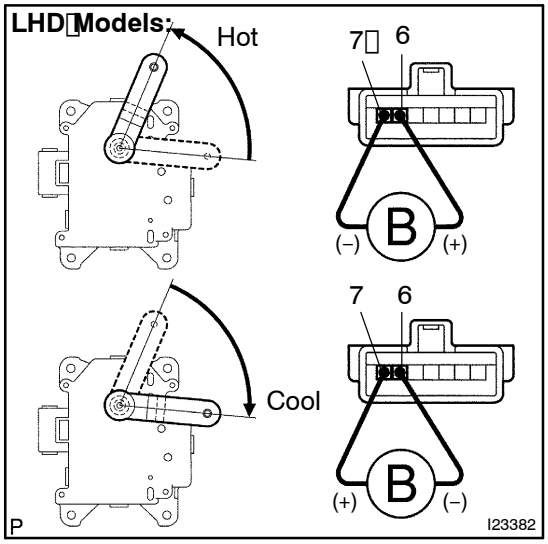
The lever turns smoothly to Hot side.

CHECK:

Connect positive (+) lead to terminal 7 and negative (–) lead to terminal 6.

OK:

The lever turns smoothly to Cool side.



NG	Replace air mix damper control servomotor assembly.

OK

3	Check harness and connector between A/C amplifier and air mix damper control servomotor assembly (See page IN–34).

NG	Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

DI26H–05

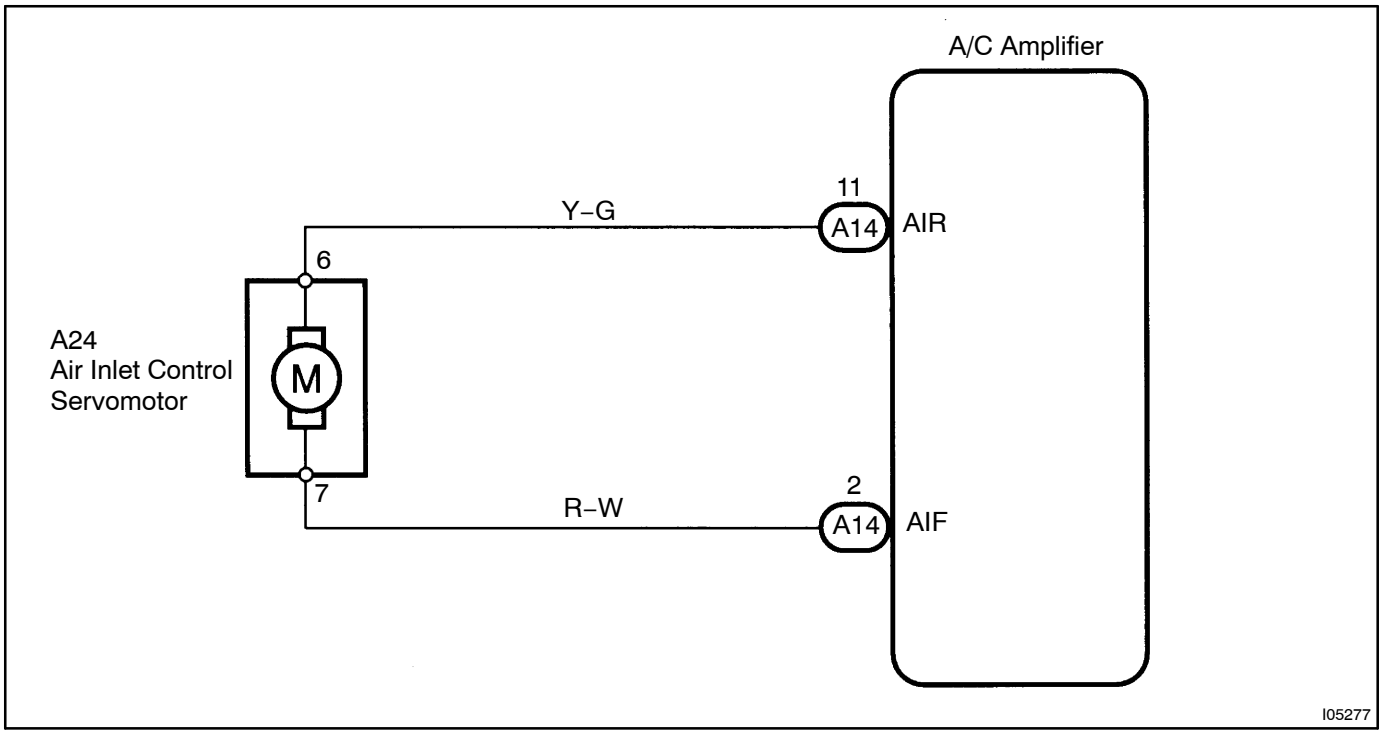
DTC	B1442	Air Inlet Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet damper control servomotor is controlled by the A/C amplifier and moves the air inlet damper to the desired position.

DTC No.	Detection item	Trouble Area
B1442	Air inlet damper position sensor value does not change even if A/C amplifier operated air inlet damper control servomotor.	• Air inlet damper position sensor. • Harness or connector between air inlet damper control servomotor assembly and A/C amplifier. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Actuator check.**

PREPARATION:

Set to the actuator check mode (See page DI–606).

CHECK:

Check the operation of air inlet damper.

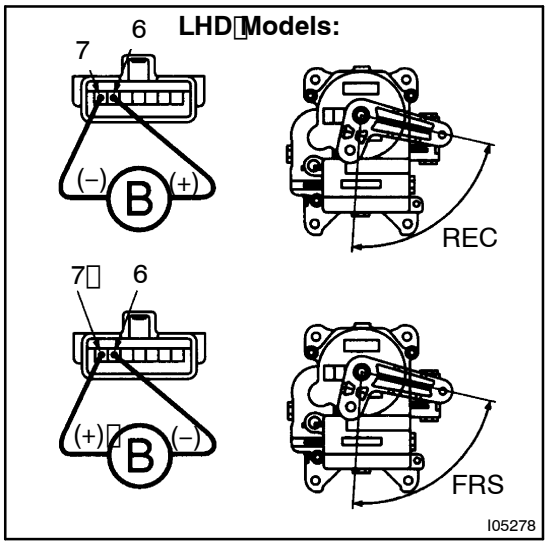
OK:

Display Code	Air Inlet Damper
0 – 1	FRESH
2 – 9	RECIRC

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).**

NG

2	Check air inlet damper control servomotor.



PREPARATION:

Remove air inlet damper control servomotor.

CHECK:

Connect positive (+) lead to terminal 6 and negative (–) lead to terminal 7.

OK:

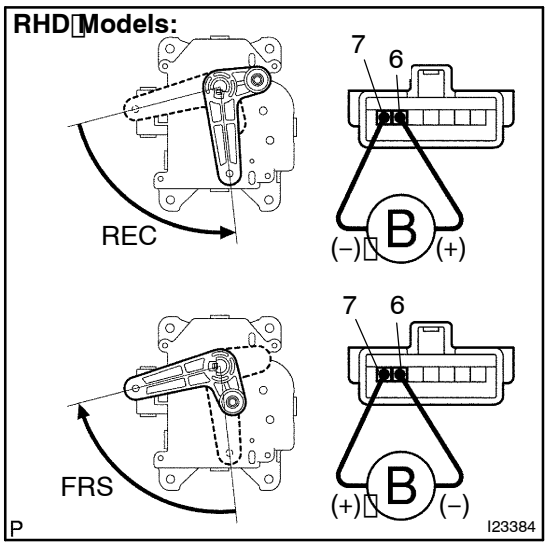
The lever moves smoothly to REC position.

CHECK:

Connect positive (+) lead to terminal 7 and negative (–) lead to terminal 6.

OK:

The lever moves smoothly to FRS position.



NG → Replace air inlet damper control servomotor assembly.

OK

3	Check harness and connector between A/C amplifier and air inlet damper control servomotor (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace A/C amplifier.

DI9H1–01

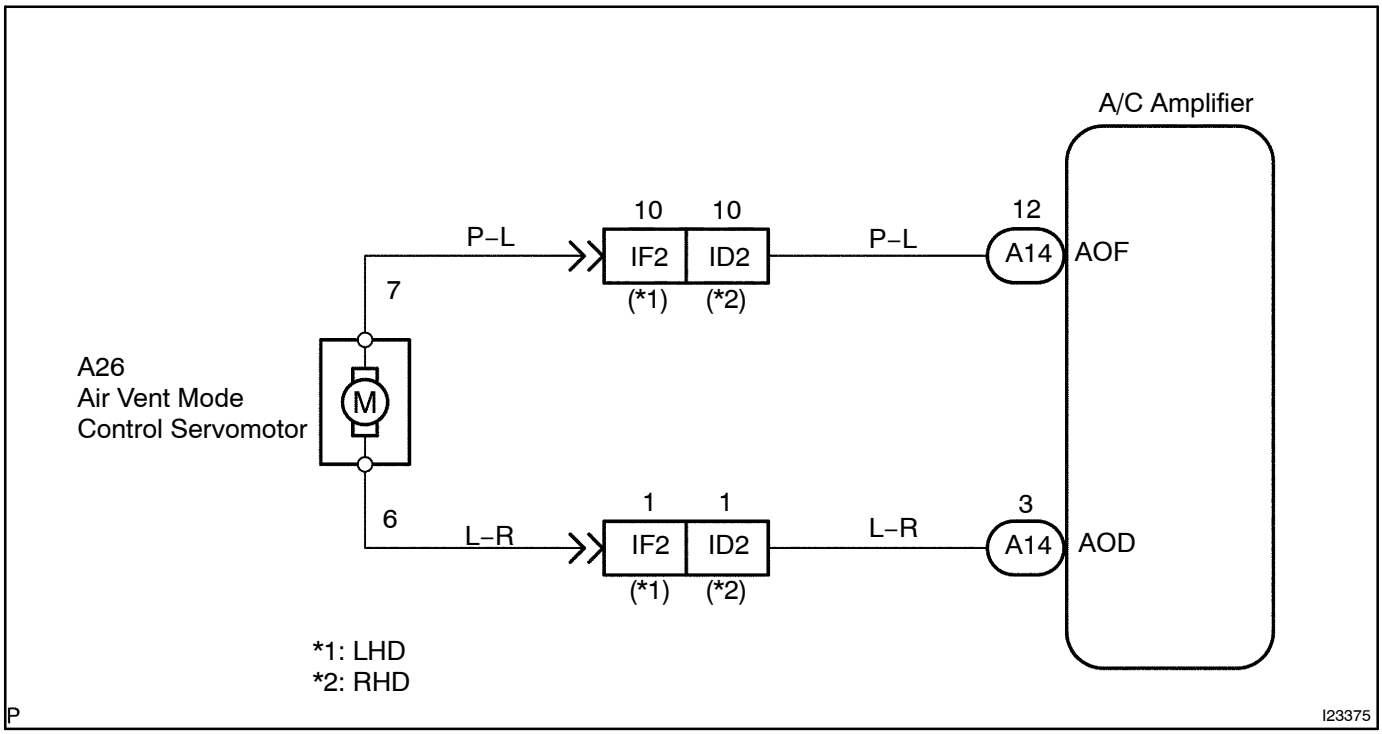
DTC	B1443	Air Outlet Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

This circuit turns the servomotor and changes each mode damper position by the signals from the A/C amplifier. When the AUTO switch is on, the A/C amplifier changes the mode automatically between (FACE), (BI–LEVEL) and (FOOT) according to the temperature setting.

DTC No.	Detection Item	Trouble Area
B1443	Air outlet damper position sensor value does not change even if A/C amplifier operated air outlet damper control servomotor.	• Air outlet damper control servomotor. • Air outlet damper position sensor. • Harness or connector between A/C amplifier air outlet damper control servomotor, air outlet damper position sensor. • A/C amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Actuator check.**

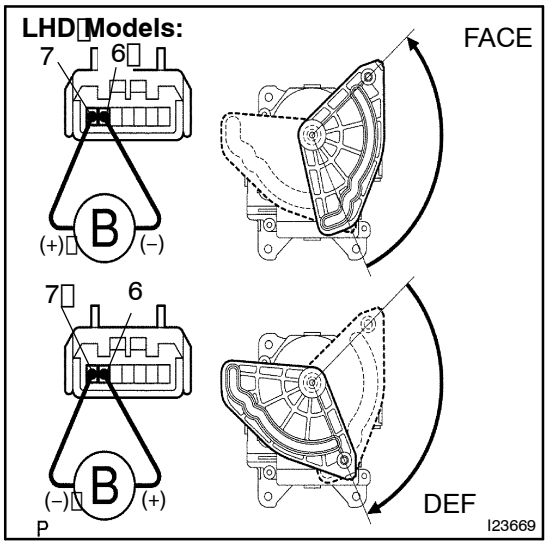
PREPARATION:
Set to the actuator check mode (See page DI–606).
CHECK:
Check the condition of air flow.
OK:

Display Code	Air Flow
0 – 4	FACE
5	BI–LEVEL
6, 7	FOOT
8	FOOT / DEF
9	DEF

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).**

NG

2	**Check air outlet damper control servomotor.**



PREPARATION:

Remove the air outlet damper control servomotor.

CHECK:

Connect positive (+) lead to terminal 7 and negative (–) lead to terminal 6.

OK:

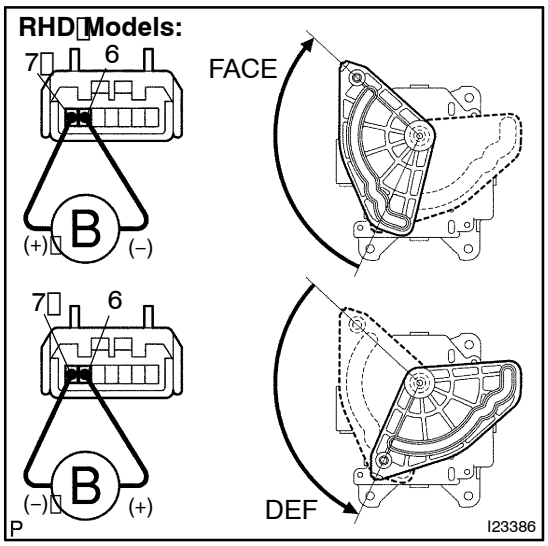
The lever moves smoothly to FACE position.

CHECK:

Connect positive (+) lead to terminal 6 and negative (–) lead to terminal 7.

OK:

The lever moves smoothly to DEF position.



NG	**Replace air outlet servomotor.**

OK

3	**Check harness and connector between A/C amplifier and air outlet damper control servomotor (See page IN–34).**

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

OK

Check and replace A/C amplifier.

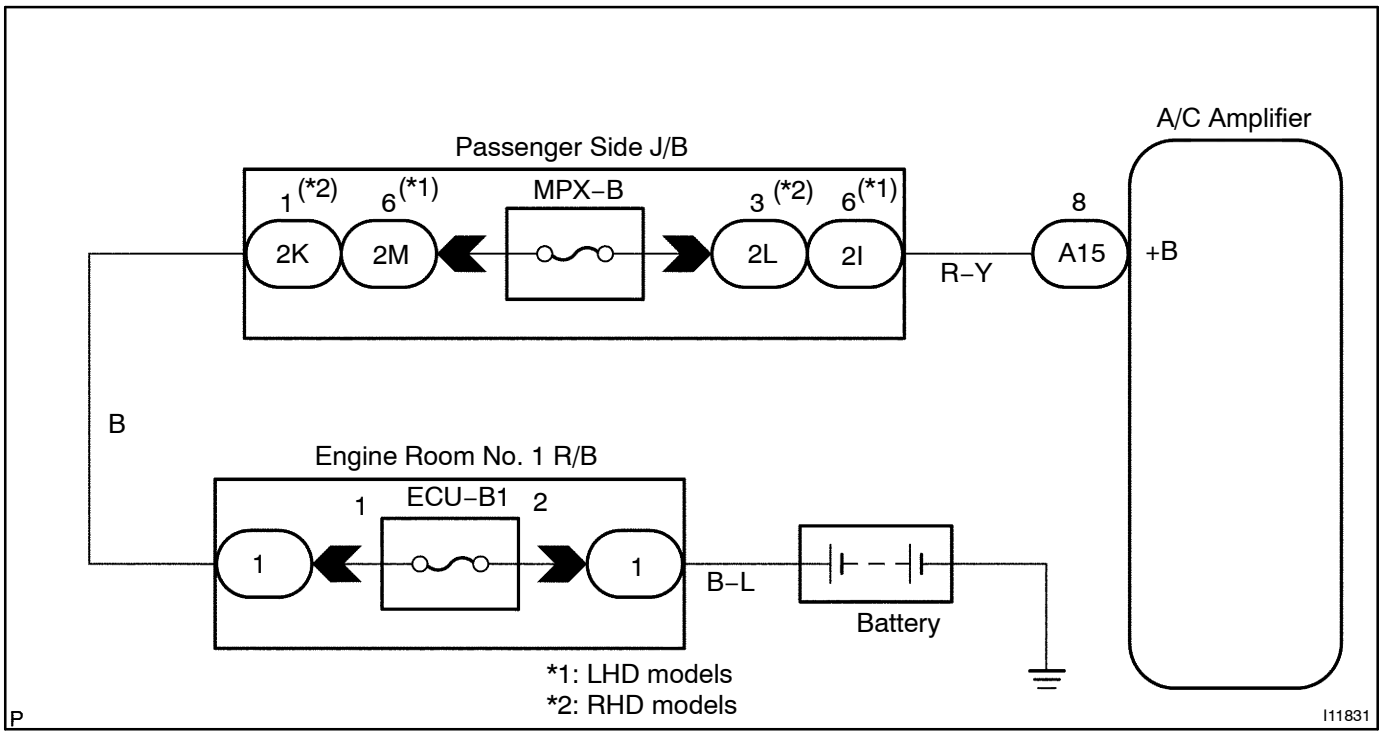
DI9H2–01

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

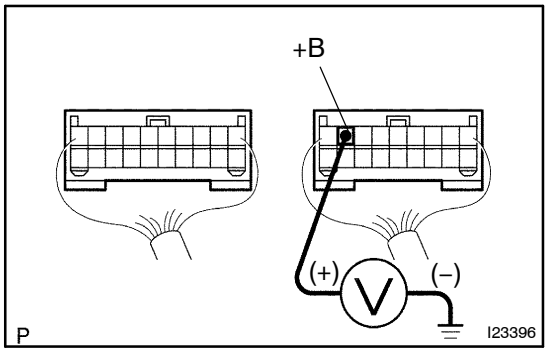
This is the back up poser source for the A/C amplifier. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal +B of A/C amplifier connector and body ground.

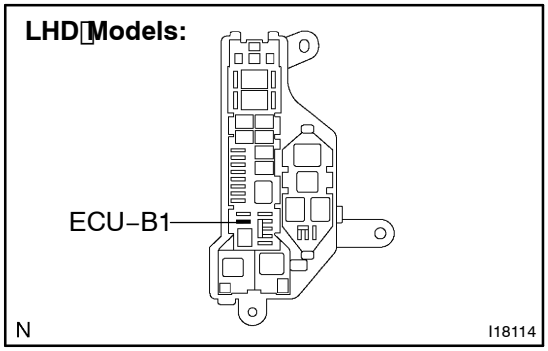


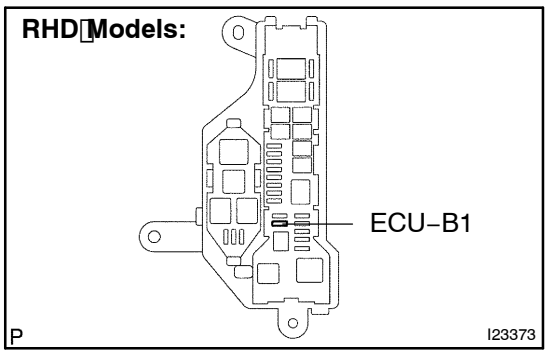
PREPARATION:
Remove the A/C amplifier with connector still connected.
CHECK:
Measure voltage between terminal +B of A/C amplifier connector and body ground.
OK:
Voltage: Battery voltage

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).

NG

2	Check ECU–B1 fuse.





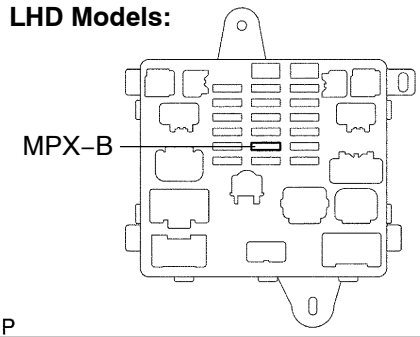
PREPARATION:
Remove ECU–B1 fuse from engine room J/B.
CHECK:
Check continuity of ECU–B1 fuse.
OK:
Continuity

NG	Check for short in all the harness and components connected to the ECU–B1 fuse (See attached wiring diagram).

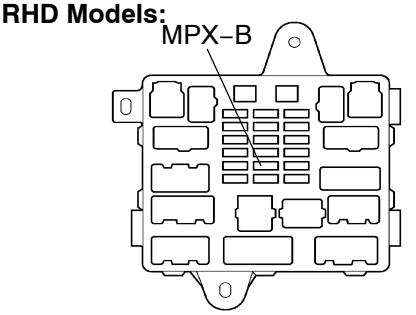
OK

3	Check MPX–B fuse.

LHD Models:



RHD Models:



PREPARATION:

Remove MPX–B fuse from passenger side J/B.

CHECK:

Check continuity of MPX–B fuse.

OK:

Continuity

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

OK

Check and repair harness and connector between A/C amplifier and battery.

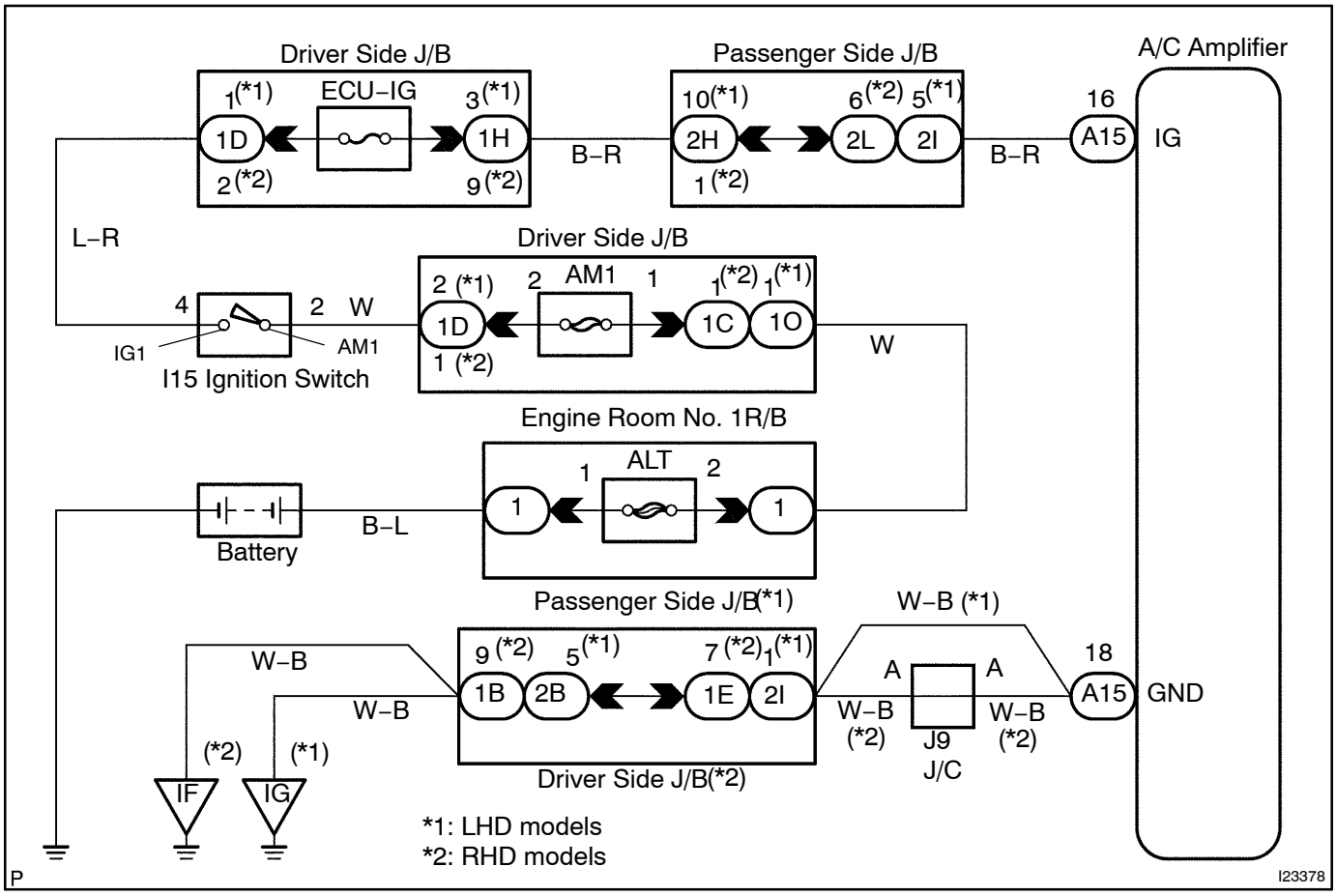
DI9H3–01

IG Power Source Circuit

CIRCUIT DESCRIPTION

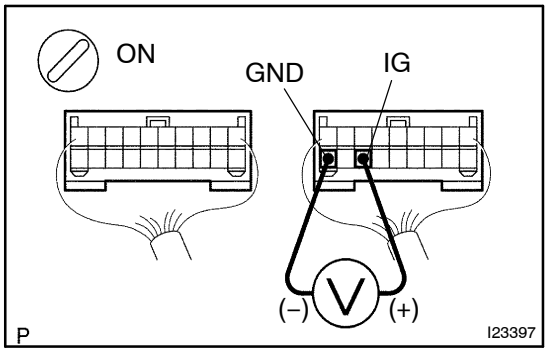
This is the power source for the A/C amplifier (contains the ECU) and servomotors, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals IG and GND of A/C amplifier connector.



PREPARATION:

(a) Remove A/C amplifier with connectors still connected.

(b) Turn ignition switch to ON.

CHECK:

Measure voltage between terminals IG and GND of A/C amplifier.

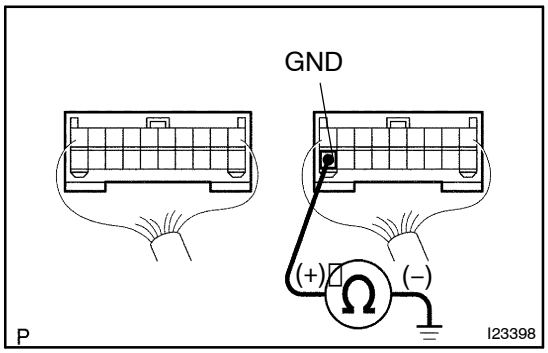
OK:

Voltage : 10 – 14 V

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).

NG

2	Check continuity between terminal GND of A/C amplifier and body ground.



CHECK:

Measure resistance between terminal GND of A/C amplifier and body ground.

OK:

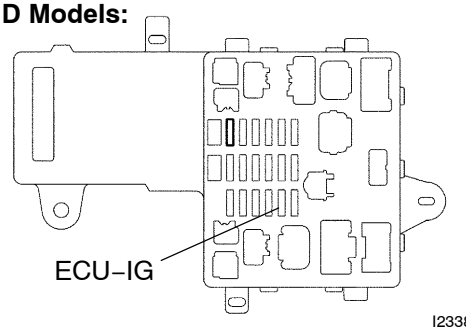
Resistance : 0 Ω (Continuity)

NG	Repair or replace harness or connector.

OK

3	Check ECU–IG fuse.

LHD Models:



PREPARATION:

Remove ECU–IG fuse from driver side J/B.

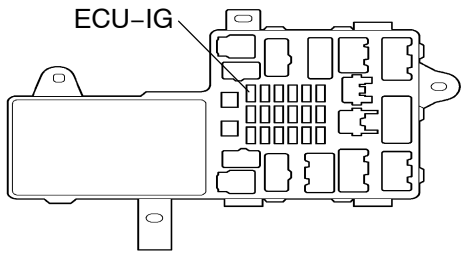
CHECK:

Check continuity of ECU–IG fuse.

OK:

Continuity exists.

RHD Models:



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

OK

Check and repair harness and connector between A/C amplifier and battery.

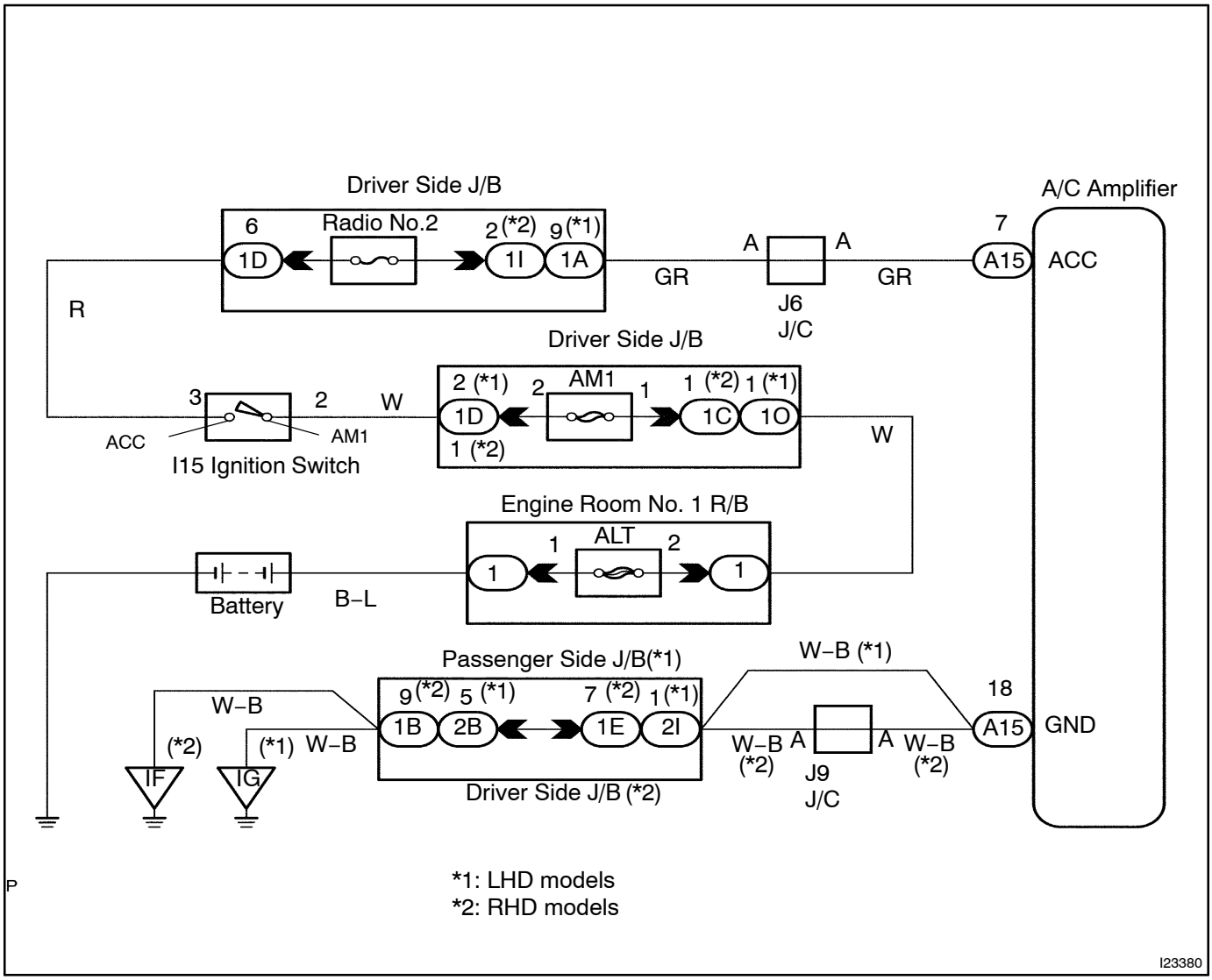
DI9H4–01

ACC Power Source Circuit

CIRCUIT DESCRIPTION

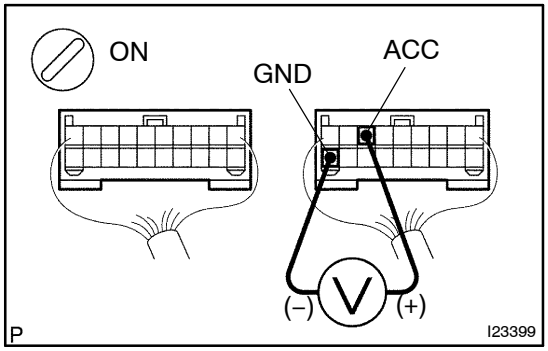
This is the power source for A/C amplifier and servomotors, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals ACC and GND of A/C amplifier connector.



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

(a) Turn ignition switch to ACC.

(b) Measure voltage between terminals ACC and GND of A/C amplifier.

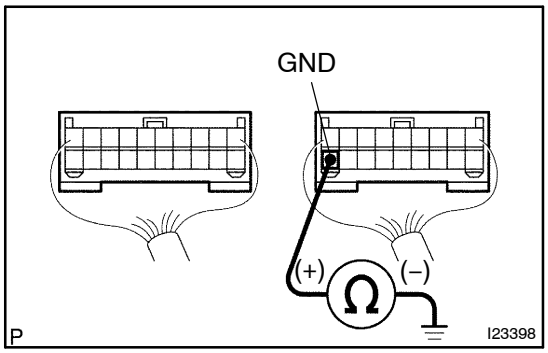
OK:

Voltage : Battery voltage

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).

NG

2	Check continuity between terminal GND of A/C amplifier and body ground.



CHECK:

Measure resistance between terminal GND of A/C amplifier and body ground.

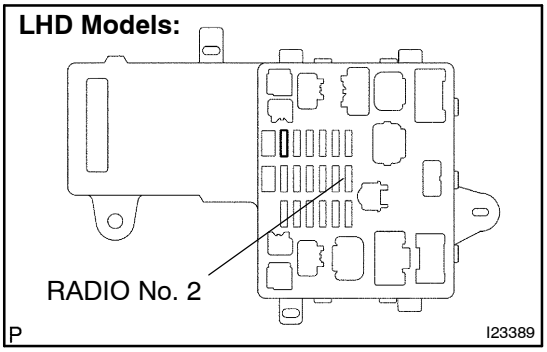
OK:

Resistance : 0 Ω (continuity)

NG	Repair or replace harness or connector.

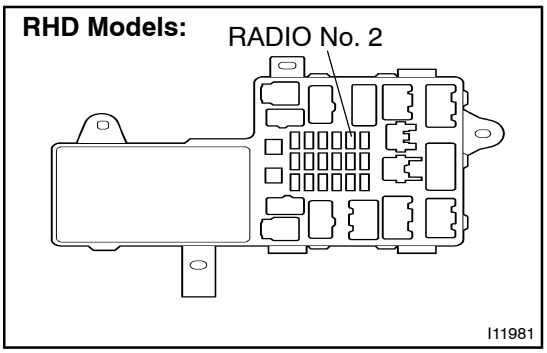
OK

3	Check RADIO No.2 fuse.



PREPARATION:
Remove RADIO No.2 fuse from driver side J/B.
CHECK:
Check continuity of RADIO No.2.
OK:

Continuity



NG → **Check for short in all the harness and components connected to the RADIO No.2 fuse (See attached wiring diagram).**

OK

Check and repair harness and connector between A/C amplifier and battery.

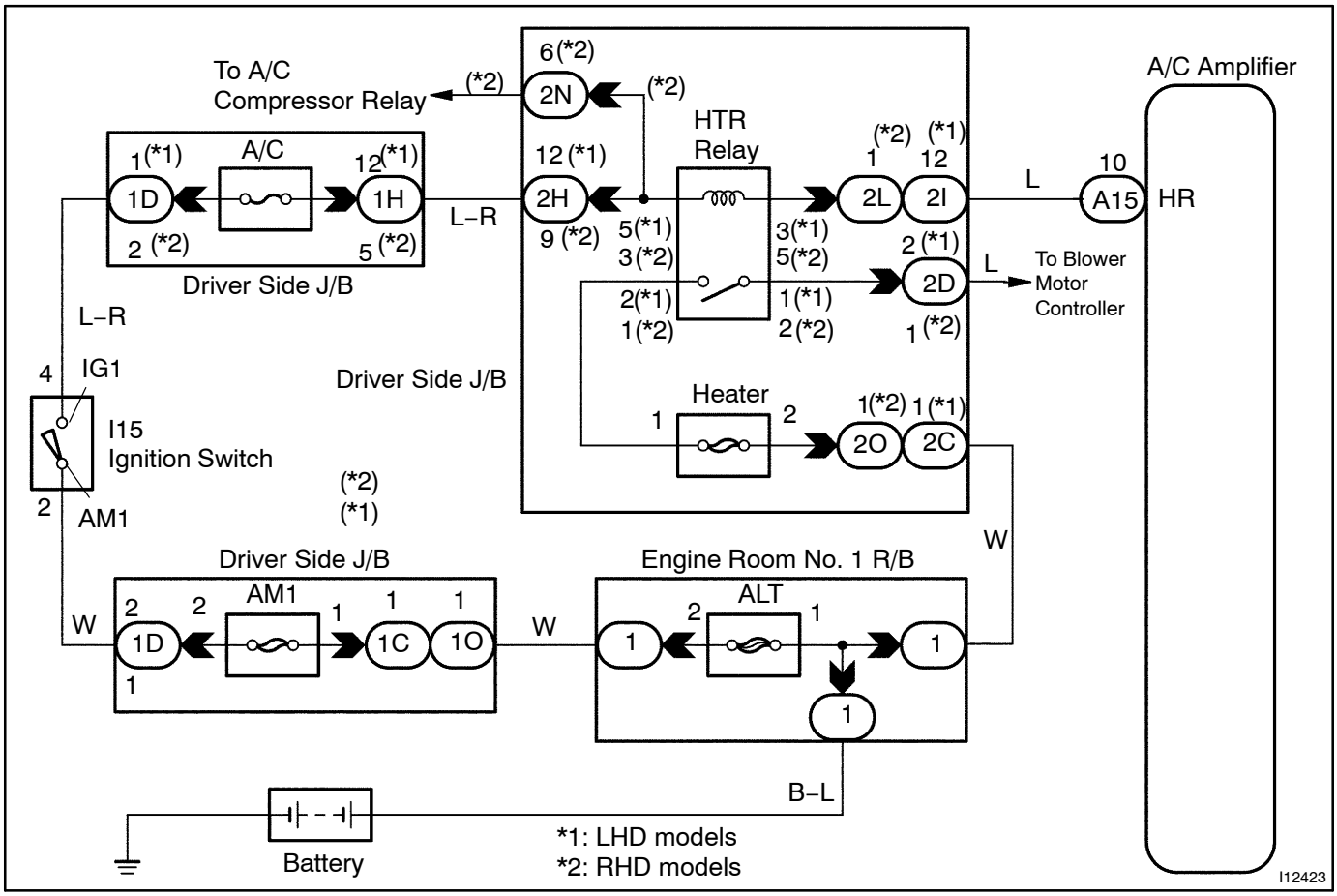
DI9H5–01

Heater Main Relay Circuit

CIRCUIT DESCRIPTION

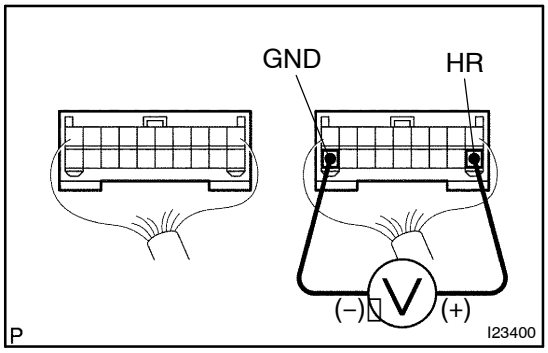
The heater main relay is switched on by signals from the A/C amplifier. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal HR of A/C amplifier connector and body ground.



PREPARATION:

Remove A/C amplifier with connectors still connected.

CHECK:

Measure voltage between terminal HR of A/C amplifier and body ground when ignition switch is ON and OFF.

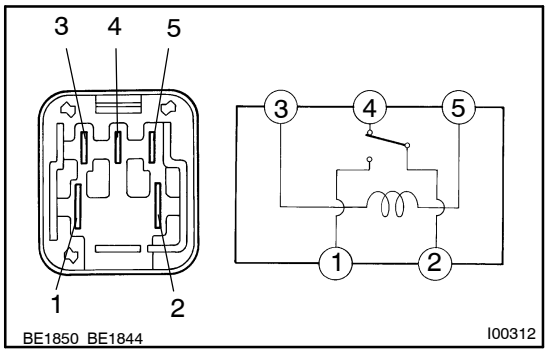
OK:

Ignition Switch	Voltage	
OFF	0 V	
ON	Blower ON	0 V
	Blower OFF	10 – 14 V

OK → Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).

NG

2	**Check heater main relay.**



PREPARATION:

Remove heater main relay from passenger side J/B.

CHECK:

Check continuity between each pair of terminals of heater main relay shown below.

OK:

Tester connection	Specified condition
1 – 4	No continuity
2 – 4	Continuity
3 – 5	62.5 – 90.9 Ω

PREPARATION:

Apply battery positive voltage between terminals 3 and 5.

CHECK:

Check continuity between each pair of terminal shown below.

OK:

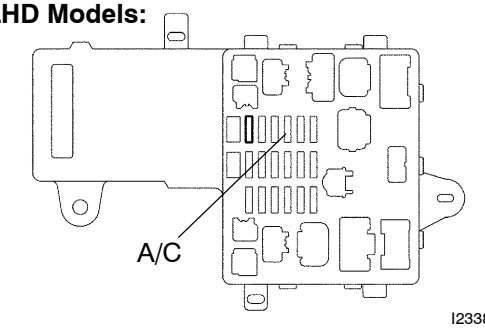
Tester connection	Specified condition
1 – 2	Continuity
2 – 4	No continuity

NG → **Replace hater main relay.**

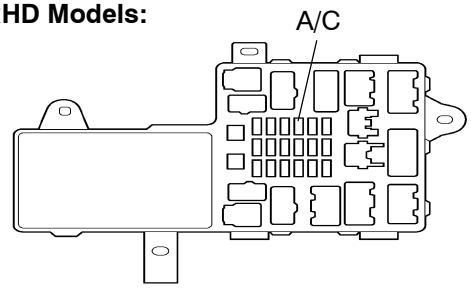
OK

3	Check A/C fuse

LHD Models:



RHD Models:



PREPARATION:

Remove A/C fuse from driver side J/B.

CHECK:

Check continuity of A/C fuse.

OK:

Continuity exists.

NG → **Check for short in all the harness and components connected to the A/C fuse (See attached wiring diagram).**

OK

Check and repair harness and connector between A/C amplifier and battery.

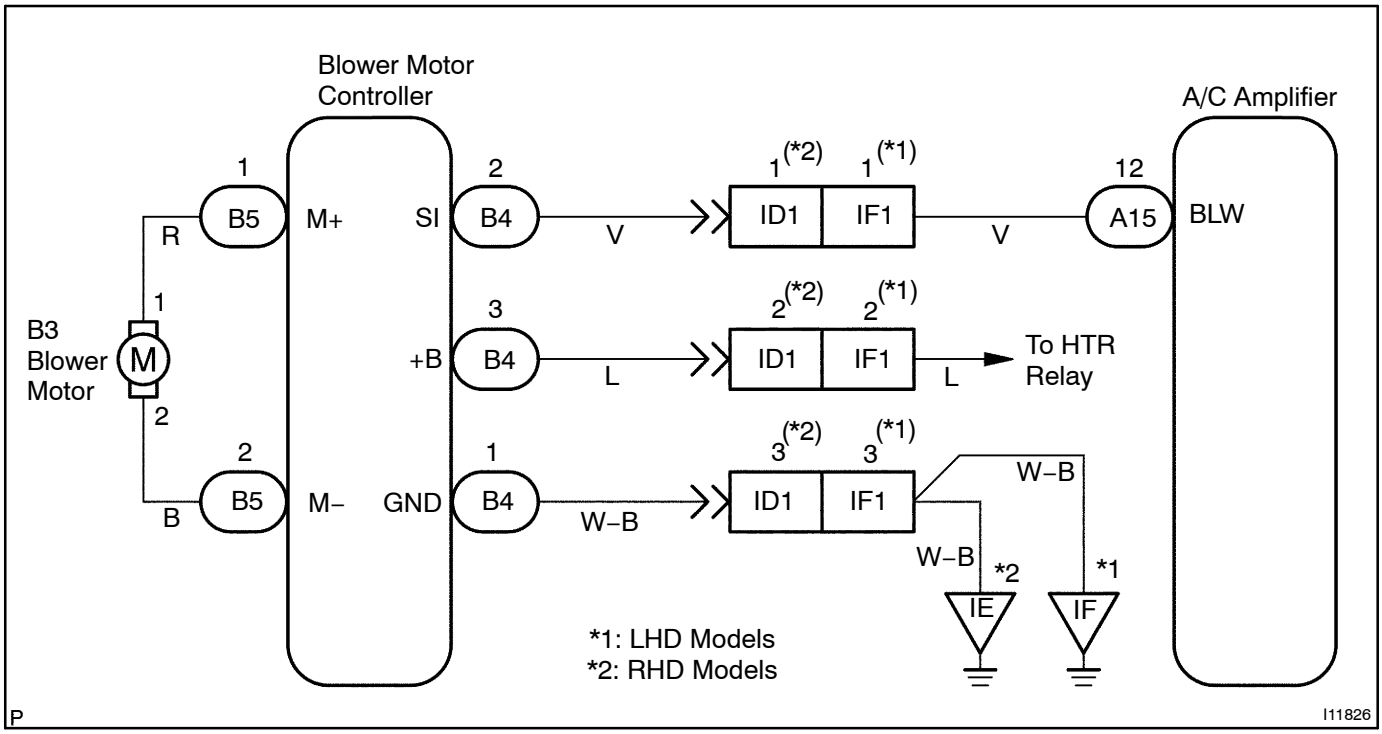
DI60M–03

Blower Motor Circuit

CIRCUIT DESCRIPTION

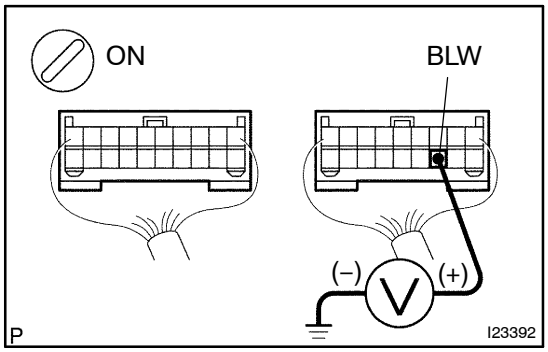
This is the power source for the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal BLW of A/C amplifier connector and body ground.**

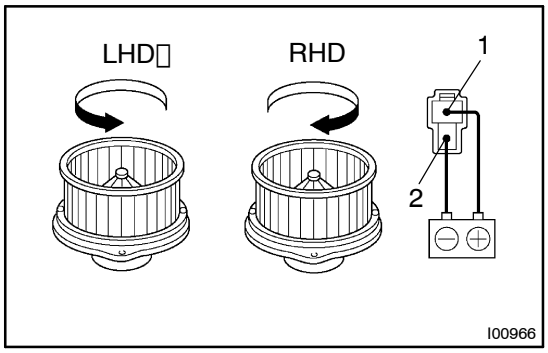


PREPARATION:
Remove the A/C amplifier with connector still connected.
CHECK:
(a) Turn ignition switch to ON.
(b) Operate blower motor.
(c) Measure voltage between terminal BLW of A/C amplifier and body ground.
OK:
Voltage: 1 – 3 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–612).**

NG

2	**Check blower motor.**

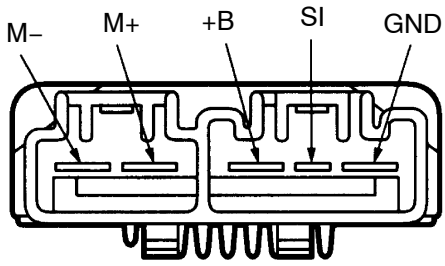


PREPARATION:
Remove blower motor.
CHECK:
Connect the positive (+) lead from the battery to terminal 1 of blower motor connector and the negative (–) lead to terminal 2.
OK:
Blower motor operates smoothly.

NG	**Replace blower motor.**

OK

3	Check blower motor control relay.



I05291

PREPARATION:

Remove blower motor control relay with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Operate blower motor (High blower speed).

OK:

Terminals	Standard Value
GND ↔ Body Ground	Continuity
+B ↔ Body Ground	Battery voltage
+M ↔ Body Ground	Battery voltage
M+ ↔ M–	Battery voltage
SI ↔ Body Ground	1 – 3 V

NG → **Replace blower motor relay.**

OK →

Repair or replace harness or connector.

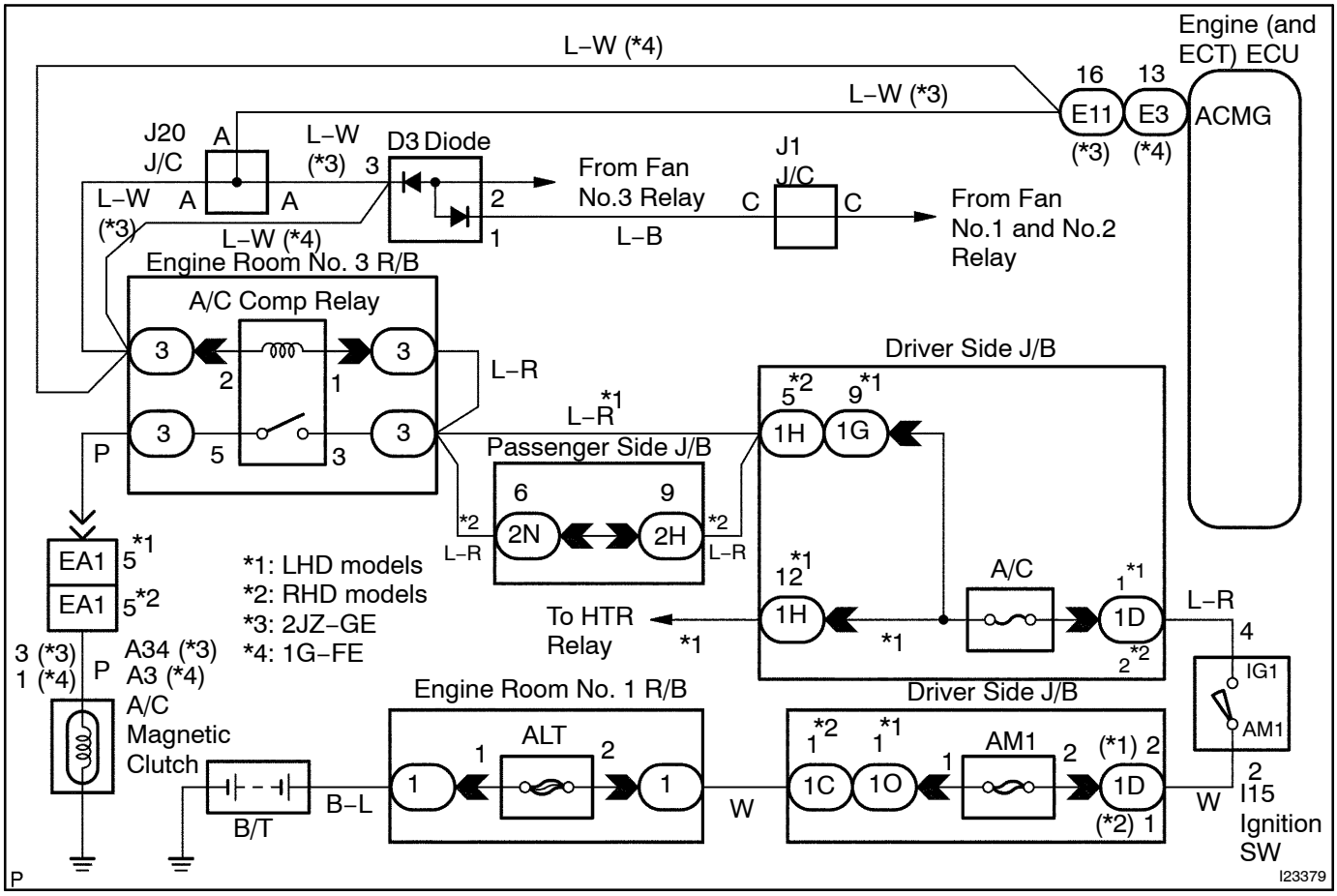
DI60N–03

Compressor Circuit

CIRCUIT DESCRIPTION

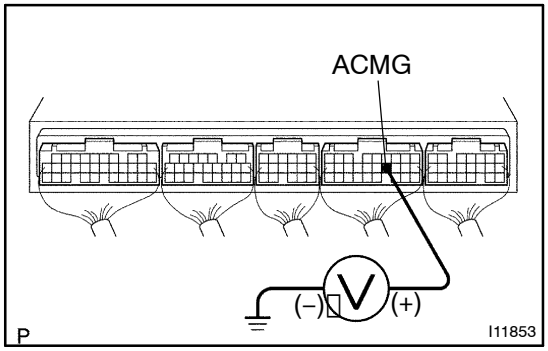
The A/C amplifier outputs the magnetic clutch ON signal from terminal MPX+ to the engine (and ECT) ECU. When the engine (and ECT) ECU receives this signal, it sends a signal from terminal ACMG and switches the A/C magnetic clutch relay ON, this turning the A/C compressor magnetic clutch ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal ACMG of engine (and ECT) ECU.



CHECK:

(a) Start engine.
(b) Push AUTO SW.
(c) Measure voltage between terminal ACMG of engine (and ECT) ECU connector and body ground when A/C switch is ON and OFF.

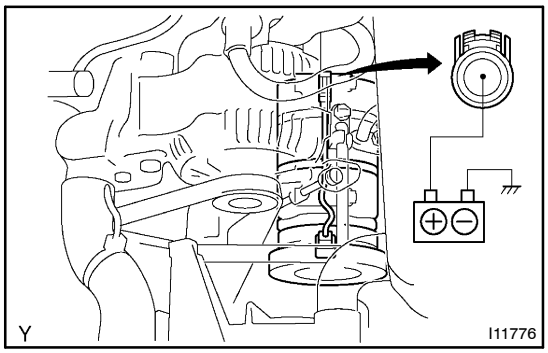
OK:

A/C switch	Voltage
ON	10 – 14 V
OFF	0 V

OK → Check and replace engine (and ECT) ECU and/or A/C amplifier.

NG

2	Check A/C compressor magnetic clutch.



PREPARATION:

Disconnect magnetic clutch connector.

CHECK:

Connect positive (+) lead connected to battery to magnetic clutch connector terminal.

OK:

Magnetic clutch is energized.

NG → Repair A/C compressor magnetic clutch.

OK

3	Check harness and connector between A/C compressor and compressor relay (See page IN–34).

NG → Repair or replace harness or connector.

OK

4	Check harness and connector between compressor relay and engine (and ECT) ECU (See page IN–34).

NG → Repair or replace harness or connector.

OK

5	Check harness and connector between engine (and ECT) ECU and A/C amplifier (See page IN–34).

NG → Repair or replace harness or connector.

OK

Check and replace engine (and ECT) ECU and/or A/C amplifier.