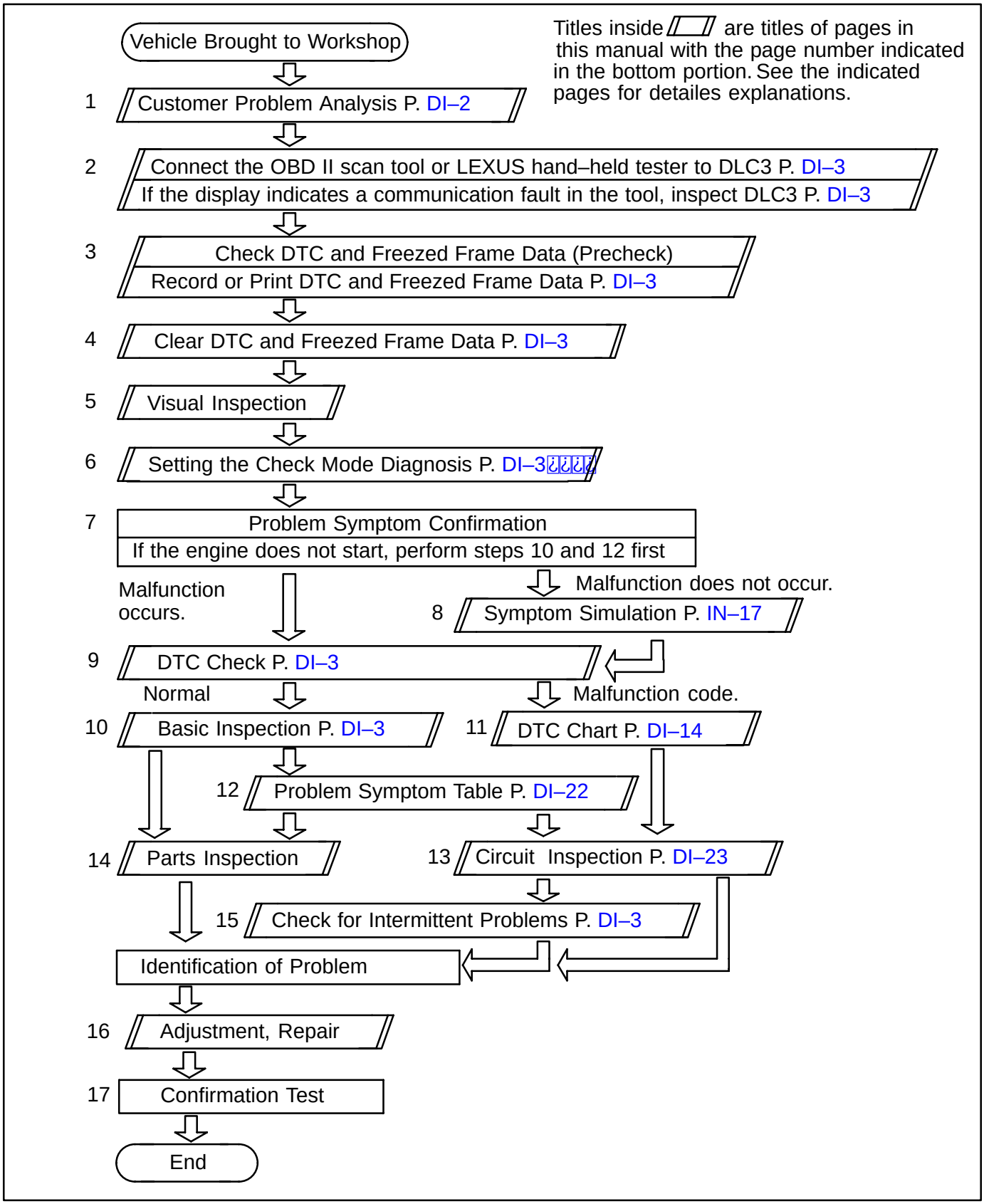
ENGINE

DI094–01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



DI095–01

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name

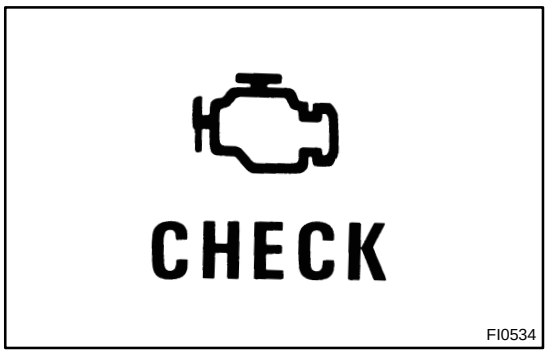
Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Date Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

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 _____

Condition of MIL		☐ Remains on	☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

DI096–01



PRE–CHECK

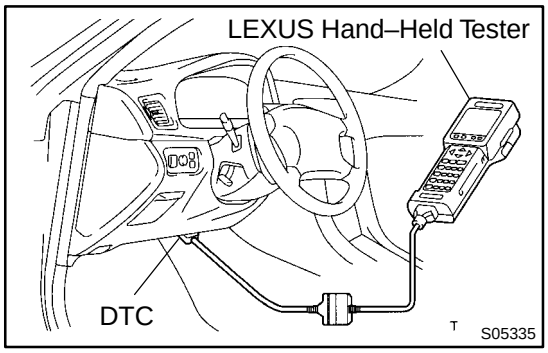
1. DIAGNOSIS SYSTEM

(a) Description

When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD II scan tool complying with SAE J1978 or LEXUS hand–held tester, and read off various data output from the vehicle's ECM.

OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTC) prescribed by SAE J2012 are recorded in the ECM memory (See page DI–14).

If the malfunction does not reoccur in 3 trips, the MIL goes off but the DTC remain recorded in the ECM memory.



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

DTC include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–14).

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 DTC use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily (LEXUS hand–held tester only).

(See page DI–14)

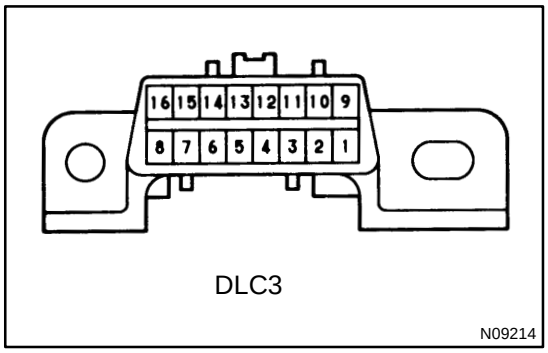
*2 trip detection logic: When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up.

The 2 trip repeats the same mode a 2nd time (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.).

Freeze frame data:
Freeze frame data records the engine condition when a misfire (DTC P0300 ~ P0306) or fuel trim malfunction (DTC P0171, P0172) or other malfunction (first malfunction only), is detected.
Because freeze frame data records the engine conditions (fuel system, calculator load, engine coolant 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 warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
Priorities for troubleshooting:
If troubleshooting priorities for multiple DTC are given in the applicable DTC chart, these should be followed.
If no instructions are given troubleshoot DTC according to the following priorities.

(1) DTC other than fuel trim malfunction (DTC P0171, P0172), EGR (DTC P0401, P0402) and misfire (DTC P0300 ~ P0306).
(2) Fuel trim malfunction (DTC P0171, P0172) and EGR (DTC P0401, P0402).
(3) Misfire (DTC P0300 ~ P0306).

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

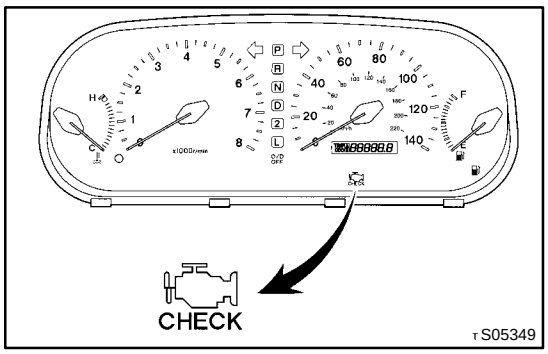


DLC3

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus ⊖ Line / Pulse generation	During transmission
4	Chassis Ground / ↔ Body Ground 1 Ω or less	Always
5	Signal 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 II scan tool or LEXUS 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.

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



2. INSPECT DIAGNOSIS (Normal Mode)

(a) Check the MIL.

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

HINT:If the MIL does not light up, troubleshoot the combination meter (See page BE–87).

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

(b) Check the DTC.

NOTICE:NOTICE (LEXUS hand–held tester only): When the diagnosis system is switched from normal mode to check mode, it erases all DTC and freezed frame data recorded in normal mode. So before switching modes, always check the DTC and freezed frame data, and note them down.

(1) Prepare the OBD II scan tool (complying with SAE J 1978) or LEXUS hand–held tester.

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

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

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

(5) See page DI–14 to confirm the details of the DTC.

NOTICE:When simulating symptoms with an OBD II scan tool (excluding LEXUS hand–held tester) to check the DTC, 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 MIL lights up and the DTC are recorded in the ECM.

3. INSPECT DIAGNOSIS (Check Mode)

LEXUS 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 mode.

(a) Check the DTC.

(1) Initial conditions.

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

(2) Turn ignition switch OFF.

(3) Prepare the LEXUS hand–held tester.

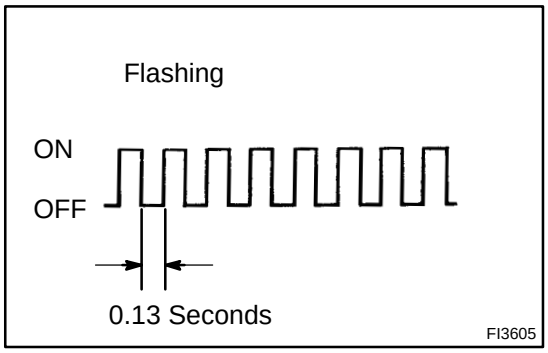
(4) Connect the LEXUS hand–held tester to DLC3 at the lower center of the instrument panel.

(5) Turn the ignition switch ON and push the LEXUS hand–held tester switch ON.

(6) Switch the LEXUS hand–held tester normal mode to check mode (Check that the MIL flashes.).

(7) Start the engine (The MIL goes out after the engine start.).

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



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

(9) After simulating the malfunction conditions, use the LEXUS hand–held tester diagnosis selector to check the DTC 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 mode to normal mode, so all DTC, etc. are erased.

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

(b) Clear the DTC.

The following actions will erase the DTC and freezed frame data.

(1) Operating the OBD II scan tool (complying with SAE J1978) or LEXUS hand–held tester to erase the codes (See the OBD II scan tool’s instruction book for operating instructions.).

(2) Disconnecting the battery terminals or EFI fuse.

NOTICE:If the LEXUS hand–held tester switches the ECM 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 DTC and freezed frame data will be erased.

4. FAIL–SAFE CHART

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

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0100	Ignition timing fixed at 10˚ BTDC	Returned to normal condition
P0110	Intake air temp. is fixed at 20˚C (68˚F)	Returned to normal condition
P0115	Engine coolant temp. is fixed at 80˚C (176˚F)	Returned to normal condition
P0120	VTA is fixed at 0˚	The following condition must be repeated at least 2 times consecutively 0.1 V ∼ VTA ∼ 0.95 V
P0135 P0141 P0155	The heater circuit in witch an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. timing retardation	Ignition switch OFF
P1300	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

LEXUS HAND–HELD TESTER only:

By putting the vehicle's ECM in check 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 DTC (See page DI–3).
(b) Set the check mode (See page DI–3).
(c) Perform a simulation test (See page IN–17).
(d) Check the connector and terminal (See page IN–27).
(e) Handle the connector (See page IN–27).

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 positive voltage 11 V or more when engine is stopped ?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked ?**

NO → **Proceed to page ST–18 and continue to troubleshoot.**

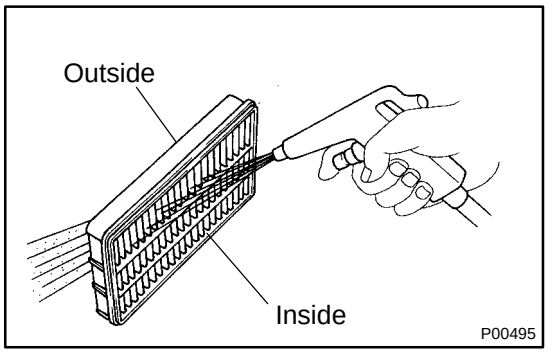
YES

3	**Does engine start ?**

NO → **Go to step 7.**

YES

4	**Check air filter.**



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

NG → **Repair or replace.**

OK

5	**Check engine idle speed.**

PREPARATION:
(a) Warm up engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into ”N” position.
(e) Connect the OBD II scan tool or LEXUS hand–held tester to DLC3 on the vehicle.

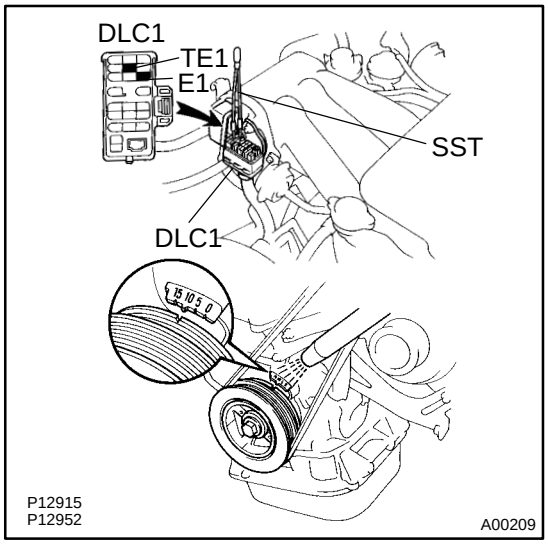
CHECK:
Use CURRENT DATA to check the idle speed.

OK:
Idle speed: 650 ~ 750 rpm

NG → **Proceed to problem symptoms table on page DI–22.**

OK

6	Check ignition timing.



PREPARATION:

(a) Warm up engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into ”N” position.
(e) Keep the engine speed at idle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843 – 18020
(g) Using a timing light, connect the tester to check wire.

CHECK:

Check ignition timing.

OK:

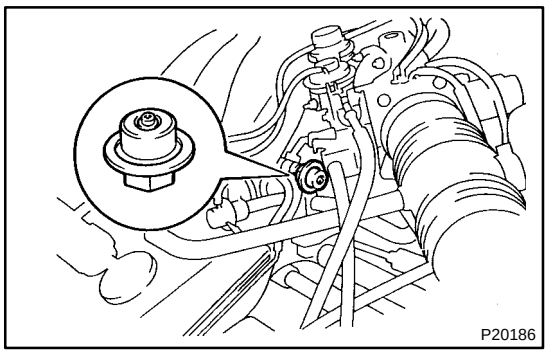
Ignition timing: 10° BTDC at idle

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI–22.

7	Check fuel pressure.



PREPARATION:

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

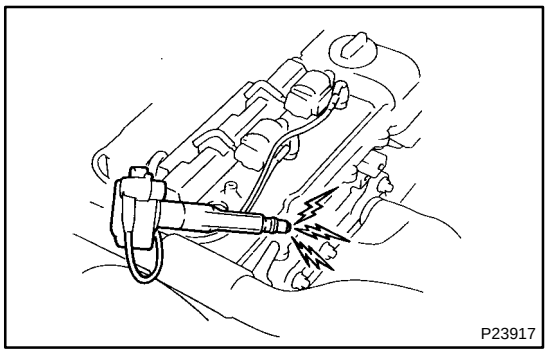
CHECK:

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

NG → **Proceed to page SF–6 and continue to troubleshoot.**

OK

8	Check for spark.



PREPARATION:

(a) Remove the ignition coil or disconnect the high–tension cord from spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil or high–tension cord.
(d) Disconnect the injector connector.
(e) Hold the end about 12.5 mm (0.5 in.) from the ground.

CHECK:

Check if spark occurs while engine is being cranked.

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

OK:

Spark jumps across electrode gap.

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI–22.

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 from those listed here. So do not decide whether a part is faulty or not solely according to the ”Normal Condition” here.

(a) CARB mandated signals.

LEXUS 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: 13.1 ~ 18.7% Racing without load (2,500rpm): 11.7 ~ 17.3%
COOLANT TEMP.	Engine Coolant 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 10 ~ 25.0°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 3.3 ~ 4.7 gm/sec. Racing without load (2,500 rpm): 10.4 ~ 15.4 gm/sec.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0%, 5 V → 100%	Throttle valve fully closed: 7 ~ 11% Throttle valve fully open: 65 ~ 75%
O2S B1, S1	Voltage Output of Oxygen Sensor Bank 1, Sensor 1	Idling: 0.1 ~ 0.9 V
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20%
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
O2FT B2, S1	Oxygen Sensor Fuel Trim Bank 2, Sensor 1 (Same as SHORT FT #2)	0 ± 20%

*: 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.

(b) LEXUS Enhanced Signals.

LEXUS hand–held tester display	Measurement Item	Normal Condition*
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
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.6 ~ 2.9 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 27 ~ 47 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SIG	Closed Throttle Position Signal	Throttle Fully Closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
ELCTRCL LOAD SIG	Electrical Load Signal	Defogger switch ON: 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 ~ 3,000 rpm
EGRT GAS	EGR Gas Temperature Sensor Value	EGR not operating: Temperature between intake air temp. and engine coolant temp.
INTAKE CTRL VSV	Intake Air Control Valve VSV Signal	VSV operating: ON
EGR SYSTEM	EGR system operating condition	Idling: OFF
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: ON
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON

*: 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.

LEXUS hand–held tester display	Measurement Item	Normal Condition*
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 ~ 1.2
TOTAL FT B2	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 2	Idling: 0.8 ~ 1.2
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 warmed 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 warmed 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 warmed up: 0 ~ 1,000 msec.
O2 RL B2, S1	Oxygen Sensor Rich Lean Bank 2, Sensor 1 Response time for oxygen sensor output to switch from rich to lean	Idling after warmed up: 0 ~ 1,000 msec.

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

DI097–01

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 check mode, check the circuit for that 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.

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI–23)	Mass Air Flow Circuit Malfunction	□Open or short in mass air flow meter circuit □Mass air flow meter □ECM	○	○
P0101 (DI–27)	Mass Air Flow Circuit Range/Performance Problem	□Mass air flow meter	○	○
P0110 (DI–28)	Intake Air Temp. Circuit Malfunction	□Open or short in intake air temp. sensor circuit □Intake air temp. sensor □ECM	○	○
P0115 (DI–33)	Engine Coolant Temp. Circuit Malfunction	□Open or short in engine coolant temp. sensor circuit □Engine coolant temp. sensor □ECM	○	○
P0116 (DI–37)	Engine Coolant Temp. Circuit Range/Performance Problem	□Engine coolant temp. sensor □Cooling system	○	○
P0120 (DI–38)	Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction	□Open or short in throttle position sensor circuit □Throttle position sensor □ECM	○	○
P0121 (DI–42)	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem	□Throttle position sensor	○	○
P0125 (DI–43)	Insufficient Coolant Temp. for Closed Loop Fuel Control	□Open or short in heated oxygen sensor circuit □Heated oxygen sensor	○	○
P0130 (DI–46)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	□Heated oxygen sensor □Fuel trim malfunction	○	○
P0133 (DI–49)	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	□Heated oxygen sensor	○	○
P0135 (DI–50)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	□Open or short in heater circuit of heated oxygen sensor □Heated oxygen sensor □ECM	○	○
P0136 (DI–52)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	□Heated oxygen sensor	○	○
P0141 (DI–50)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	□Same as DTC No. P0135	○	○
P0150 (DI–46)	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	□Same as DTC No. P0130	○	○

*: ○ ~~~MIL lights up

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0153 (DI–49)	Heated Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	□Same as DTC No. P0133	○	○
P0155 (DI–50)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	□Same as DTC No. P0135	○	○
P0171 (DI–54)	System too Lean (Fuel Trim)	□Air intake (hose loose) □Fuel line pressure □Injector blockage □Heated oxygen sensor malfunction □Mass air flow meter □Engine coolant temp. sensor	○	○
P0172 (DI–54)	System too Rich (Fuel Trim)	□Fuel line pressure □Injector leak, blockage □Heated oxygen sensor malfunction □Mass air flow meter □Engine coolant temp. sensor	○	○
P0300 (DI–57)	Random/Multiple Cylinder Misfire Detected	□Ignition system □Injector □Fuel line pressure □Compression pressure □Valve clearance not to specification □Valve timing □Mass air flow meter □Engine coolant temp. sensor	○*2	○
P0301 P0302 P0303 P0304 P0305 P0306 (DI–57)	Misfire Detected – Cylinder 1 – Cylinder 2 – Cylinder 3 – Cylinder 4 – Cylinder 5 – Cylinder 6			
P0325 (DI–62)	Knock Sensor 1 Circuit Malfunction	□Open or short in knock sensor 1 circuit □Knock sensor 1 (looseness) □ECM	○	○
P0330 (DI–62)	Knock Sensor 2 Circuit Malfunction	□Open or short in knock sensor 2 circuit □Knock sensor 2 (looseness) □ECM	○	○
P0335 (DI–66)	Crankshaft Position Sensor ”A” Circuit Malfunction	□Open or short in crankshaft position sensor circuit □Crankshaft position sensor □Starter □ECM	○	○
P0340 (DI–69)	Camshaft Position Sensor Circuit Malfunction	□Open or short in camshaft position sensor circuit □Camshaft position sensor □Starter □ECM	○	○
P0401 (DI–71)	Exhaust Gas Recirculation Flow Insufficient Detected	□EGR valve (stuck closed) □Open or short in EGR gas temp. sensor circuit □EGR gas temp. sensor □Open in VSV circuit for EGR □VSV for EGR □Vacuum control valve □Vacuum hose disconnected or blocked □ECM	○	○

*1: ○ ~~~MIL lights up *2: MIL lights up or blinking

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0402 (DI–81)	Exhaust Gas Recirculation Flow Excessive Detected	□EGR valve stuck open □VSV for EGR open malfunction □Short in VSV circuit for EGR □Open or short in EGR valve position sensor circuit □EGR valve position sensor □ECM	○	○
P0420 (DI–84)	Catalyst System Efficiency Below Threshold	□Three–way catalytic converter □Open or short in heated oxygen sensor circuit □Heated oxygen sensor	○*2	○
P0440 (DI–87)	Evaporative Emission Control System Malfunction	□Vapor pressure sensor □Fuel tank cap incorrectly installed □Fuel tank cap cracked or damaged □Vacuum hose cracked, holed, blocked, damaged or disconnected □Hose or tube cracked, holed, damaged or insufficient seal □Fuel tank cracked, holed or damaged □Charcoal canister cracked, holed or damaged	○	○
P0441 (DI–93)	Evaporative Emission Control System Incorrect Purge Flow	□Open or short in VSV circuit for EVAP □VSV for EVAP □Open or short in vapor pressure sensor circuit □Vapor pressure sensor □Open or short in VSV circuit for vapor pressure sensor □VSV for vapor pressure sensor □Vacuum hose cracked, holed, blocked, damaged or disconnected □Charcoal canister cracked, holed or damaged	○	○
P0446 (DI–93)	Evaporative Emission Control System Vent Control Malfunction	□Open or short in VSV circuit for EVAP □VSV for EVAP □Open or short in vapor pressure sensor circuit □Vapor pressure sensor □Open or short in VSV circuit for vapor pressure sensor □VSV for vapor pressure sensor □Vacuum hose cracked, holed, blocked, damaged or disconnected □Charcoal canister cracked, holed or damaged	○	○
P0450 (DI–104)	Evaporative Emission Control System Pressure Sensor Malfunction	□Open or short in vapor pressure sensor circuit □Vapor pressure sensor □ECM	○	○
P0500 (DI–106)	Vehicle Speed Sensor Malfunction	□Open or short in speed signal circuit □Open or short in speed sensor circuit for ABS □Combination meter □ECM □ABS ECU	○	○
P0505 (DI–109)	Idle Control System Malfunction	□IAC valve is stuck or closed □Open or short in IAC valve circuit □Open or short in A/C signal circuit □Air intake (hose loose)	○	○

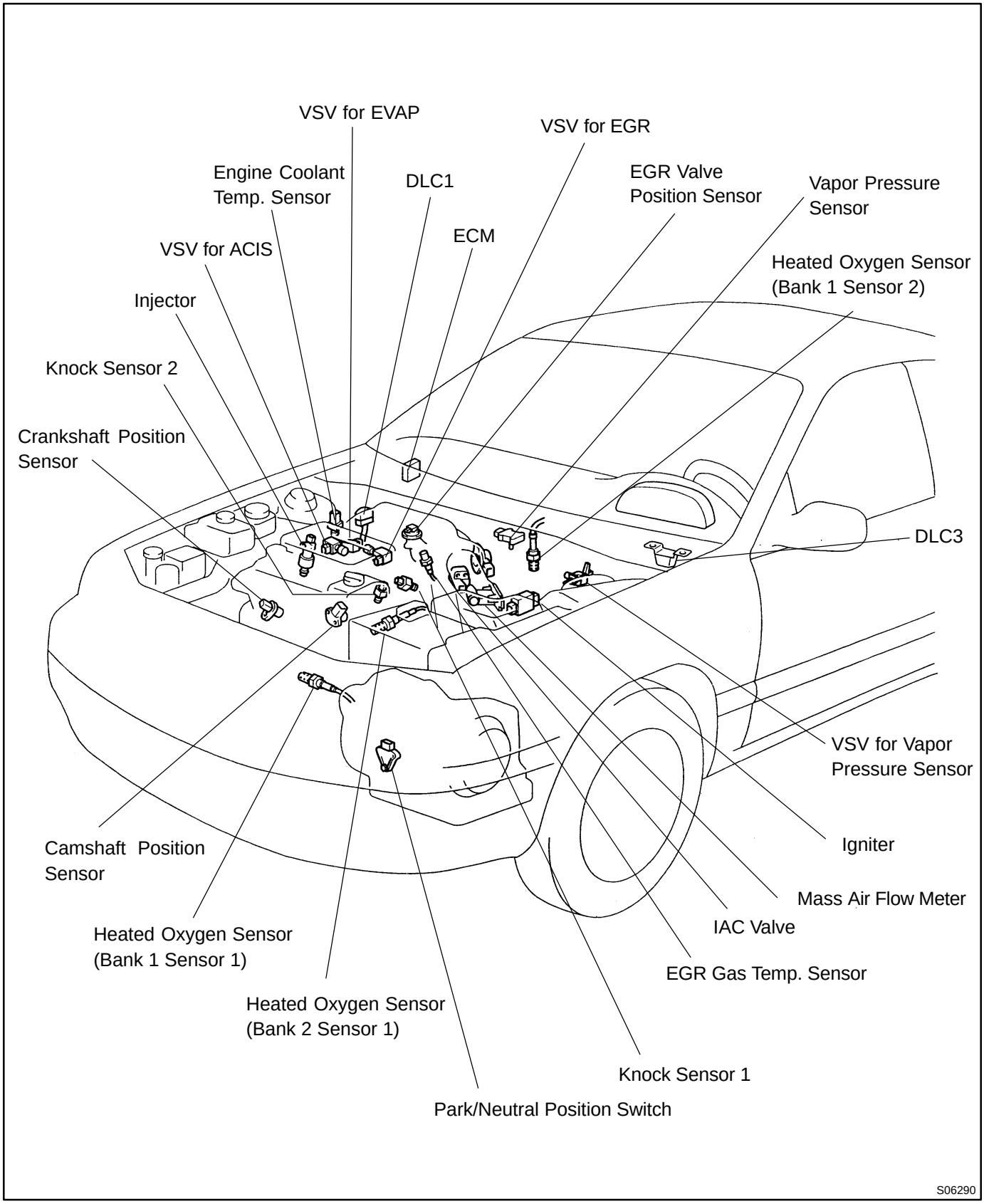
*1: ○ ~~~MIL lights up *2: MIL lights up on U.S.A. and Canadian specification vehicles

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1300 (DI–112)	Igniter Circuit Malfunction	□ Open or short in IGF or IGT circuit from igniter to ECM □ Igniter □ ECM	○	○
P1335 (DI–117)	Crankshaft Position Sensor Circuit Malfunction (during engine running)	□ Open or short in crankshaft position sensor circuit □ Crankshaft position sensor □ ECM	–	○
P1410 (DI–118)	EGR Valve Position Sensor Circuit Malfunction	□ Open or short in EGR valve position sensor circuit □ EGR valve position sensor □ ECM	○	○
P1411 (DI–122)	EGR Valve Position Sensor Circuit Range/Performance Problem	□ EGR valve position sensor	○	○
P1520 (DI–123)	Stop Light Switch Signal Malfunction	□ Short in stop light switch signal circuit □ Stop light switch □ ECM	○	○
P1600 (DI–126)	ECM BATT Malfunction	□ Open in back up power source circuit □ ECM	○	○
P1780 (DI–128)	Park/Neutral Position Switch Malfunction	□ Short in park/neutral position switch circuit □ Park/neutral position switch □ ECM	○	○

*: – ~~~MIL does not light up ○ ~~~MIL lights up

DI098–01

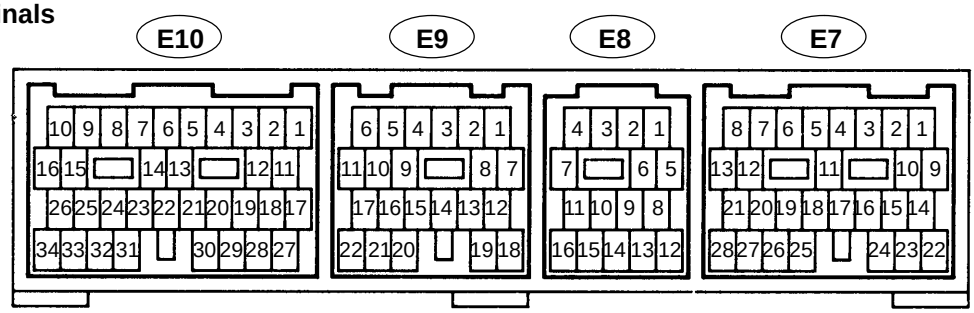
PARTS LOCATION



DI099–01

TERMINALS OF ECM

ECM Terminals



FI6810

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E7 – 14) – E1 (E8 – 16)	B–Y ↔ BR	Always	9 ~ 14
+B (E7 – 23) – E1 (E8 – 16)	B–Y ↔ BR	IG switch ON	9 ~ 14
VC (E9 – 1) – E2 (E9 – 22)	Y ↔ BR	IG switch ON	4.5 ~ 5.5
VTA1 (E9 – 7) – E2 (E9 – 22)	L ↔ BR	IG switch ON Throttle valve fully closed	0.3 ~ 1.0
		IG switch ON Throttle valve fully open	3.2 ~ 4.9
VG (E9 – 8) – E2G (E8 – 7)	P ↔ R–B	Idling , A/C switch OFF	1.1 ~ 1.5
THA (E9 – 21) – E2 (E9 – 22)	L–Y ↔ BR	Idling, Intake air temp. 20˚C (68˚F)	0.5 ~ 3.4
THW (E9 –20) – E2 (E9 – 22)	G–B ↔ BR	Idling, Engine coolant temp. 80˚C (176˚F)	0.2 ~ 1.0
STA (E10 – 13) – E1 (E8 – 16)	GR ↔ BR	Cranking	6.0 or more
#10 (E10 – 10) – E01 (E10 – 34)	L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
#20 (E10 – 9) – E01 (E10 – 34)	R ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
#30 (E10 – 8) – E01 (E10 – 34)	Y ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
#40 (E10 – 7) – E01 (E10 – 34)	W ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
#50 (E10 – 6) – E01 (E10 – 34)	R–L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
#60 (E10 – 5) – E01 (E10 – 34)	G ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–57)
IGT1 (E10 – 24) – E1 (E8 – 16)	GR ↔ BR	Idling	Pulse generation (See page DI–112)
IGT2 (E10 – 16) – E1 (E8 – 16)	BR–Y ↔ BR	Idling	Pulse generation (See page DI–112)
IGT3 (E10 – 15) – E1 (E8 – 16)	LG–B ↔ BR	Idling	Pulse generation (See page DI–112)

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IGF (E10 – 12) – E1 (E8 – 16)	W–R ↔ BR	IG switch ON	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–112)
THG (E8 – 14) – E2 (E9 – 22)	G–Y ↔ BR	IG switch ON	4.5 ~ 5.5
G22+ (E9 – 17) – NE– (E9 – 6)	B–W ↔ L	Idling	Pulse generation (See page DI–66)
NE+ (E9 – 5) – NE– (E9 – 6)	B–R ↔ L	Idling	Pulse generation (See page DI–66)
ELS (E7 – 3) – E1 (E8 – 16)	G–O ↔ BR	Taillight switch ON	7.5 ~ 14
		Taillight switch OFF	0 ~ 1.5
ELS2 (E7 – 2) – E1 (E8 – 16)	B–Y ↔ BR	Defogger switch ON	7.5 ~ 14
		Defogger switch OFF	0 ~ 1.5
EGR (E8 – 12) – E01 (E10 –34)	Y–G ↔ BR	IG switch ON	9 ~ 14
ACIS (E8 – 6) – E01 (E10 – 34)	R–G ↔ BR	IG switch ON	9 ~ 14
FC (E9 – 18) – E1 (E8 – 16)	G–R ↔ BR	IG switch ON	9 ~ 14
		Idling	0 ~ 3.0
EVP1 (E8 – 2) – E01 (E10 – 34)	LG ↔ BR	IG switch ON	9 ~ 14
RSC (E10 – 22) – E01 (E10 – 34)	Y–B ↔ BR	IG switch ON Disconnect E10 of ECM connector	9 ~ 14
RSO (E10 – 23) – E01 (E10 – 34)	R–W ↔ BR	IG switch ON Disconnect E10 of ECM connector	9 ~ 14
OXR1 (E9 – 13) – E1 (E8 – 16)	W ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–84)
OXL1 (E9 – 19) – E1 (E8 – 16)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–84)
OXS (E7 – 18) – E1 (E8 – 16)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–84)
HTL (E8– 10) – E03 (E10 – 28)	Y–R ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
HTR (E8 – 11) – E03 (E10 – 28)	L–B ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
HTS (E7 – 17) – E03 (E10 –28)	P–B ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
KNKR (E9 – 15) – E1 (E8 – 16)	W ↔ BR	Idling	Pulse generation (See page DI–62)
KNKL (E9 – 14) – E1 (E8 – 16)	W ↔ BR	Idling	Pulse generation (See page DI–62)
NSW (E10 – 14) – E1 (E8 – 16)	B–W ↔ BR	IG switch ON Other shift position in ”P” ,”N” position	9 ~ 14
		IG switch ON Shift position in ”P” ,”N” position	0 ~ 3.0
SPD (E7 – 12) – E1 (E8 – 16)	V–W ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation
TC (E8 – 5) – E1 (E8 – 16)	L–W ↔ BR	IG switch ON	9 ~ 14

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
W (E8 – 3) – E1 (E8 – 16)	G–R ↔ BR	IG switch ON	Below 3.0
PS (E10 – 31) – E1 (E8 – 16)	B ↔ L	IG switch ON	9 ~ 14
ACT (E7 – 5) – E1 (E8 – 16)	B–Y ↔ BR	A/C switch OFF	Below 2.0
		A/C switch ON at idling	9 ~ 14
A/C (E7 – 16) – E1 (E8 – 16)	LG–W ↔ BR	A/C switch ON at idling	Below 2.0
		A/C switch OFF	9 ~ 14
CF (E8 – 9) – E1 (E8 – 16)	G–W ↔ BR	Electric cooling fan is operating on high speed	9 ~ 14
		Electric cooling fan is operating on low speed or OFF	0 ~ 2
TACH (E7 – 13) – E1 (E8–16)	B–O ↔ BR	Idling	Pulse generation
TPC (E8 – 8) – E1 (E8 – 16)	W–R ↔ BR	IG switch ON Disconnect the vacuum hose from the vapor pressure sensor	9 ~ 14
PTNK (E8 – 13) – E1 (E8 – 16)	L–R ↔ BR	IG switch ON	3.0 ~ 3.6
		IG switch ON Apply vacuum 2.0 kPa (15 mmHg, 0.6 in.Hg)	1.3 ~ 2.1
SIL (E7 – 8) – E1 (E8 – 16)	W ↔ BR	During transmission	Pulse generation
STP (E7 – 24) – E1 (E8 – 16)	G–W ↔ BR	IG switch ON Brake pedal depressed	7.5 ~ 14
		IG switch ON Brake pedal released	Below 1.5
EGLS (E8 – 15) – E1 (E8 – 16)	W–G ↔ BR	IG switch ON Apply vacuum (0 kPa, 0 mmHg, 0 in.Hg) to EGR valve	0.4 ~ 1.6
		IG switch ON Apply vacuum (17.3 kPa, 130 mmHg, 5.12 in.Hg) to EGR valve	3.2 ~ 5.1

DI09A–01

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST–18 ST–20
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–132 DI–138 IN–27
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–138
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–132 DI–138 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–132 DI–138
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI–132 DI–138
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	DI–569 DI–135
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	DI–569 DI–138
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–138
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–135 DI–138
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–138 DI–148
Surging	1. Fuel pump control circuit	DI–138
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI–138
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor circuit) 2. Engine control module (ECM)	DI–569 IN–27

DI09B–01

CIRCUIT INSPECTION

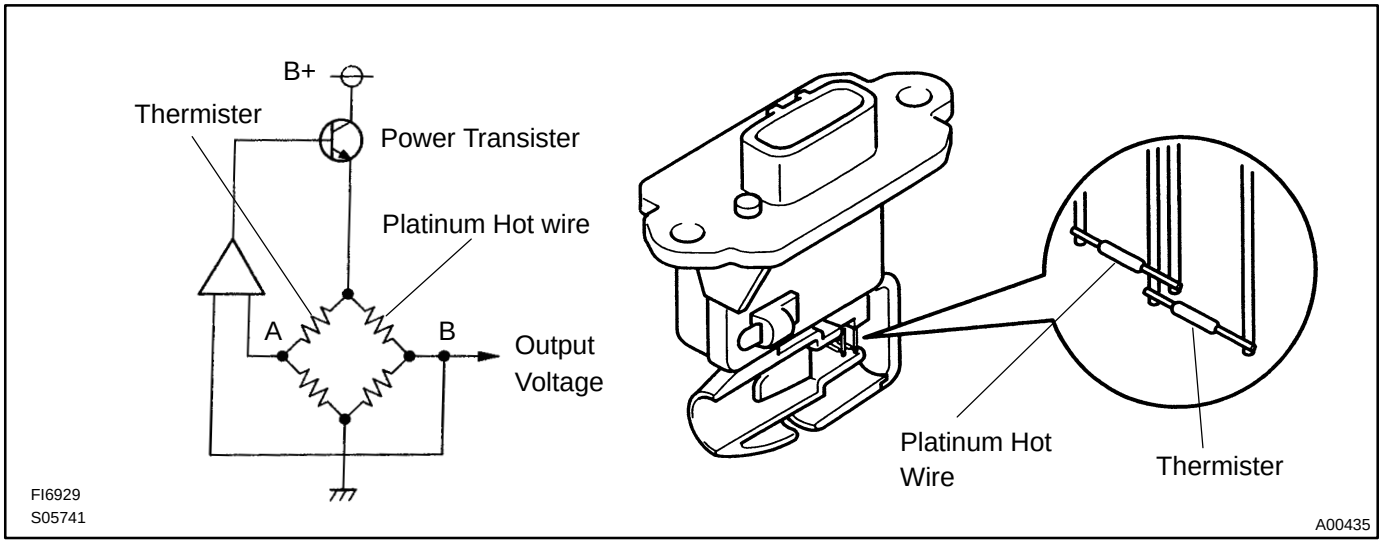
DTC	P0100	Mass Air Flow Circuit Malfunction

CIRCUIT DESCRIPTION

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

The hot wire is maintained at the set temp. 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 thermistor provide a bridge circuit,with the power transistor controlled so that the potential of A and B remains equal to maintain the set temp.



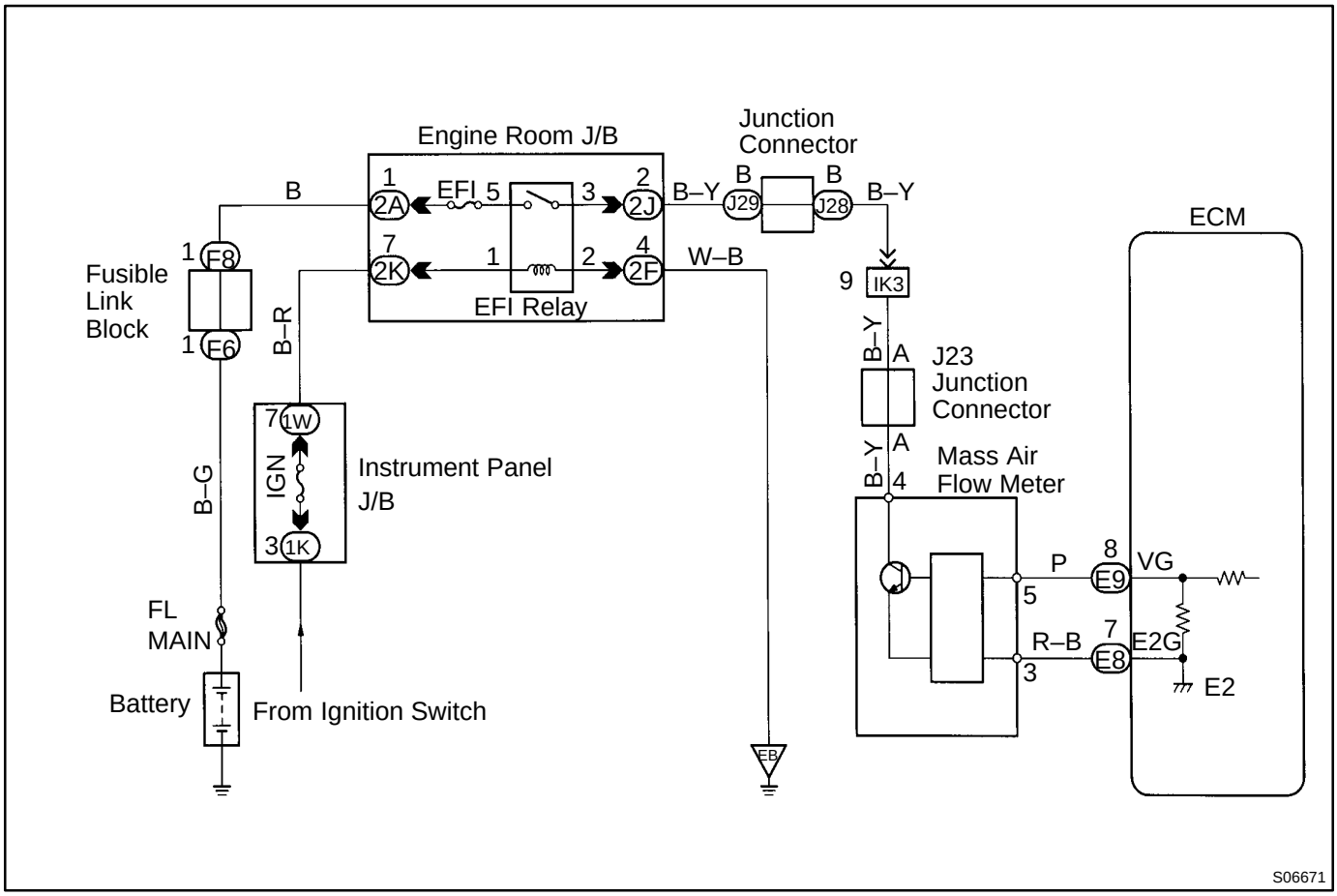
DTC No.	DTC Detecting Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or less	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM

If the ECM detects DTC ”P0100” it operates the fail–safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.

HINT:After confirming DTC P0100 use the OBD II scan tool or LEXUS hand–held tester to confirm the mass air flow ratio from ”CURRENT DATA”.

Mass Air Flow Value (gm/sec.)	Malfunction
0.0	●Mass air flow meter power source circuit open ●VG circuit open or short
271.0 or more	●E2G circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.
(b) Turn ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.
(c) Start the engine.

CHECK:

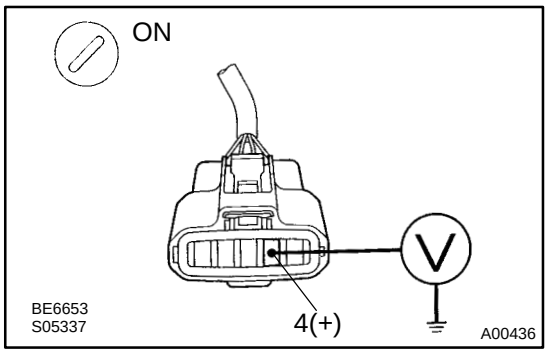
Read mass air flow rate on the OBD II scan tool or LEXUS hand–held tester.

RESULT:

	Type I	Type II
Mass 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 mass air flow meter power source.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal 4 of mass air flow meter connector and body ground.

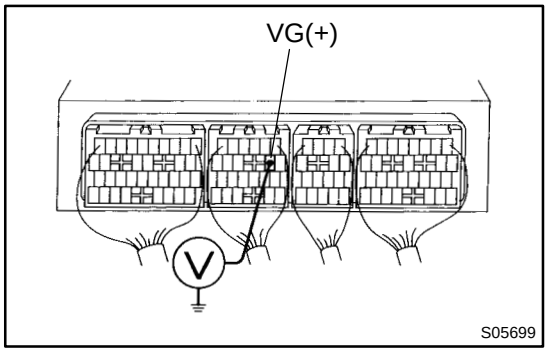
OK:

Voltage: 9 ~ 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and mass air flow meter (See page IN–27).**

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Start the engine.

CHECK:

Measure voltage between terminal VG of ECM and body ground while engine is idling.

OK:

Voltage:
1.1 ~ 1.5 V (P or N position and A/C switch OFF)

OK → **Check and replace ECM (See page IN–27).**

NG

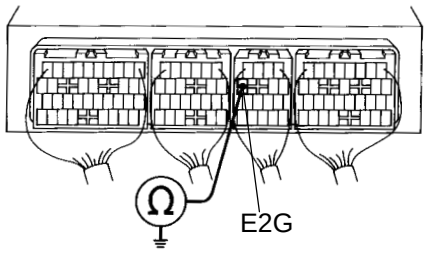
4	**Check for open and short in harness and connector between mass air flow meter and ECM (See page IN–27).**

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

OK

Replace mass air flow meter.

5	**Check continuity between terminal E2G of ECM and body ground.**



PREPARATION:
Remove the glove compartment (See page SF–64).
CHECK:
Check continuity between terminal E2G of ECM connector and body ground.
OK:
Continuity (1 Ω or less)

NG → **Check and replace ECM (See page IN–27).**

OK

6	**Check for open in harness and connector between mass air flow meter and ECM (See page IN–27).**

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

OK

Replace mass air flow meter.

DI09C–01

DTC	P0101	Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 (Mass Air Flow Circuit Malfunction) on page DI–23.

DTC No.	DTC Detecting Condition	Trouble Area
P0101	Conditions (a), (b) and (c) continue 10 sec. or more with engine speed 900 rpm or less: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output ⊖ 2.2 V (c) THW > 70°C	●Mass air flow meter
	Conditions (a) and (b) continue 10 sec. or more with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA ≧ 0.63 V (b) Mass air flow meter output ～ 1.06 V	

WIRING DIAGRAM

Refer to DTC P0100 on page DI–23 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

1	**Are there any other codes (besides DTC P0101) being output?**

NO → **Replace mass air flow meter.**

YES

Go to relevant DTC chart.

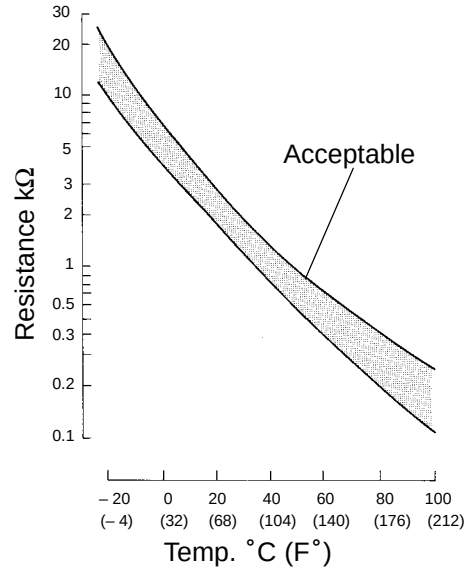
DI09D–01

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

The intake air temp. sensor is built into the air flow meter 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 ECM. The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from the terminal THA via resistor R.
That is, the 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 ECM increases the fuel injection volume to improve driveability during cold engine operation.
If the ECM detects the DTC ”P0110”, it operates the fail–safe function in which the intake air temperature is assumed to be 20˚C (68˚F).

(fig. 1)



<Reference>

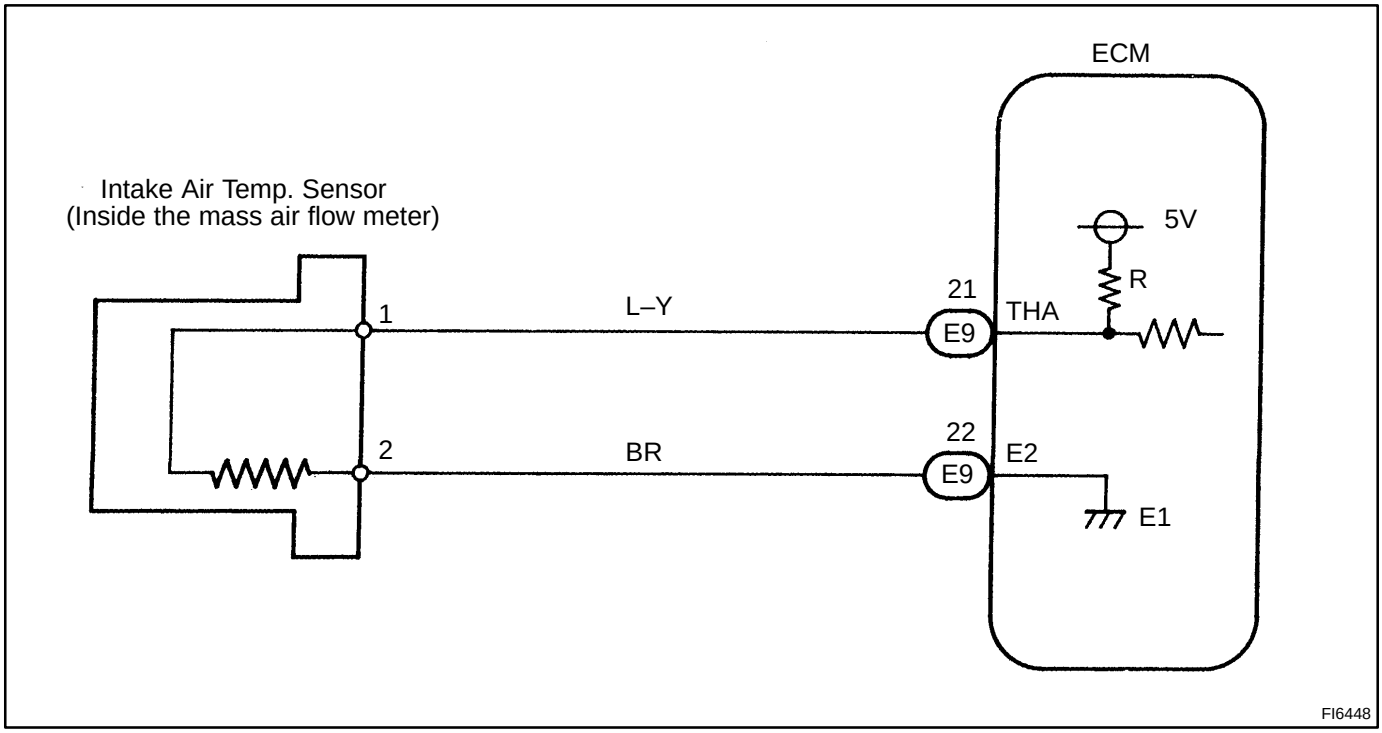
Intake air temp. ˚C (˚F)	Resistance (kΩ)	Voltage (V)
–20 (–4)	16.0	4.3
0 (32)	5.9	3.4
20 (68)	2.5	2.4
40 (104)	1.1	1.4
60 (140)	0.6	0.9
80 (176)	0.3	0.5
100 (212)	0.1	0.2

DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor ●ECM

HINT:After confirming DTC P0110 use the OBD II scan tool or LEXUS hand–held tester to confirm the intake air temp. form ”CURRENT DATA”.

Temp. Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) and P1410 (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.

1	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of intake air temp.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Turn ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Same as actual intake air temp.

HINT:

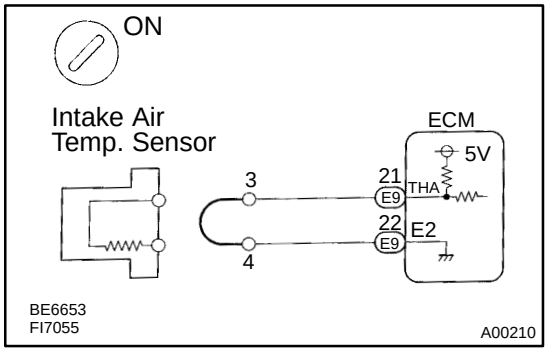
- If there is open circuit, OBD II scan tool or LEXUS hand–held tester indicates –40˚C (–40˚F).
- If there is short circuit, OBD II scan tool or LEXUS hand–held tester indicates 140˚C (284˚F) or more.

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–3).

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Connect sensor wire harness terminals together.

(c) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

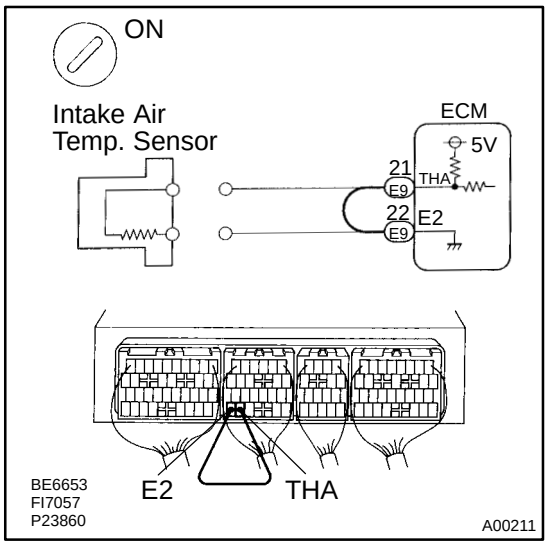
OK:

Temp. value: 140°C (284°F) or more

OK → **Confirm good connection at sensor.**
If OK, replace mass air flow meter.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Connect between terminals THA and E2 of ECM connector.

HINT:Mass air flow meter connector is disconnected.

Before checking, do a visual and contact pressure check for the ECM connector (See page IN–27).

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

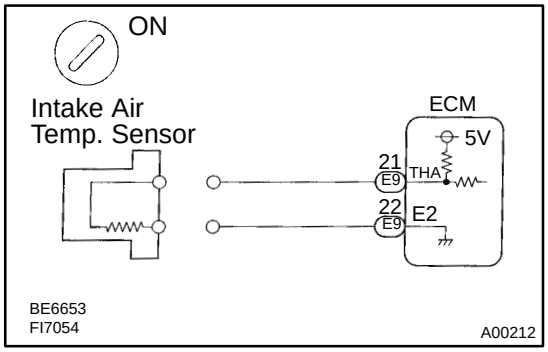
Temp. value: 140°C (284°F) or more

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

NG

Confirm good connection at ECM.
If OK, check and replace ECM.

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

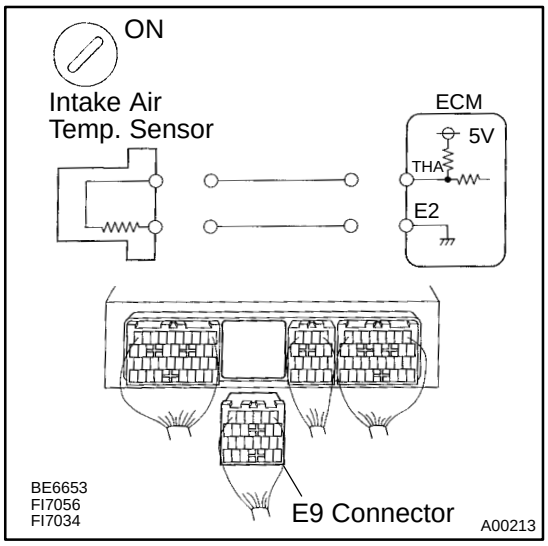
OK:

Temp. value: –40°C (–40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E9 connector of ECM.

HINT: Mass air flow meter connector is disconnected.

(c) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Temp. value: – 40°C (– 40°F)

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

NG

Check and replace ECM (See page IN–27).

DI09E–01

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

A thermistor built into the engine coolant temp. sensor changes the resistance value according to the engine coolant temp.

The structure of the sensor and connection to the ECM is the same as in the intake air temp. circuit malfunction shown on page DI–28.

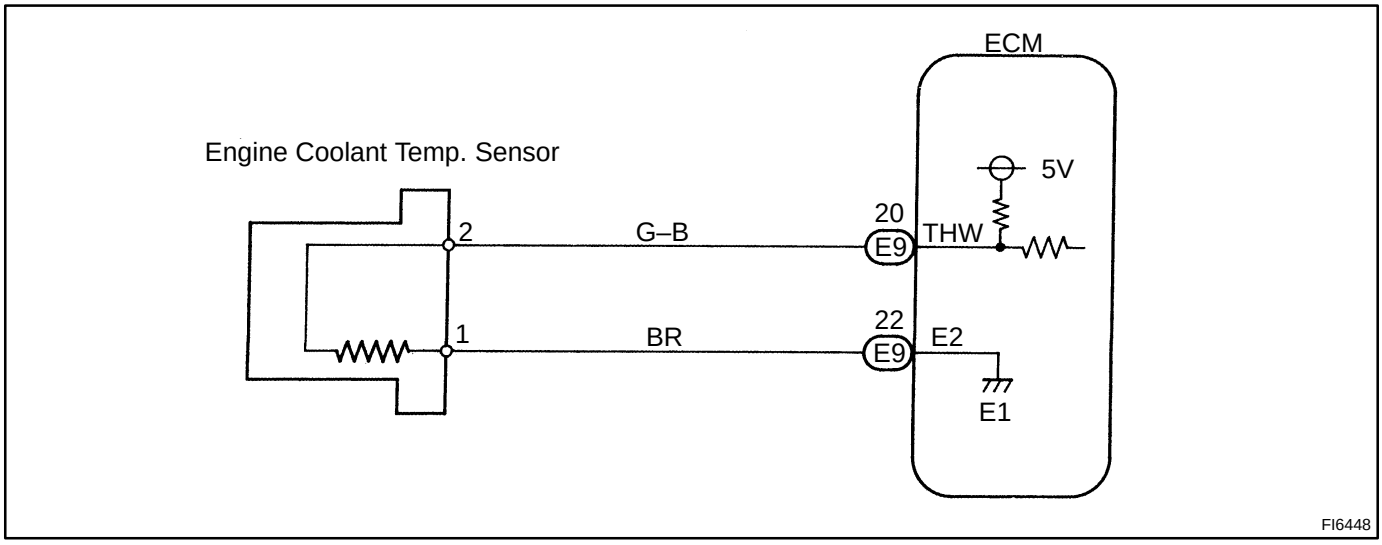
If the ECM detects the DTC P0115, it operates the fail–safe function in which the engine coolant temp. is assumed to be 80˚C (176˚F).

DTC No.	Detection Item	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM

HINT:After confirming DTC P0115 use the OBD II scan tool or LEXUS hand–held tester to confirm the engine coolant temp. from CURRENT DATA.

Temp. Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:If DTC P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal/Position Sensor/Switch "A" Circuit Malfunction) and P1410 (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.

1	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of engine coolant temp.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Turn ignition switch ON and switch the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Same as actual engine coolant temp.

HINT:

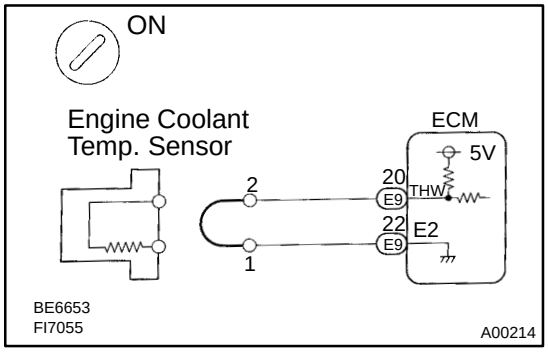
- If there is open circuit, OBD II scan tool or LEXUS hand–held tester indicates –40˚C (–40˚F).
- If there is open circuit, OBD II scan tool or LEXUS hand–held tester indicates 140˚C (284˚F) or more.

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–3).

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Connect sensor wire harness terminals together.

(c) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

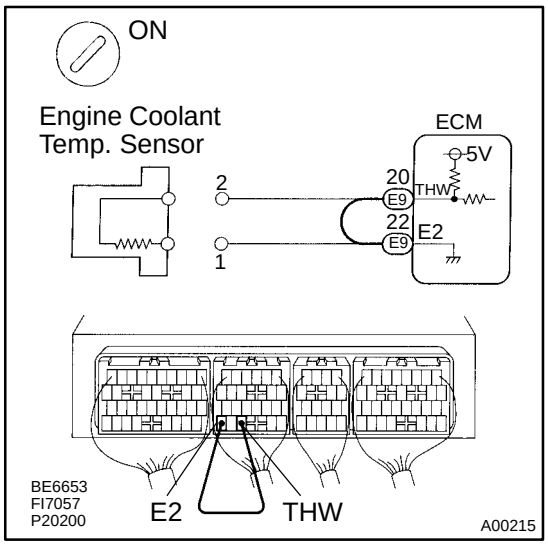
OK:

Temp. value: 140°C (284°F) or more

OK → **Confirm good connection at sensor.**
If OK, replace engine coolant temp. sensor.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Connect between terminals THW and E2 of ECM connector.

HINT:Engine coolant temp. sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN–27).

(c) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

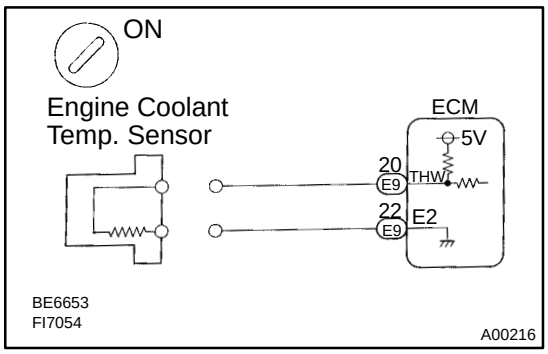
Temp. value: 140°C (284°F) or more

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

NG

Confirm good connection at ECM.
If OK, check and replace ECM.

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

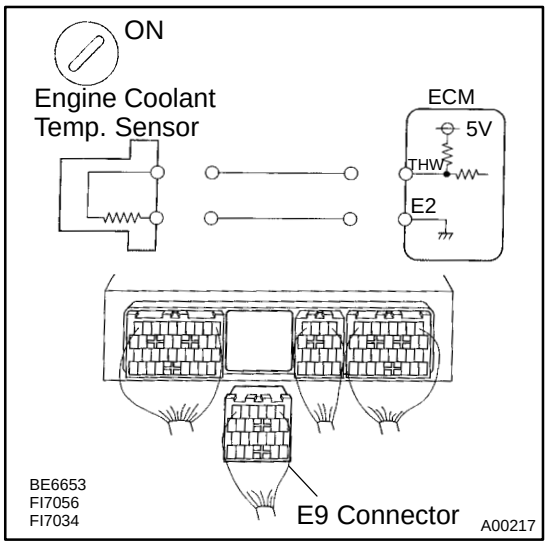
OK:

Temp. value: –40°C (–40°F)

OK	Replace engine coolant temp. sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E9 connector of ECM.

HINT: Engine coolant temp. sensor connector is disconnected.

(c) Turn ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Temp. value: –40°C (–40°F)

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

NG → **Check and replace ECM (See page IN–27).**

DI09F–01

DTC	P0116	Engine Coolant Temp. Circuit Range/ Performance problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 (Engine Coolant Temp. Circuit Malfunction) on page DI–33.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If THW ⍰ –7˚C (19.4˚F), 20 min. or more after starting engine, engine coolant temp. sensor value is 35˚C (95˚F) or less (2 trip detection logic)	●Engine coolant temp. sensor ●Cooling system
	If THW ⍰ –7˚C (19.4˚F), 5 min. or more after starting engine, engine coolant temp. sensor value is 35˚C (95˚F) or less (2 trip detection logic)	

INSPECTION PROCEDURE

HINT:If DTC P0115 (Engine Coolant Temp. Circuit Malfunction) and P0116 (Engine Coolant Temp. Circuit Range/Performance) are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.

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

YES → Go to relevant DTC chart.

NO

2	Check thermostat (See page CO–11).

NG → Replace thermostat.

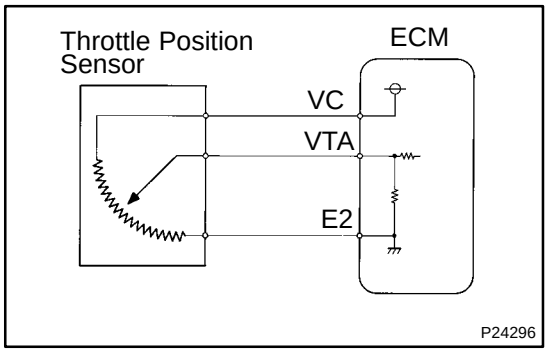
OK

Replace engine coolant temp. sensor.

DI09G–01

DTC	P0120	Throttle/Pedal position Sensor/Switch ”A” Circuit Malfunction

CIRCUIT DESCRIPTION



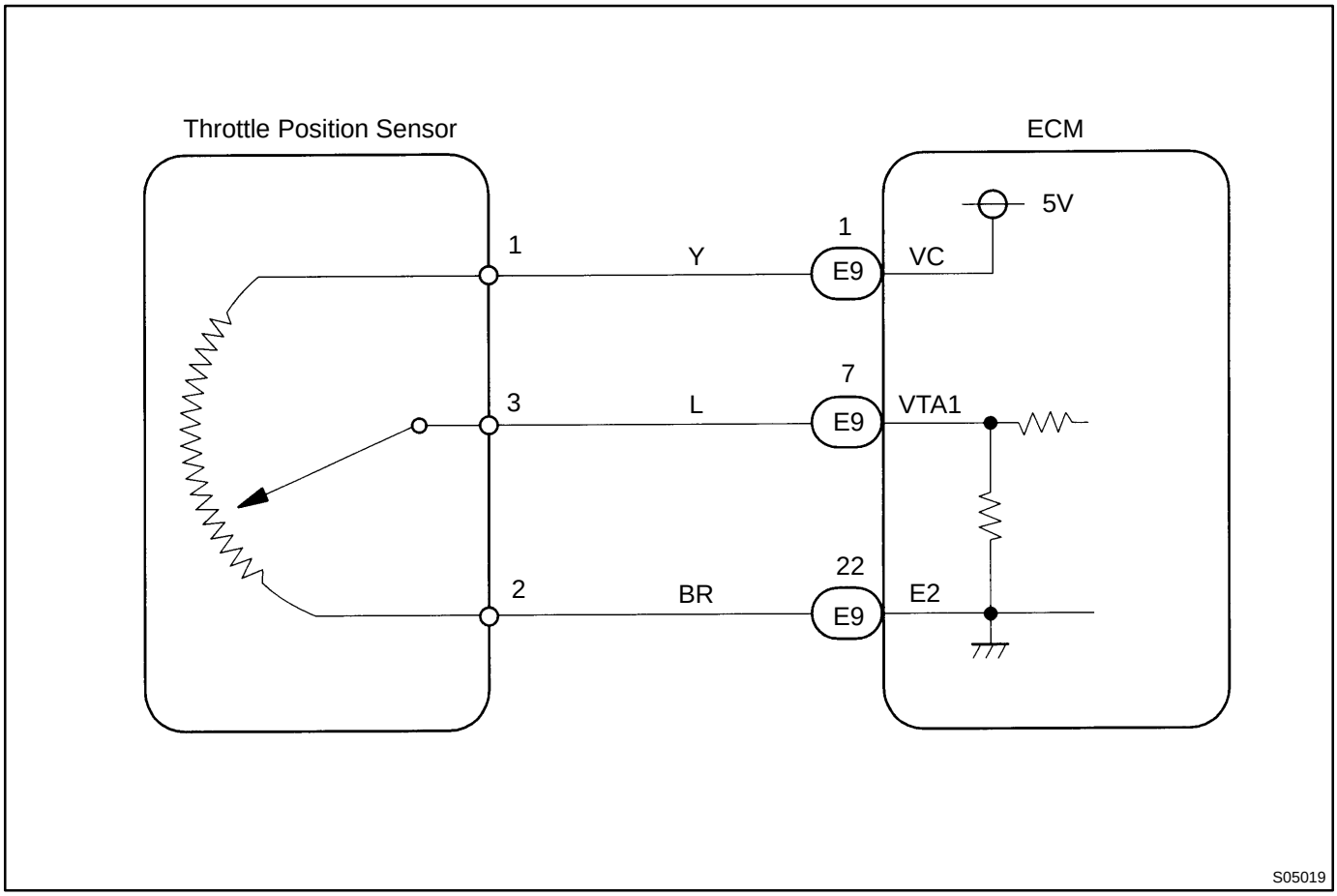
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.7 V is applied to terminal VTA of the ECM. The voltage applied to the terminals VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 2.7 ~ 5.2 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminals VTA and uses them as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (a) or (b) continues: (a) VTA ⍁ 0.1 V (b) VTA ⍂ 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:After confirming DTC P0120 use the OBD II scan tool or LEXUS hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	VC line open VTA line open or short
Approx. 100 %	Approx. 100 %	E2 line open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:If DTC P0110, P0115, P0120 and P1410 are output simultaneously, E2 (Sensor Ground) may be open.

1	**Connect OBD II scan tool or LEXUS hand–held tester, read throttle valve opening percentage.**

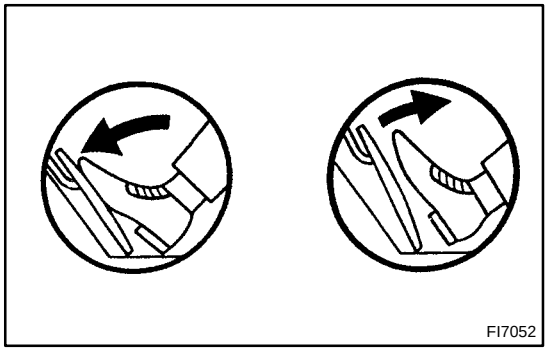
PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to DLC3.

(b) Turn ignition switch ON and switch the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read the throttle valve opening percentage.



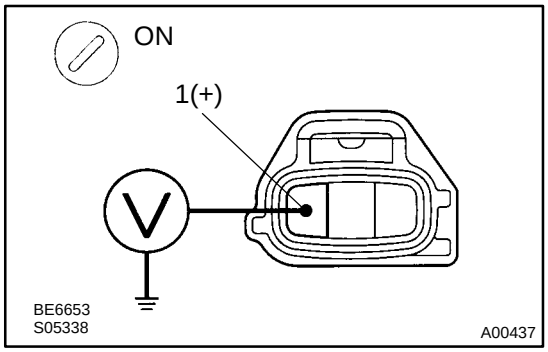
OK:

Throttle valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 75 %
Fully closed	Approx. 10 %

OK → **Check for intermittent problems (See page DI–3).**

NG

2	Check voltage between terminal 1 of wire harness side connector and body ground.



PREPARATION:
(a) Disconnect the throttle position sensor connector.
(b) Turn ignition switch ON.

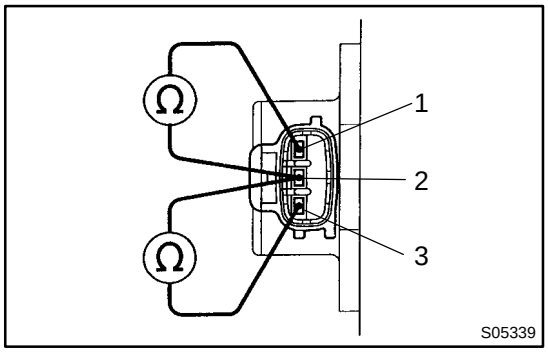
CHECK:
Measure voltage between terminal 1 (VC) of wire harness side connector and body ground.

OK:
Voltage: 4.5 ~ 5.5 V

NG → **Go to step 5.**

OK

3	Check throttle position sensor.



PREPARATION:
Disconnect the throttle position sensor connector.

CHECK:
Measure voltage between terminals 1, 3 and 2 of throttle position sensor.

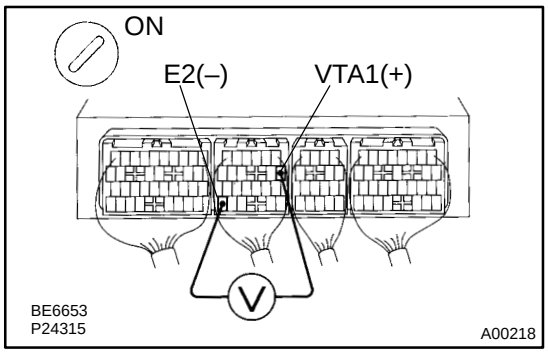
OK:

Terminals	Throttle valve	Resistance
1 ~ 2	—	2.5 ~ 5.9 kΩ
3 ~ 2	Fully closed	0.2 ~ 6.3 kΩ
	Fully open	2.0 ~ 10.2 kΩ

NG → **Replace throttle position sensor.**

OK

4	Check voltage between terminals VTA1 and E2 of ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals VTA1 and E2 of ECM connector.

OK:

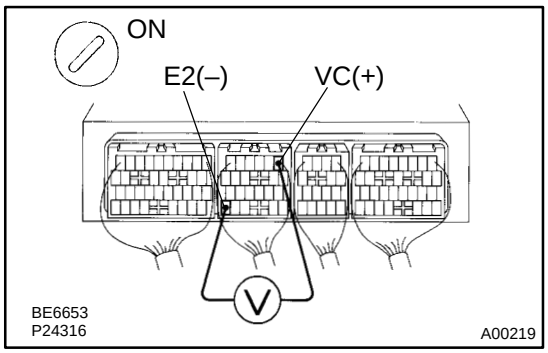
Throttle valve	Voltage
Fully closed	0.3 ~ 1.0 V
Fully open	2.7 ~ 5.2 V

NG → **Check for open and short in harness and connector between ECM and throttle position sensor (VTA line) (See page IN–27).**

OK

Check and replace ECM (See page IN–27).

5	Check voltage between terminals VC and E2 of ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of ECM connector.

OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–27).**

OK

Check for open in harness and connector between ECM and sensor (VC line) (See page IN–27).

DI09H–01

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–38.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	After the vehicle speed has been exceeded 30 km/h (19 mph) even once, the output value of the throttle position sensor is out of the applicable range while the vehicle speed between 30 km/h (19 mph) and 0 km/h (0 mph)	●Throttle position sensor

INSPECTION PROCEDURE

1	Are there any other codes (besides DTC P0121) being output?

YES → Go to relevant DTC chart.

NO

Replace throttle position sensor.

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

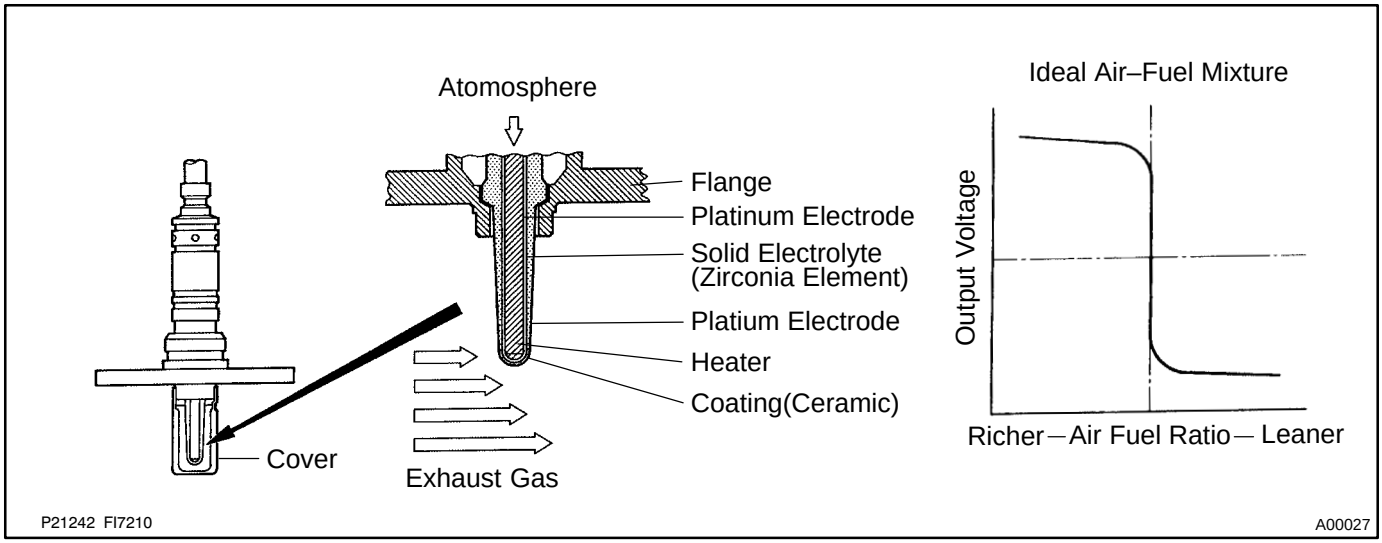
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel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

The oxygen sensor 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 ECM 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 in reduced and the oxygen sensor informs the ECM of the RICH condition (large electromotive force: 1V). The ECM 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 ECM is unable to perform accurate air–fuel ratio control.

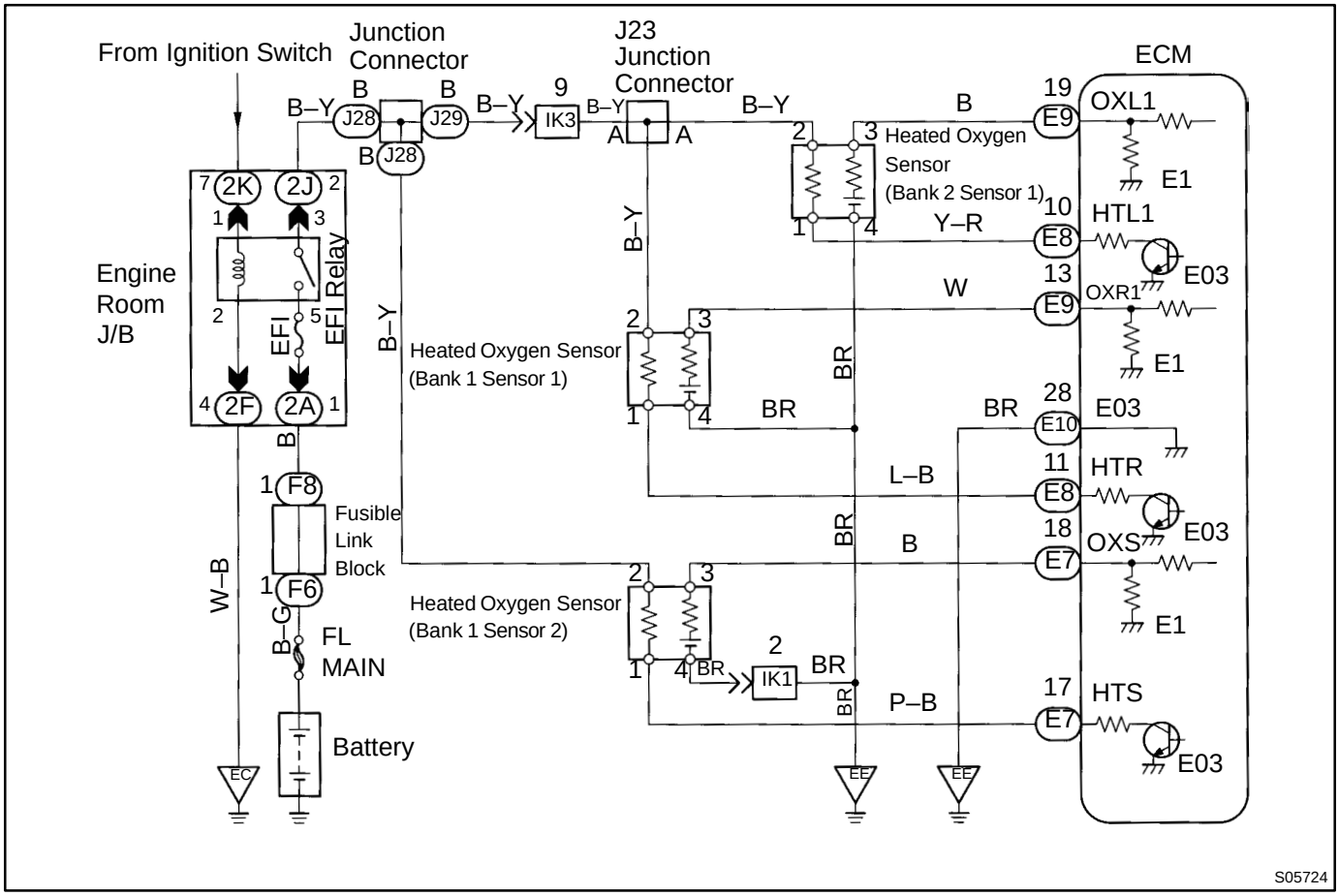
The heated oxygen sensors include a heater which heats the Zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temp. of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



DTC No.	DTC Detecting Condition	Trouble Area
P0125	After the engine is warmed up, heated oxygen sensor (bank 1, 2 sensor 1) output does not indicate RICH even once when conditions (a), (b), (c) and (d) continue for at least 2 min.: (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ~ 100 km/h (25 ~ 62 mph) (c) Throttle valve does not fully closed (d) 140 sec. or more after starting engine	●Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit ●Heated oxygen sensor (bank 1, 2 sensor 1)

HINT:After confirming DTC P0125 use the OBD II scan tool or LEXUS hand–held tester to confirm voltage output of heated oxygen sensor (bank 1, 2 sensor 1) from CURRENT DATA.
If voltage output of heated oxygen sensor (bank 1, 2 sensor 1) is 0 V, heated oxygen sensor (bank 1, 2 sensor 1) circuit may be open or short.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Connect OBD II scan tool or LEXUS hand–held tester and read value for voltage output of heated oxygen sensor (bank 1, 2 sensor 1).**

PREPARATION:
(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.
(b) Warm up engine to normal operating temp.

CHECK:
Read voltage output of heated oxygen sensor (bank 1 sensor 1) when engine is suddenly raced.
HINT:Perform quick racing to 4,000 rpm 3 times using accelerator pedal.

OK:

Both heated oxygen sensors [(bank 1 sensor 1) (bank 2 sensor 1)] output a RICH signal (0.45 V or more) at least once.

OK	**Check and replace ECM (See page IN–27).**

NG

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1) (See page IN–27).**

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

OK

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

DI09J–01

DTC	P0130	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)

DTC	P0150	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–43.

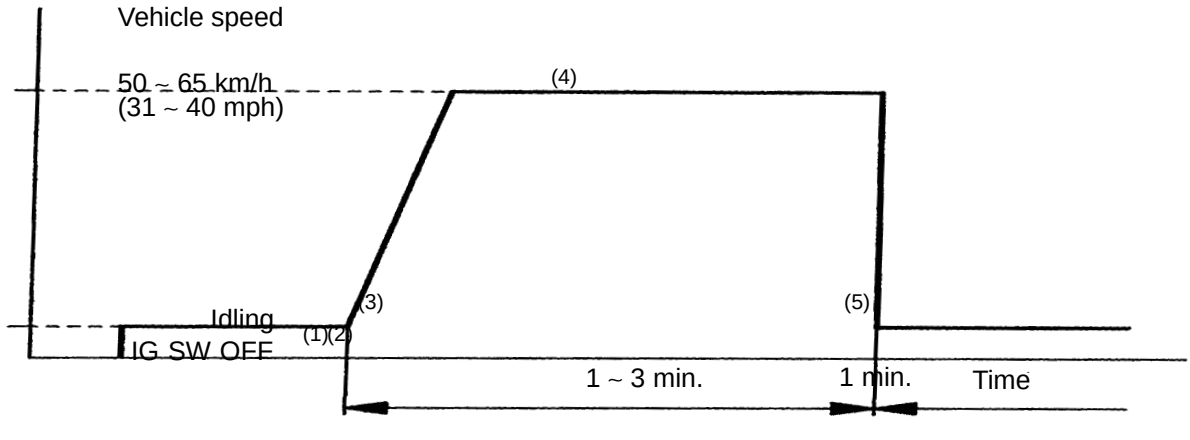
DTC No.	DTC Detecting Condition	Trouble Area
P0130 P0150	Voltage output of heated oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after the engine is warmed up (2 trip detection logic)	●Heated oxygen sensor ●Fuel trim malfunction

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

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43 for the WIRING DIAGRAM.

CONFIRMATION DRIVING PATTERN



FI7130

(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Switch the LEXUS hand–held tester from normal mode to check mode (See page DI–3).
(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.

HINT:If a malfunction exists, the MIL will light up during step (5).

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 LEXUS hand–held tester, turn the ignition switch OFF after performing steps (3) to (5), then perform steps (3) to (5) again.

INSPECTION PROCEDURE

1	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–27).**

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

OK

2	**Check for heated oxygen sensor data.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up engine to normal operating temp.

CHECK:

Read the heated 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–54).**

3

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

PREPARATION:

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

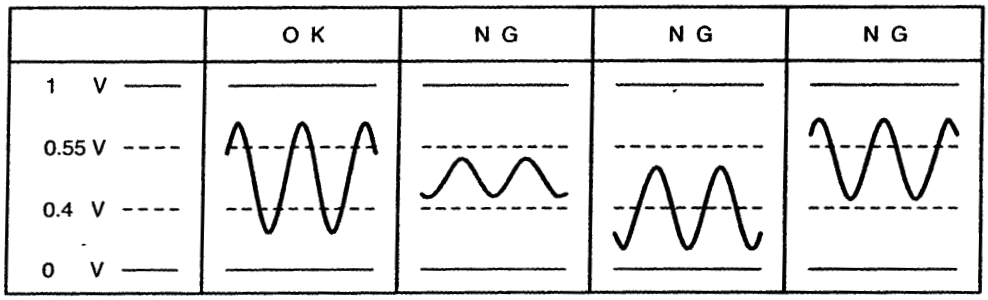
CHECK:

Use the OBD II scan tool or LEXUS hand–held tester read the output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:

Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Perform confirmation driving pattern (See page DI–46).**

NG → **Replace heated oxygen sensor.**

DI09L–01

DTC	P0135	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

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

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

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P0135 P0141 P0155	When the heater operates, heater current exceeds 2 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
	Heater current of 0.2 A or less when the heater operates (2 trip detection logic)	

HINT:

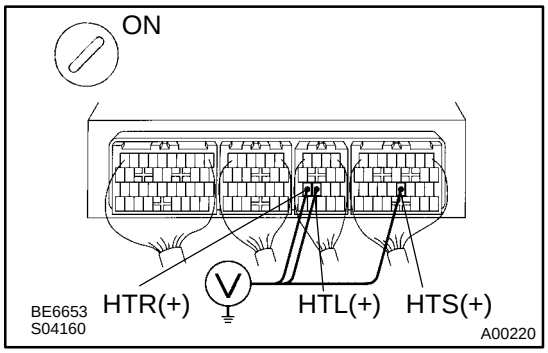
- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

1	**Check voltage between terminals HTR, HTS, HTL of ECM connectors and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals HTR, HTS, HTL of ECM connectors and body ground.

HINT:

- Connect terminal HTR to bank 1 sensor 1.
- Connect terminal HTS to bank 1 sensor 2.
- Connect terminal HTL to bank 2 sensor 1.

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–27).**

NG

2	**Check resistance of heated oxygen sensor heater (See page SF–63).**

NG	**Replace heated oxygen sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI), heated oxygen sensor and ECM (See page IN–27).

DI09M–01

DTC	P0136	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P0136	Voltage output of the heated oxygen sensor (bank 1 sensor 2) remains at 0.4 V or more or 0.5 V or less when the vehicle is driven at 50 km/h (31 mph) or more after the engine is warmed up (2 trip detection logic)	●Heated oxygen sensor

HINT:Bank 1 refers to the bank that includes cylinder No.1. Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

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

YES → **Go to relevant DTC chart.**

NO

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–27).**

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

OK

3	**Check output voltage of heated oxygen sensor (bank 1 sensor 2).**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up engine to normal operating temp.

CHECK:

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

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

OK:

Heated 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 heated oxygen sensor (bank 1 sensor 2).

DI09N–01

DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Rich (Fuel Trim)

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 MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	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)	●Air intake (hose loose) ●Fuel line pressure ●Injector blockage ●Heated oxygen sensor (bank 1, 2 sensor 1) malfunction ●Mass air flow meter ●Engine coolant temp. sensor
P0172	When the air fuel ratio feedback is stable after engine warming up, the fuel trim is considerably in error on the LEAN side (2 trip detection logic)	●Fuel line pressure ●Injector leak, blockage ●Heated oxygen sensor (bank 1, 2 sensor 1) malfunction ●Mass air flow meter ●Engine coolant temp. sensor

HINT:

- When DTC P0171 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air–fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 is recorded. The MIL 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

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

NG → **Repair or replace.**

OK

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

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up engine to normal operating temp.

CHECK:

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

HINT:Read the values for the same bank.

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	

3 → **Check for heated oxygen sensor (bank 1, 2 sensor 1) (See page DI–46).**

1, 2 ↓

3	**Check fuel pressure (See page SF–6).**

NG → **Check and repair fuel pump, fuel pipe line and filter (See page SF–1).**

OK ↓

4	**Check injector injection (See page SF–20).**

NG → **Replace injector.**

OK ↓

5	Check mass air flow meter and engine coolant temp. sensor (See page SF–29, SF–57).

NG → Repair or replace.

OK

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

NG → Repair or replace.

OK

Check and replace ECM (See page IN–27).

DI09O–01

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

DTC	P0306	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

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

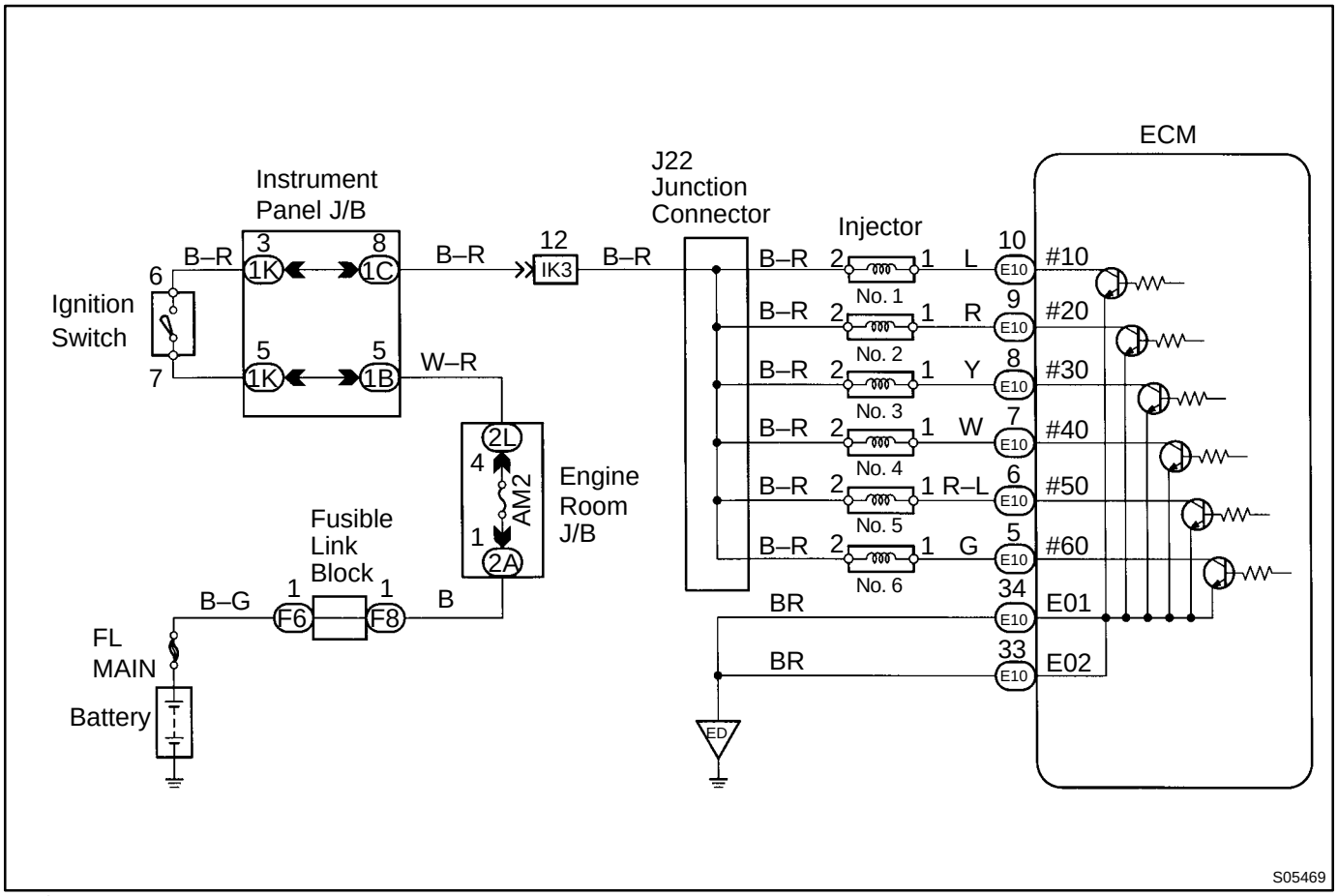
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. When the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.

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

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during the any particular 200 or 1,000 revolutions	●Ignition system ●Injector ●Fuel line pressure ●EGR ●Compression pressure ●Valve clearance not to specification ●Valve timing ●Mass air flow meter ●Engine coolant temp. sensor
P0301 P0302 P0303 P0304 P0305 P0306	For any particular 200 revolutions for the engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	
	For any particular 1,000 revolutions of the engine, misfiring is detected which causes a deterioration in emission (2 trip detection logic)	

HINT:When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no Random Misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM

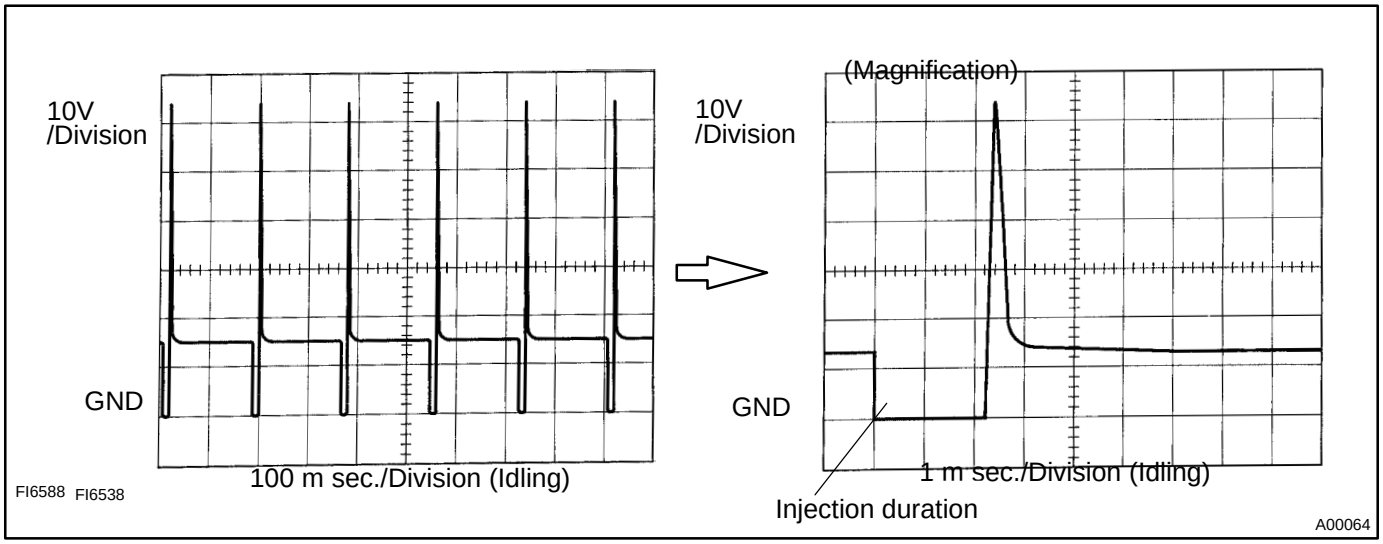


Reference INSPECTION USING OSCILLOSCOPE

INJECTOR SIGNAL WAVEFORM

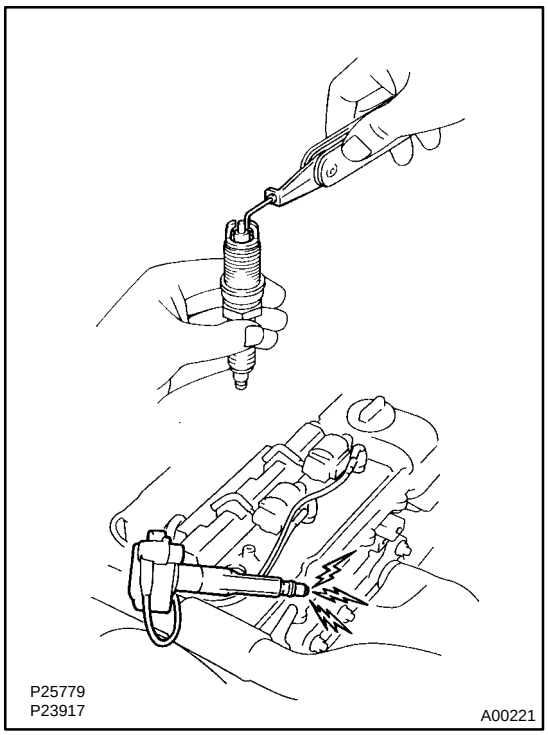
With the engine idling, measure between terminals #10 ~ #60 and E01 of ECM.

HINT:The correct waveform is as shown.



INSPECTION PROCEDURE

1	**Check spark plug and spark of misfiring cylinder.**



PREPARATION:

(a) Remove the ignition coil (See page IG–7).

(b) Remove the spark plug.

CHECK:

(1) Check spark plug type.

(2) Check for carbon deposits on electrode.

(3) Check electrode gap.

OK:

(1) Twin ground electrodes type.
Recommended spark plug:
ND PK20TR11
NGK BKR6EKPB–11
(2) No large carbon deposit present.
Not wet with gasoline or oil.
(3) Electrode gap: 1.1 ~ 1.3 mm (0.043 ~ 0.051 in.)

PREPARATION:

(a) Install the spark plug to the ignition coil, and connect the ignition coil connector.

(b) Disconnect injector connector.

(c) Hold the end about 12.5 mm (0.5 in.) from the ground.

CHECK:

Check if spark occurs while engine is being cranked.

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

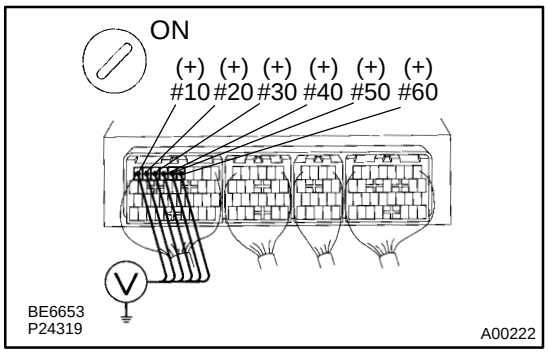
OK:

Spark jumps across electrode gap.

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

OK

2	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between applicable terminal of ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK → **Go to step 4.**

NG

3	Check resistance of injector of misfiring cylinder (See page SF–16).

NG → **Replace injector.**

OK

Check for open and short in harness and connector between injector and ECM (See page IN–27).

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

NG → **Check and repair fuel pump, fuel pipe line and filter (See page SF–1).**

OK

5	Check injector injection (See page SF–20).

NG → Replace injector.

OK

6	Check EGR system (See page EC–7).

NG → Replace EGR system.

OK

7	Check mass air flow meter and engine coolant temp. sensor (See page SF–29, SF–57).

NG → Repair or replace.

OK

Check compression pressure, valve clearance and valve timing.

DI09P–01

DTC	P0325	Knock Sensor 1 Circuit Malfunction

DTC	P0330	Knock Sensor 2 Circuit Malfunction

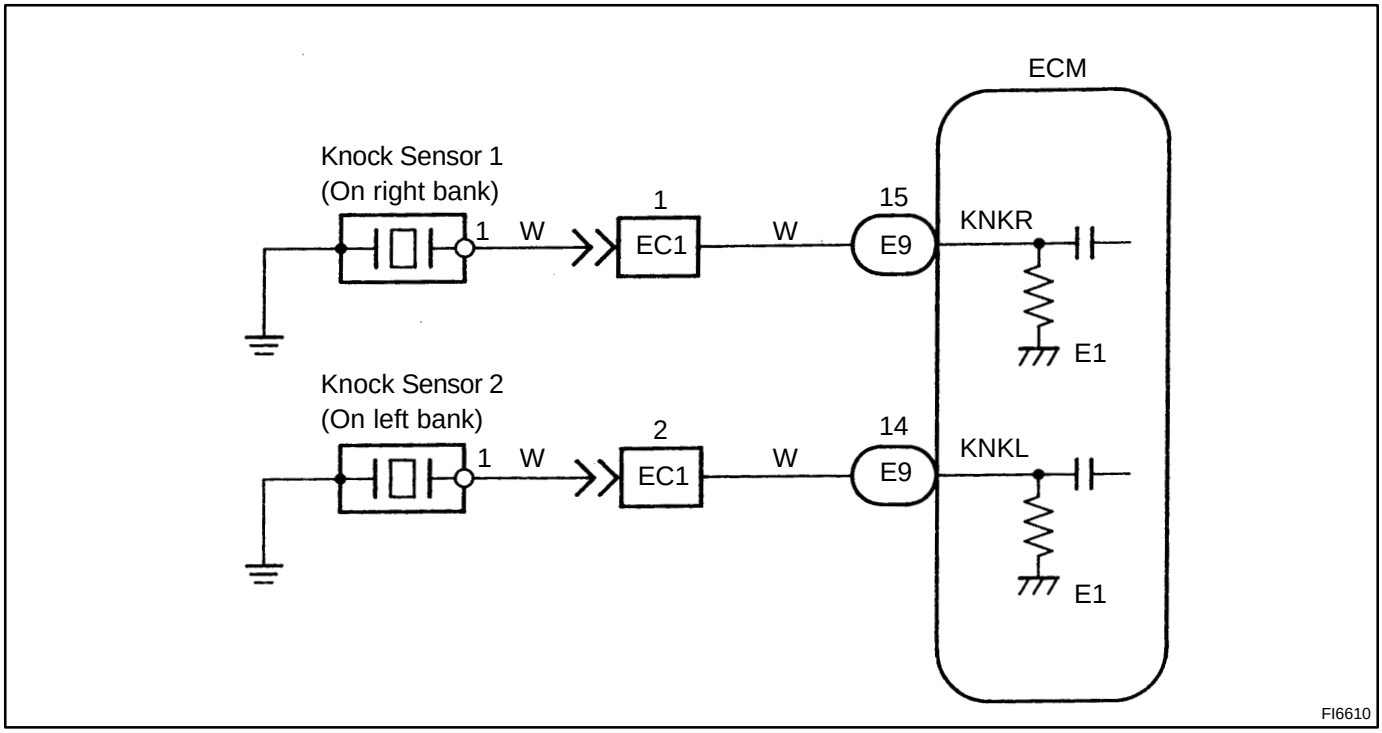
CIRCUIT DESCRIPTION

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	No knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM
P0330	No knock sensor 2 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 2 circuit ●Knock sensor 2 (looseness) ●ECM

If the ECM detects the above diagnosis conditions, it operates the fail–safe function in which the corrective retard angle value is set to the maximum value.

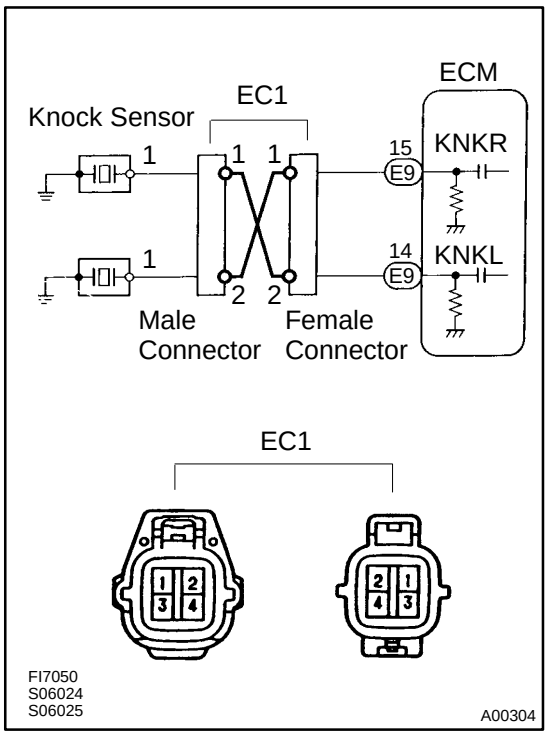
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:DTC P0325 is for the right bank knock sensor circuit. DTC P0330 is for the left bank knock sensor circuit.

1	**Connect OBD II scan tool or LEXUS hand–held tester and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Disconnect the wire to wire connector EC1.

(c) Connect the terminals of the disconnected EC1 male connector and EC1 female as follows.

Male connector ↔ Female connector
Terminal 1 ↔ Terminal 2
Terminal 2 ↔ Terminal 1

(d) Turn ignition switch ON and switch the OBD II scan tool or LEXUS hand–held tester main switch ON.

(e) After the engine is warmed up, perform quick racing to 4,000 rpm three times.

CHECK:

Check the DTC.

RESULT:

Type I	DTC same as when vehicle brought in. P0325 → P0325 or P0330 → P0330
Type II	DTC different to when vehicle brought in. P0325 → P0330 or P0330 → P0325

Type II → **Go to step 3 .**

Type I

2	**Check for open and short in harness and connector between EC1 connector and ECM (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN–27).**

HINT:

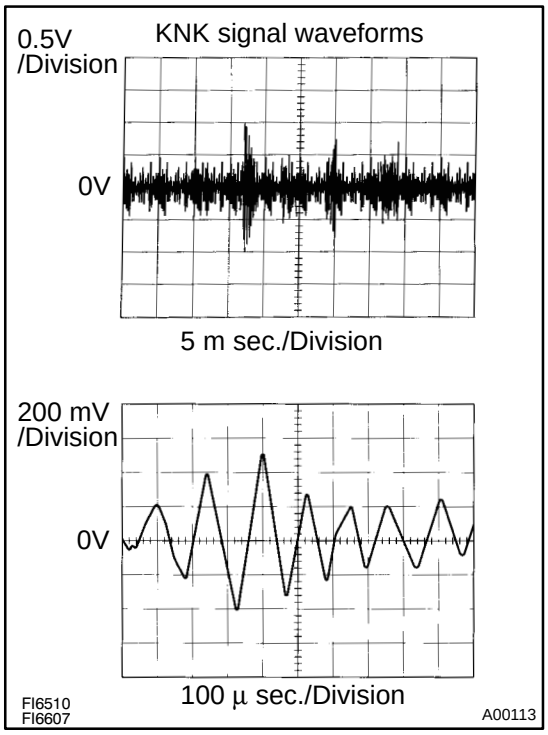
- If DTC P0325 has changed to P0330, check the knock sensor circuit on the right bank side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the left bank side.

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

OK

Replace knock sensor.

Reference INSPECTION USING OSCILLOSCOPE



- With the engine racing (4,000 rpm) measure between terminals KNKR, KNKL of ECM and body ground.

HINT: The correct waveform is as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 141 μ 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.

DI09Q–01

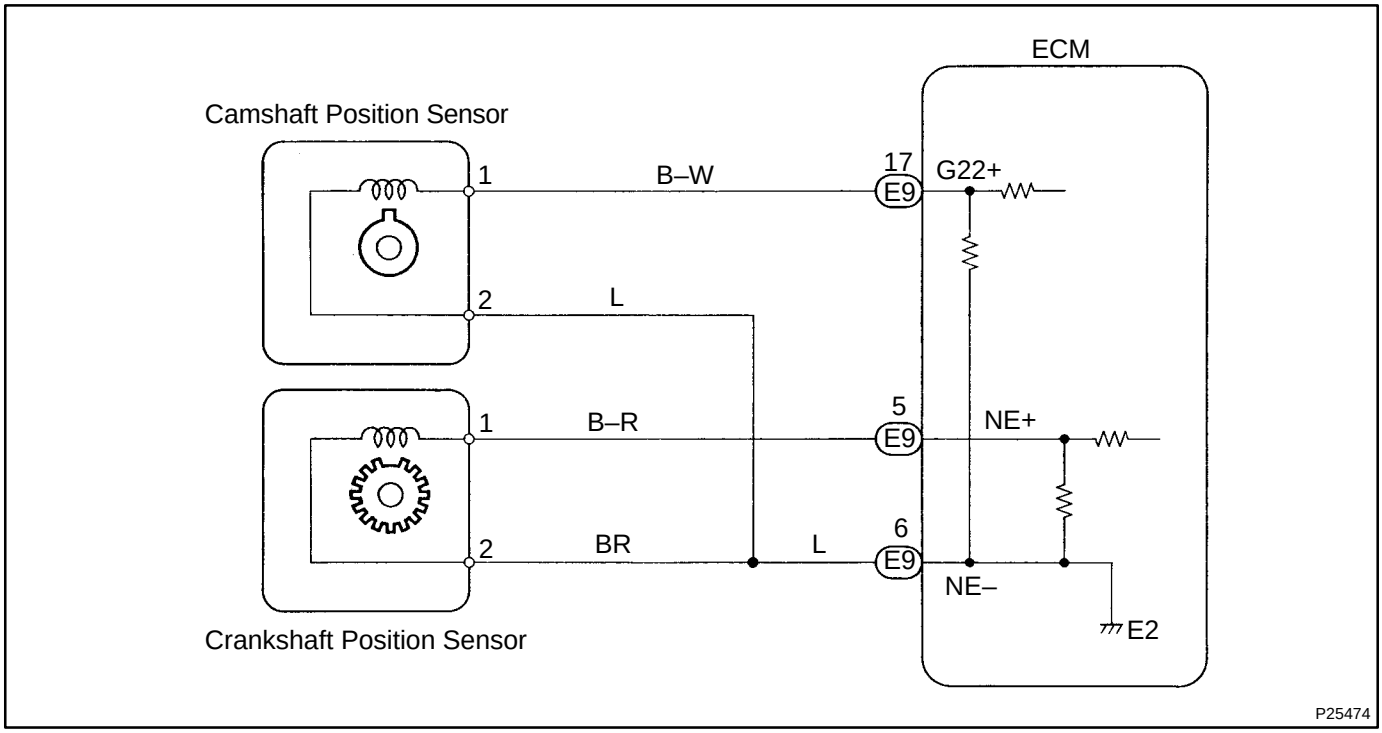
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consists of a signal plate and 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 ECM detects the standard crankshaft angle based on the G22 signals, and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Starter ●ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM

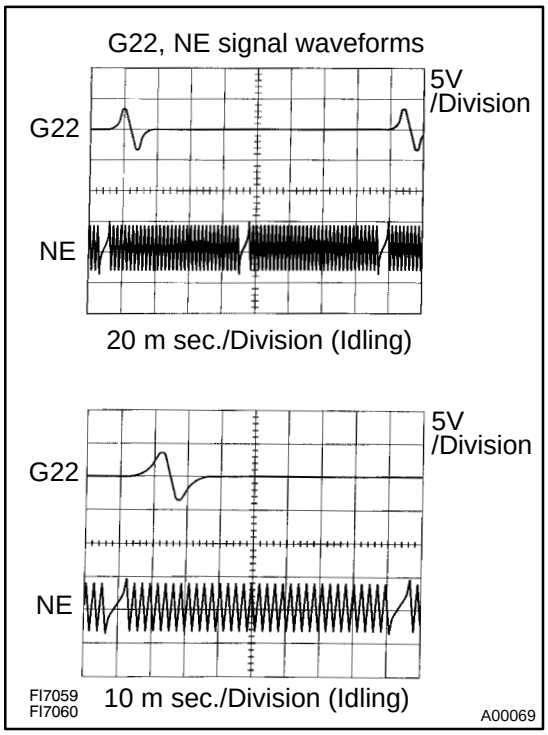


INSPECTION PROCEDURE

HINT:Perform troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical systems.

1	**Check resistance of crankshaft position sensor (See page IG–12).**

Reference INSPECTION USING OSCILLOSCOPE



During cranking or idling, check between terminals G22+ and NE–, NE and NE– of ECM.
HINT:The correct waveforms are as shown.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN–27).**

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

OK

3	**Inspect sensor installation and teeth of crankshaft timing pulley.**

NG → **Tighten the sensor.**
Replace crankshaft timing pulley.

OK

Check and replace ECM (See page IN–27).

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G22 signal) consist of a signal plate and pickup coil.
The G22 signal plate has one 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 ECM detects the standard crankshaft angle based on the G22 signal and the actual crankshaft angle and the engine speed by the NE signals.

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

WIRING DIAGRAM

Refer to DTC P0335 on page DI–66 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

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

Reference INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 on page DI–66 for the OSCILLOSCOPE.

NG → **Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN–27).**

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

OK

3	**Inspect sensor installation and tooth of left bank camshaft timing pulley.**

NG → **Tighten the sensor.**
Replace left bank camshaft timing pulley.

OK

Check and replace ECM (See page IN–27).

DTC	P0401	Exhaust Gas Recirculation Flow Insufficient Detected

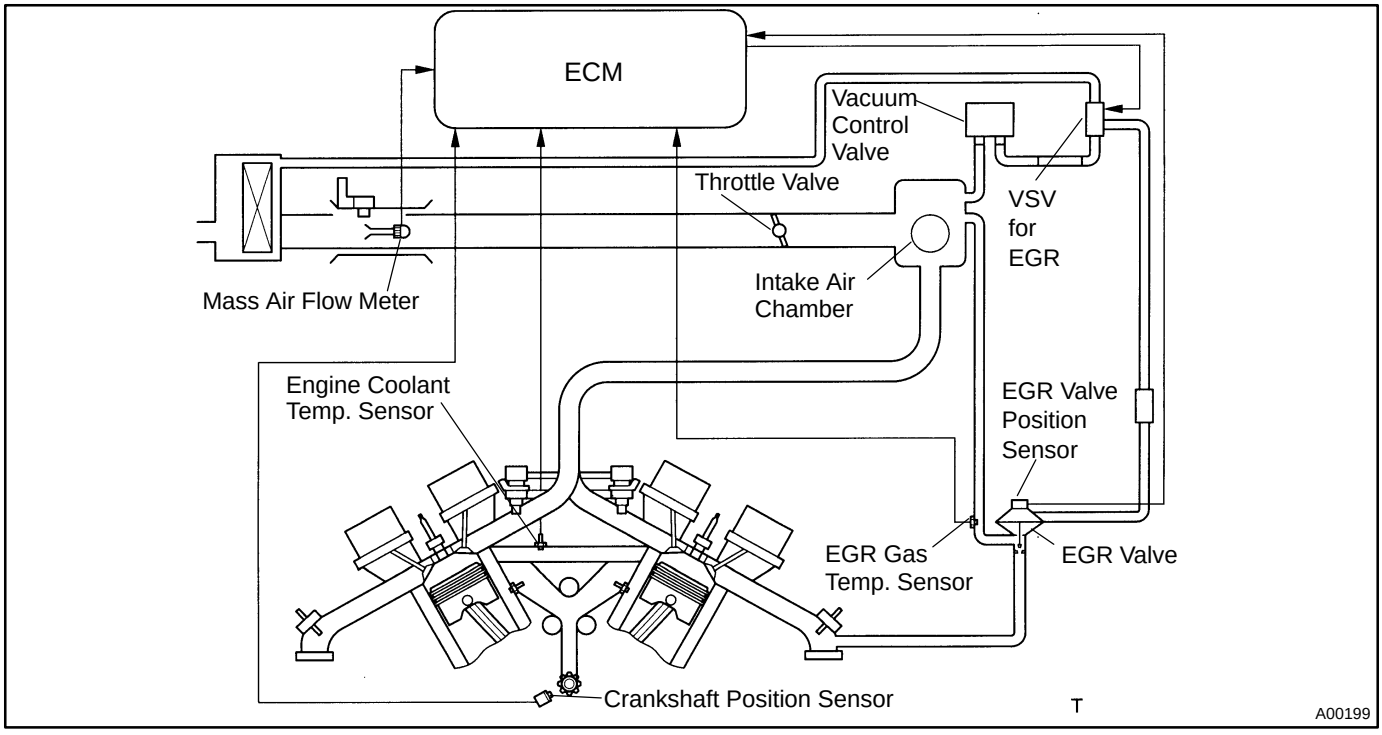
CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture to slow down combustion, reduce the combustion temperature and reduce NOx emissions.

The lift amount of EGR valve is controlled by the vacuum which is regulated by the Duty–VSV operated by the ECM. The lift amount of EGR valve is detected by the EGR valve position sensor which is mounted on the EGR valve and it provides feedback to the ECM to control the lift amount of EGR valve in response to engine operating conditions.

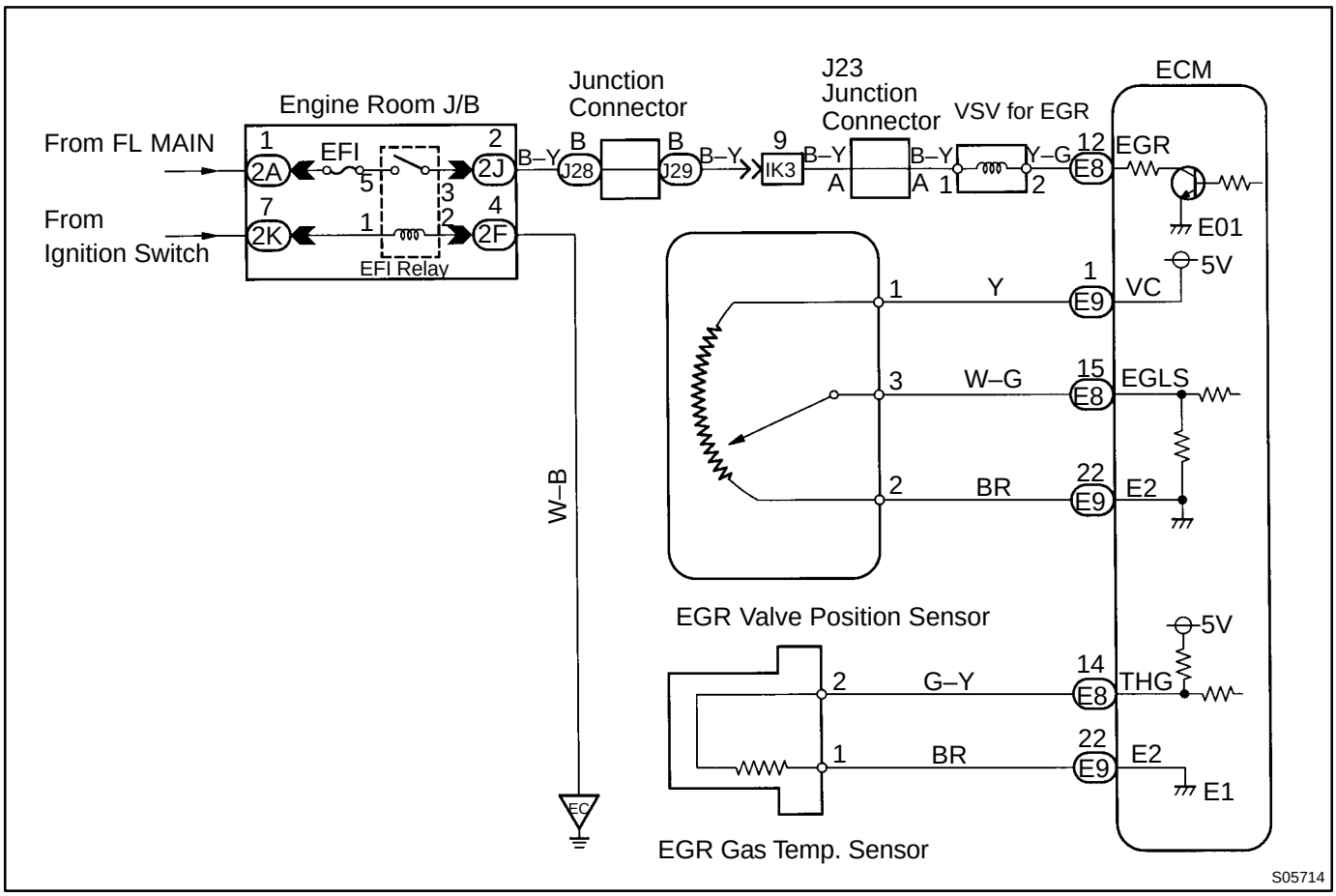
Under the following conditions, EGR is cut to maintain driveability.

- Before the engine is warmed up
- During deceleration (throttle valve closed)
- Light engine load (amount of intake air very small)
- Engine speed over 4,000 rpm
- Engine idling

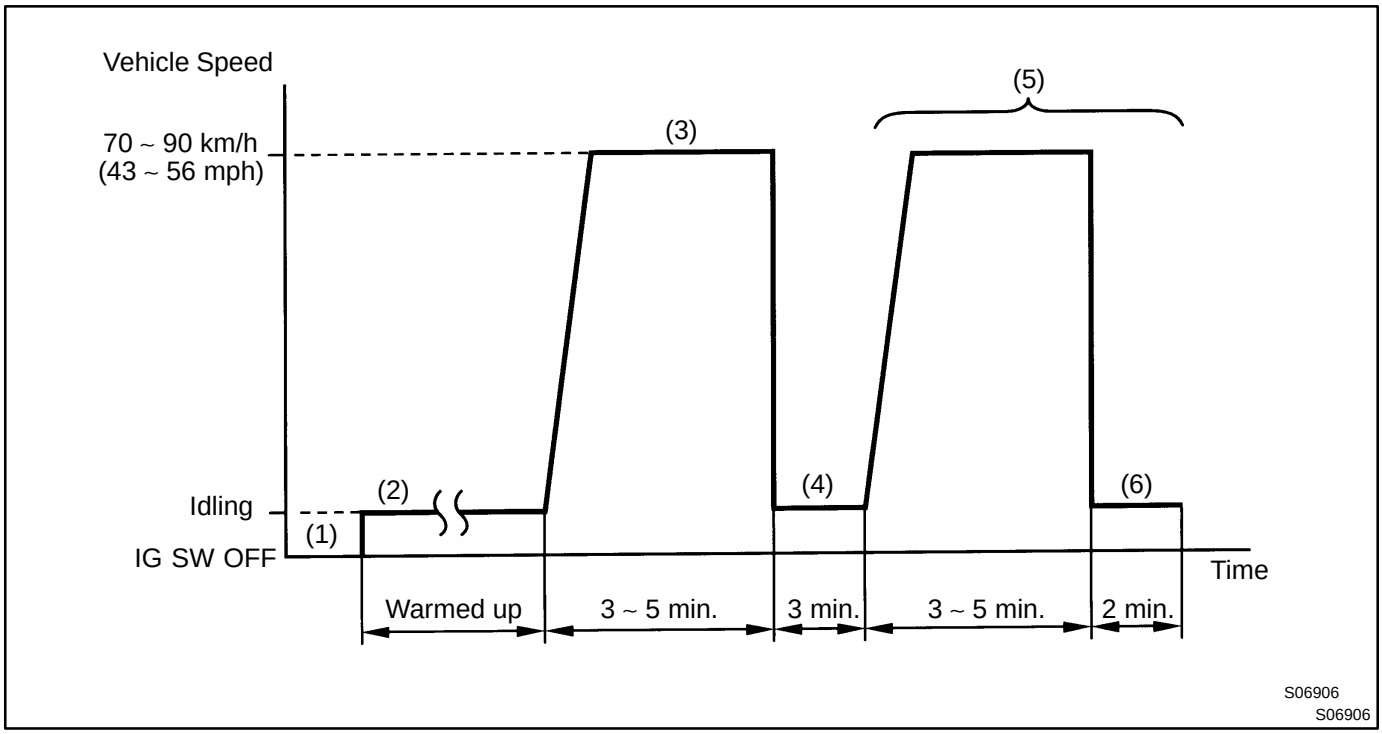


DTC No.	DTC Detecting Condition	Trouble Area
P0401	After the engine is warmed up and run at 80 km/h (50 mph) for 3 to 5 min. the EGR gas temperature sensor valve does not exceed 35˚C (95˚F) above the ambient air temperature (2 trip detection logic)	●EGR valve (stuck closed) ●Open or short in EGR gas temp. sensor circuit ●EGR gas temp. sensor ●Open in VSV circuit for EGR ●VSV for EGR ●Vacuum control valve ●Vacuum hose disconnected or blocked ●ECM

WIRING DIAGRAM



SYSTEM CHECK DRIVING PATTERN



(1) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.
(2) Start and warm up the engine with all accessories switched OFF.
(3) Run the vehicle at 70 ~ 90 km/h (43 ~ 56 mph) for 3 min. or more.
(4) Idle the engine for about 2 min.
(5) Start the engine and do steps (3) and (4) again.
(6) Check the READINESS TESTS mode on the OBD II scan tool or LEXUS hand–held tester.

If COMPL is displayed and the MIL does not light up, the system is normal.

If INCMPL is displayed and the MIL does not light up, run the vehicle step (5) for some times and check it.

HINT:INCMPL is displayed when either condition (a) or (b) exists.

(a) The system check is incomplete.
(b) There is a malfunction in the system.
If there is a malfunction in the system, the MIL light up after steps (2) to (5) above are done again.

INSPECTION PROCEDURE

LEXUS hand–held tester

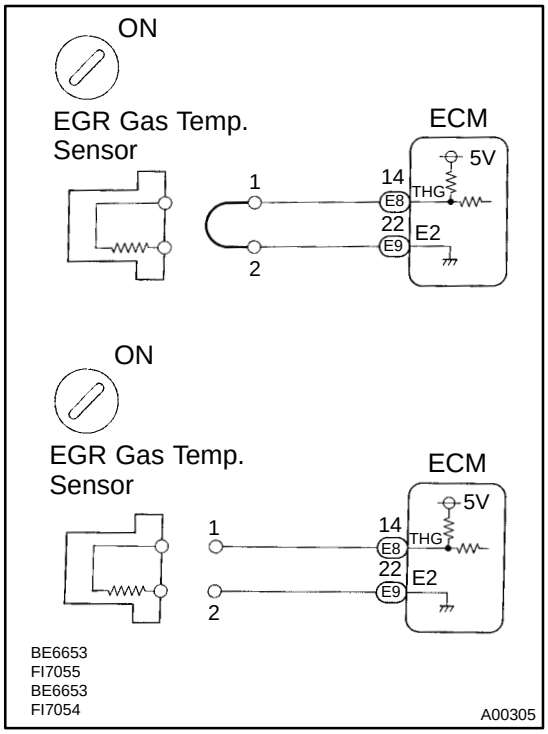
1	**Connect LEXUS hand–held tester and read value of EGR gas temperature.**

PREPARATION:
(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Warm up the engine.
CHECK:
Read EGR gas temperature on LEXUS hand–held tester during idling.
OK:
EGR gas temp. : 10°C (50°F) ~ 150°C (302°F) (Not immediately after driving)
HINT:If there is an open circuit, LEXUS hand–held tester indicates 3.1°C (37.6°F).
If there is an short circuit, LEXUS hand–held tester indicates 159.3°C (318.7°F).

OK → **Go to step 4.**

NG

2	**Check for open or short in harness or ECM.**



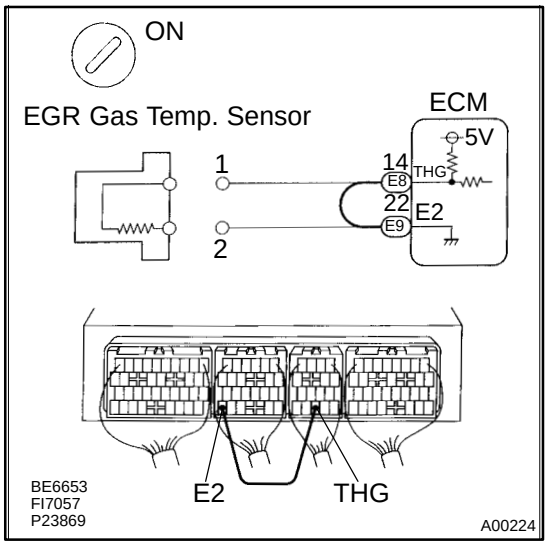
For open circuit
PREPARATION:
(a) Disconnect the EGR gas temp. sensor connector.
(b) Connect sensor wire harness terminals together.
(c) Turn ignition switch ON.
CHECK:
Read EGR gas temperature on the LEXUS hand–held tester.
OK:
EGR gas temp. : 159.3°C (318.7°F)

For short circuit
PREPARATION:
Disconnect the EGR gas temp. sensor connector.
CHECK:
Read EGR gas temperature on the LEXUS hand–held tester.
OK:
EGR gas temp. : 3.1°C (37.6°F)

OK → **Confirm good connection at sensor.**
If OK, check and replace EGR gas temp. sensor.

NG

3	Check for open or short in harness or ECM.



For open circuit

PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Connect between terminals THG and E2 of ECM connectors.

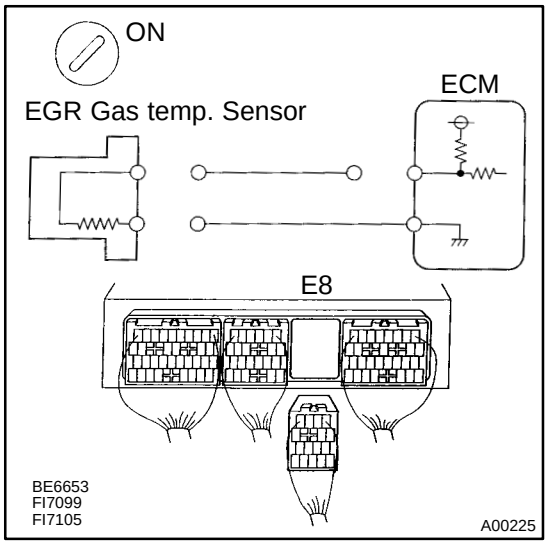
HINT:EGR gas temp. sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the ECM connector (See page IN–27).

CHECK:

Read EGR gas temperature on the LEXUS hand–held tester.

OK:

EGR gas temp. : 159.3°C (318.7°F)



For short circuit

PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E8 connector of ECM.

CHECK:

Read EGR gas temperature on the LEXUS hand–held tester.

OK:

EGR gas temp. : 3.1°C (37.6°F)

OK → **Repair or replace harness.**

NG

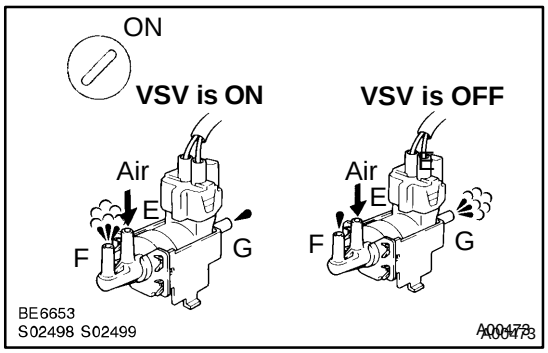
Confirm connection at ECM.
If OK, check and replace ECM.

4	Check connection and blockage of vacuum hose (See page EC–7).

NG → **Repair or replace vacuum hose.**

OK

5	Check VSV for EGR.



PREPARATION:
Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:
Check operation VSV when it is operated by the LEXUS 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 pipe G.

OK	Go to step 7.

NG

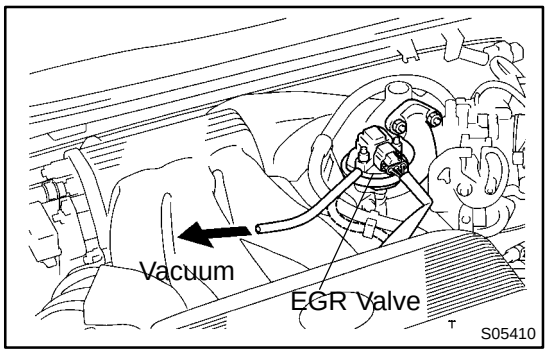
6	Check operation of VSV for EGR (See page SF–50).

NG	Replace VSV for EGR.

OK

Check for open in harness and connector between engine room J/B and ECM.

7	**Check EGR valve.**



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.

(b) Start the engine.

CHECK:

Check whether the engine stall when apply vacuum to EGR valve.

OK:

Engine runs rough or stall.

NG → **Repair or replace EGR valve.**

OK

8	**Check vacuum control valve (See page EC–7).**

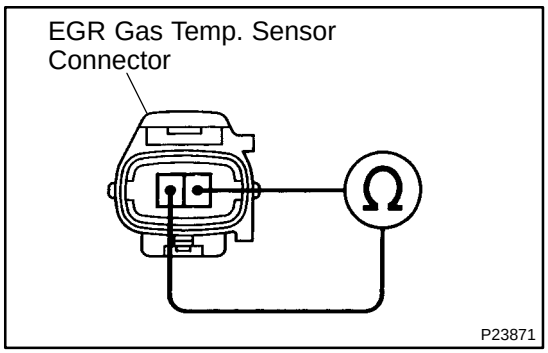
NG → **Replace vacuum control valve.**

OK

Check and replace ECM (See page IN–27).

OBDII scan tool (excluding LEXUS hand–held tester)

1	**Check resistance of EGR gas temp. sensor.**



PREPARATION:
Disconnect the EGR gas temp. sensor connector.
CHECK:
Measure resistance between terminals of EGR gas temp. sensor connector.
OK:

Resistance: 2.5 kΩ ~ 600 kΩ
(Not immediately after driving)

HINT:If there is open circuit, ohmmeter indicates 720 kΩ or more. If there is short circuit, ohmmeter indicates 200 Ω or less.

NG → **Replace EGR gas temp. sensor.**

OK

2	**Check for open and short in harness and connector between EGR gas temp. sensor and ECM (See page IN–27).**

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

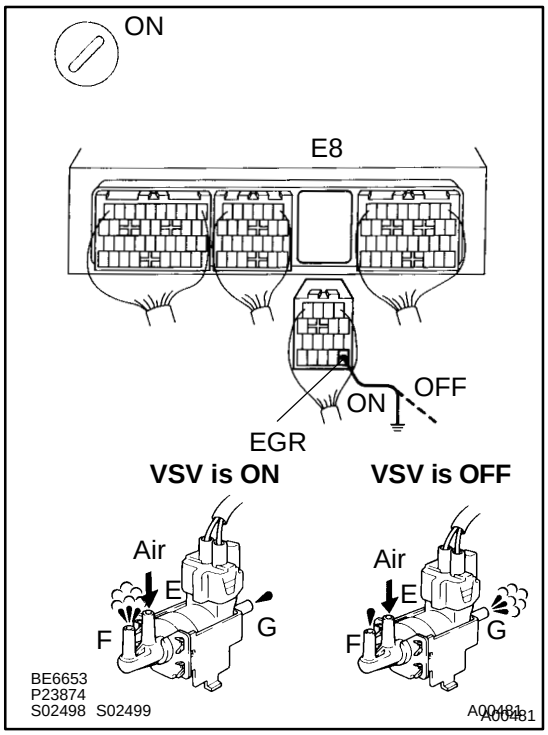
OK

3	**Check connection and blockage of vacuum hose (See page EC–7).**

NG → **Repair or replace vacuum hose.**

OK

4	Check VSV for EGR.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).
(b) Disconnect the E8 connector of ECM..
(c) Turn ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal EGR of ECM and body ground (VSV is ON).
(2) Disconnect between terminal EGR of ECM and body ground (VSV is OFF).

OK:

(1) VSV is ON:
Air from pipe E flows out through pipe F.
(2) VSV is OFF:
Air from pipe E flows out through pipe G.

OK	Go to step 6.

NG

5	Check operation of VSV for EGR (See page SF–50).

NG	Replace VSV for EGR.

OK

Check for open in harness and connector between engine room J/B and ECM.

6	Check EGR valve (See page EC–7).

NG	Repair or replace EGR valve.

OK

7	Check vacuum control valve (See page EC–7).

NG → Replace vacuum control valve.

OK →

Check and replace ECM (See page IN–27).

DTC	P0402	Exhaust Gas Recirculation Flow Excessive Detected

CIRCUIT DESCRIPTION

Refer to DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on page DI–71.

DTC No.	DTC Detecting Condition	Trouble Area
P0402	When the EGR cut–off, the lift amount of EGR valve is 2.6 mm (0.1 in.) or more (2 trip detection logic)	●EGR valve stuck open ●VSV for EGR open malfunction ●Short in VSV circuit for EGR ●Open or short in EGR valve position sensor circuit ●EGR valve position sensor ●ECM

See DTC P0401 for SYSTEM CHECK DRIVING PATTERN and WIRING DIAGRAM.

INSPECTION PROCEDURE

LEXUS hand–held tester

1	**Check connection and blockage of vacuum hose.**

NG → **Repair or replace vacuum hose.**

OK

2	**Check VSV for EGR (See page DI–164, DI–14).**

OK → **Go to step 4.**

NG

3	Check operation of VSV for EGR (See page SF–50).

NG → Replace VSV for EGR.

OK →

Check for short in harness between VSV for EGR and ECM.

4	Check EGR valve (See page EC–7).

NG → Repair or replace EGR valve.

OK →

5	Check EGR valve position sensor (See page DI–118).

NG → Repair or replace EGR valve position sensor or harness.

OK →

Check and replace ECM (See page IN–27).

OBDII scan tool (excluding LEXUS hand–held tester)

1	Check connection and blockage of vacuum hose.

NG → Repair or replace vacuum hose.

OK →

2	Check VSV for EGR (See page DI–164, DI–14).

OK → Go to step 4.

NG

3	Check operation of VSV for EGR (See page SF–50).

NG → Replace VSV for EGR.

OK

Check for short in harness between VSV for EGR and ECM.

4	Check EGR valve (See page EC–7).

NG → Repair or replace EGR valve.

OK

5	Check EGR valve position sensor (See page DI–118).

NG → Repair or replace EGR valve position sensor or harness.

OK

Check and replace ECM (See page IN–27).

DI09U–01

DTC	P0420	Catalyst System Efficiency Below Threshold

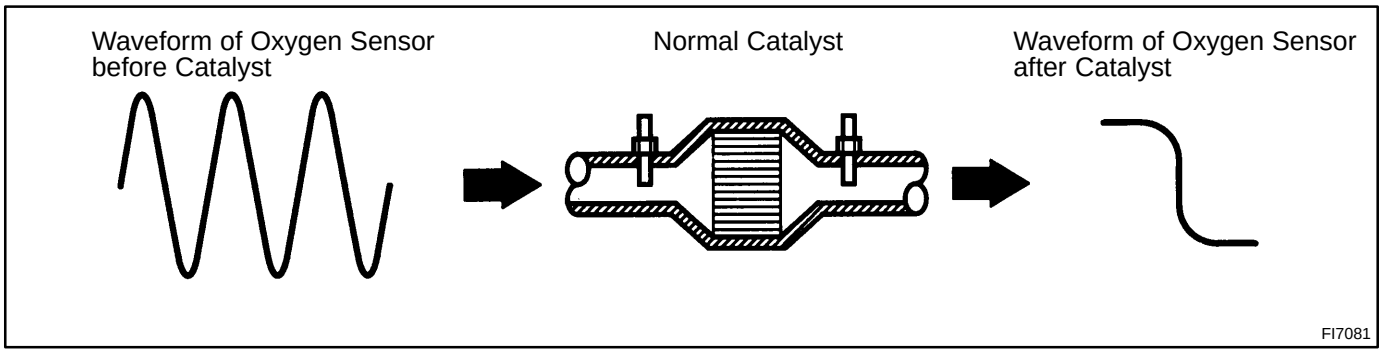
CIRCUIT DESCRIPTION

The ECM 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.

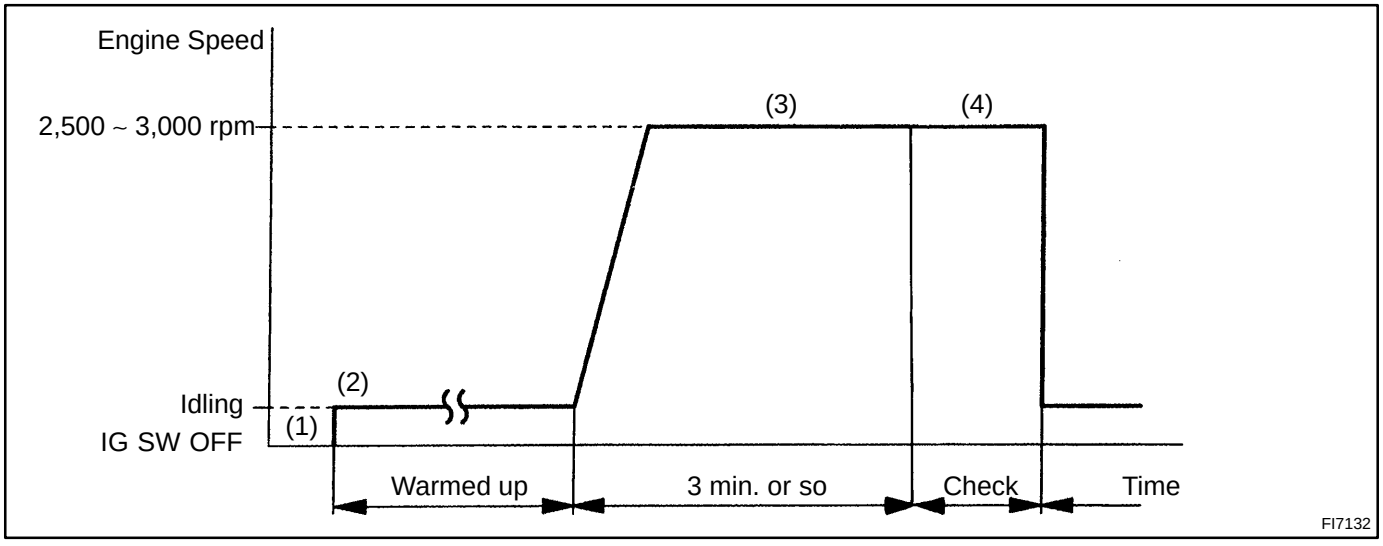
But when both waveforms change at a similar rate, it indicates that catalyst performance has deteriorated.



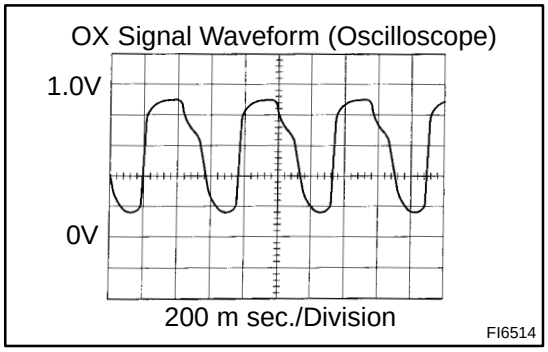
DTC No.	DTC Detecting Condition	Trouble Area
P0420	After the engine and the catalyst are warmed up, and while the vehicle is driven within the set vehicle and engine speed range, the waveforms of the heated oxygen sensors (bank 1, 2 sensor 1 and bank 1 sensor 2) have the same amplitude (2 trip detection logic)	●Three–way catalytic converter ●Open or short in heated oxygen sensor (bank 1, 2 sensor 1/ bank 1 sensor 2) circuit ●Heated oxygen sensor (bank 1, 2 sensor 1/ bank 1 sensor 2)

HINT:U.S.A. and Canadian vehicles does the MIL light up when a malfunction is detected.

CONFIRMATION ENGINE RACING PATTERN



(1) Connect the LEXUS hand–held tester to the DLC3, or connect the probe of the oscilloscope between terminals OXR, OXL, OXS and E1 of ECM.
(2) Start engine and warm it up with all accessories switched OFF until water temp. is stable.
(3) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(4) After confirming that the waveform of the heated oxygen sensor, bank 1, 2 sensor 1 (OXR, OXL), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor, bank 1 sensor 2 (OXS).



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

INSPECTION PROCEDURE

1	**Are there any other codes (besides DTC P0420) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page).**

NG → **Repair or replace.**

OK

3	Check heated oxygen sensor (bank 1 sensor 2) (See page SF–63).

NG → Repair or replace.

OK

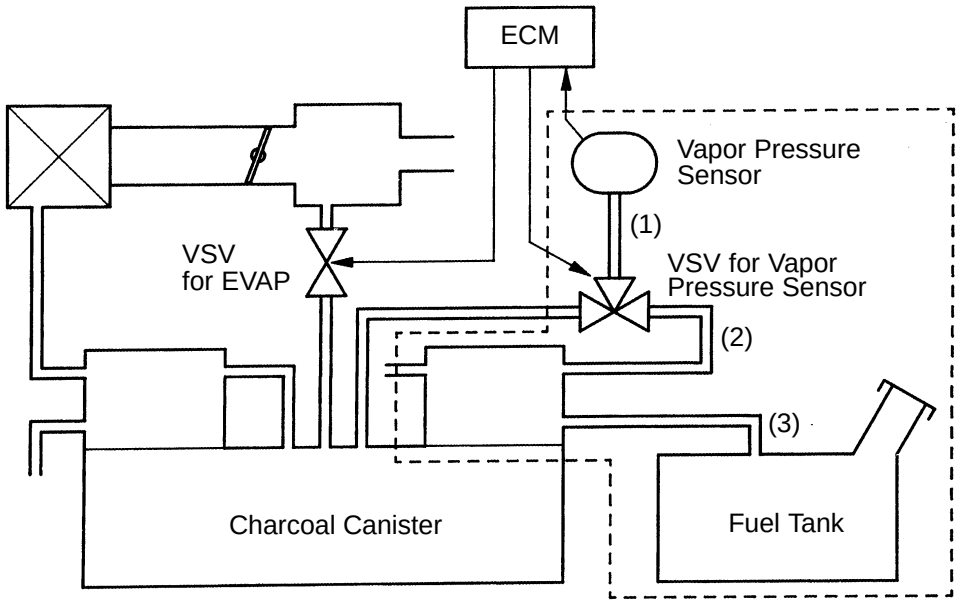
Replace three–way catalytic converter.

DTC	P0440	Evaporative Emission Control System Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when the vapor pressure sensor malfunctions.

fig. 1



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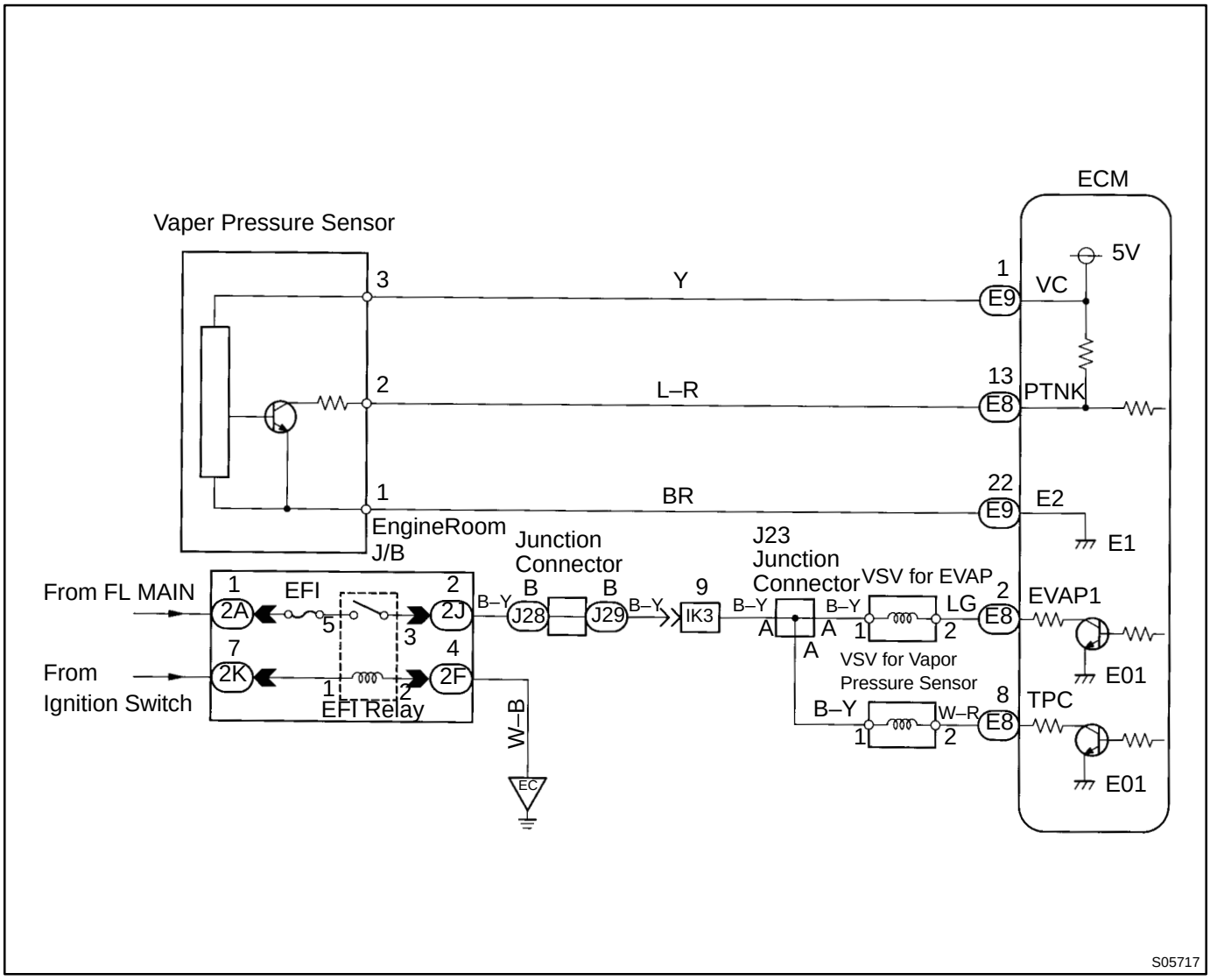
DTC No.	DTC Detecting Condition	Trouble Area
P0440	The fuel tank pressure is atmospheric pressure after the vehicle is driven for 20 min. (2 trip detection logic)	●Vapor pressure sensor ●Fuel tank cap incorrectly installed ●Fuel tank cap cracked or damaged ●Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in fig. 1) ●Hose or tube cracked, holed, damaged or loose seal ((3) in fig. 1) ●Fuel tank cracked, holed or damaged ●Charcoal canister cracked, holed or damaged

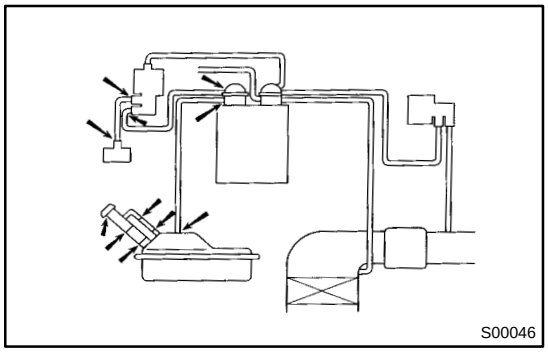
WIRING DIAGRAM



INSPECTION PROCEDURE

- If DTC P0441, P0446 or P0450 is output after DTC P0440, first troubleshoot DTC P0441, P0446 or P0450. If no malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether, after the MIL came on, the customer found the fuel tank cap loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was not loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.

1	**Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of these parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around the fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is LEXUS genuine parts.**

NG → **Replace to LEXUS genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC–5).**

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK ↓

6	**Check vacuum hoses between vapor pressure sensor and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace.**

OK ↓

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page SF–1), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace.**

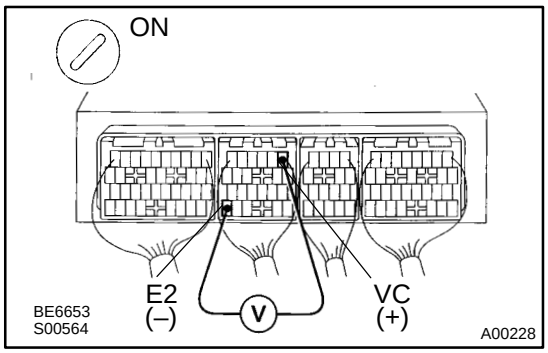
OK ↓

8	**Check charcoal canister for cracks, hole and damage (See page EC–5).**

NG → **Replace charcoal canister.**

OK ↓

9	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of ECM connector.

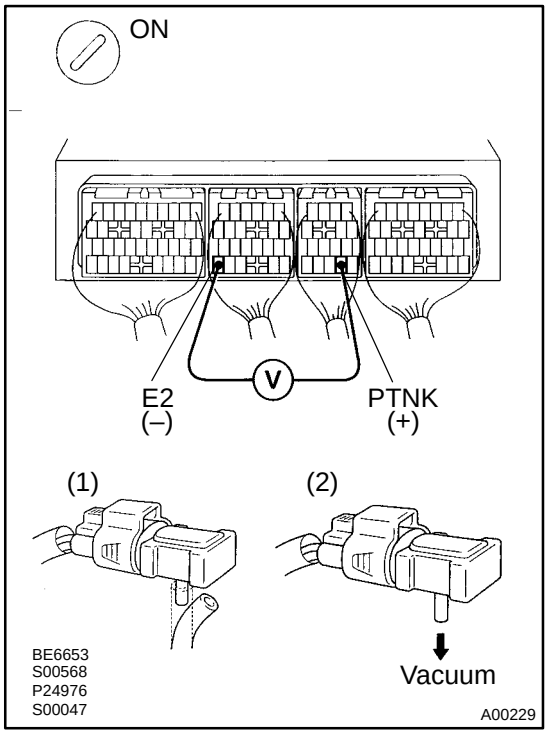
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–27).**

OK

10	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals PTNK and E2 of ECM connectors.

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand–Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE: The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

(1) Voltage: 2.9 ~ 3.7 V

(2) Voltage: 0.5 V or less

OK → **Go to step 12.**

NG

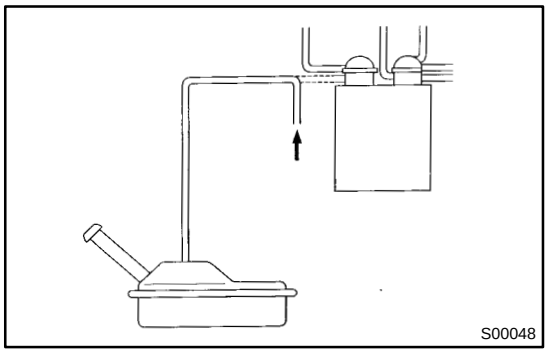
11	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–27).**

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

OK →

Replace vapor pressure sensor.

12	**Check fuel tank for cracks and damage.**



PREPARATION:

(a) Disconnect the vacuum hose from charcoal canister.
(b) Correctly install the fuel cap.
(c) Apply a pressure of 5 kPa (50 gf/cm^2, 0.7 psi) to the fuel tank.

CHECK:

Check whether the pressure is maintained after 1 minute.

OK:

Pressure applied to the fuel tank is maintained.

NG → **Replace fuel tank.**

OK →

It is likely that vehicle user did not properly close fuel tank cap.
Please explain to customer how to properly install fuel tank cap.

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

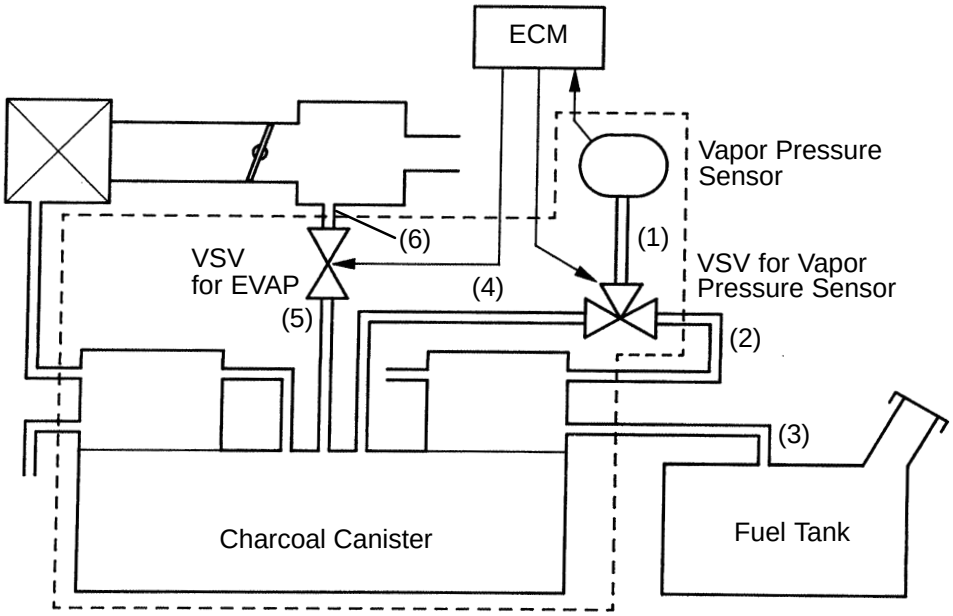
CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTC P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when there is a malfunction in either the VSV for EVAP, the VSV for vapor pressure sensor, or in the vapor pressure sensor itself.

fig. 1



DTC No.	DTC Detecting Condition	Trouble Area
P0441	The pressure in the charcoal canister does not drop during purge control (2 trip detection logic)	●Open or short in VSV circuit for EVAP ●Open or short in VSV circuit for vapor pressure sensor ●Open or short in vapor pressure sensor circuit ●VSV for EVAP ●VSV for vapor pressure sensor ●Vapor pressure sensor ●Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (4), (5) and (6) in fig. 1) ●Charcoal canister cracks, holed or damaged
	During purge cut–off, the pressure in the charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)	
	When VSV for vapor pressure sensor is ON, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)	
	After the purge cut off operates, the pressure in the charcoal canister is maintained at atmospheric pressure (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0440 on page DI–87 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:If DTC P0441, P0446 or P0450 is output after DTC P0440, first troubleshoot DTC P0441, P0446 or P0450. If no malfunction is detected, troubleshoot DTC P0440 next.

LEXUS hand–held tester

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

2	**Check vacuum hose between intake manifold and VSV for EVAP, VSV for EVAP and charcoal canister, charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	Check voltage between terminals VC and E2 of ECM connector (See page DI–87, IG–1).

NG → Check and replace ECM (See page IN–27).

OK

4	Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–87, SF–6).

OK → Go to step 6.

NG

5	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–27).

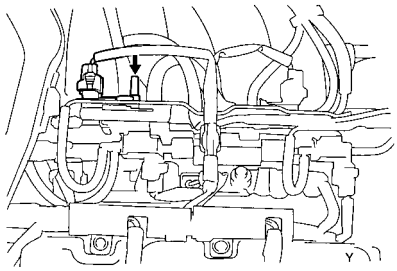
NG → Repair or replace harness or connector.

OK

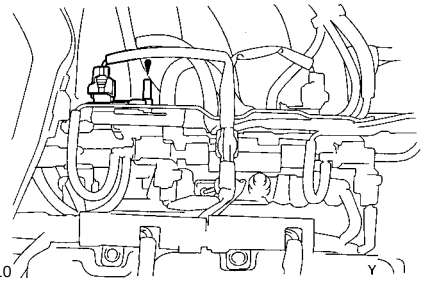
Replace vapor pressure sensor.

6	Check purge flow.

VSV is ON



VSV is OFF



S04610
S04609
A00230

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(c) Disconnect from the charcoal canister the vacuum hose to the VSV for EVAP.
(d) Start the engine.

CHECK:

When the VSV for EVAP is operated by the LEXUS hand–held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK → **Go to step 10.**

NG

7	Check vacuum hose between intake manifold and VSV for EVAP, and VSV for EVAP and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

8	Check operation of VSV for EVAP (See page SF–52).

NG → **Replace VSV for EVAP.**

OK

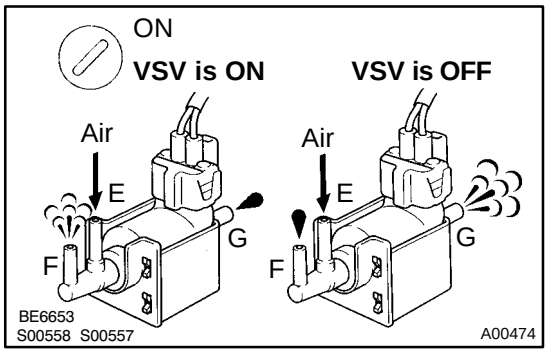
9	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP and ECM (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

10	**Check VSV for vapor pressure sensor.**



PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn ignition switch ON and OBD II scan tool or LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check the VSV operation, when it is operated by LEXUS 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 pipe G.

OK → **Go to step 13.**

NG

11	**Check operation of VSV for vapor pressure sensor (See page SF–56).**

NG → **Replace VSV for vapor pressure sensor.**

OK

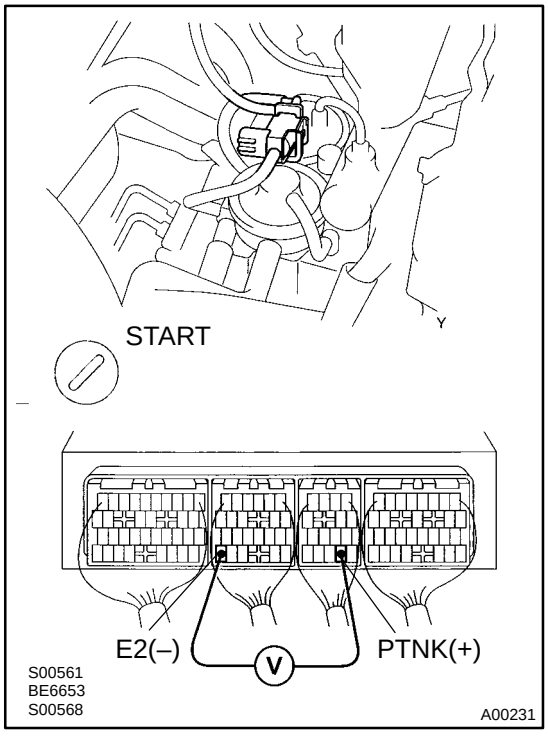
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor and ECM (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

13	**Connect LEXUS hand–held tester, when VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Disconnect the VSV connector for vapor pressure sensor.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(d) Start the engine.

CHECK:

Measure voltage between terminals PTNK and E2 of ECM connectors, when VSV for EVAP is ON, using the LEXUS hand–held tester.

OK:

Voltage: 2.0 V or less

OK → **Go to step 15.**

NG

14	Check vacuum hose between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.

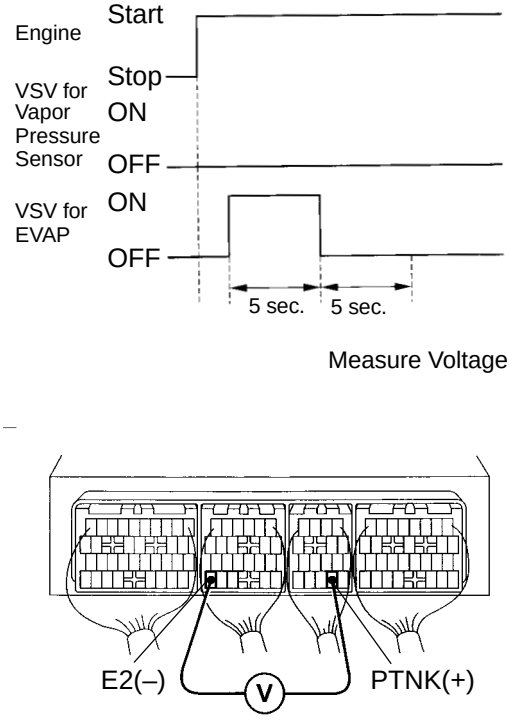
CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

15	Check charcoal canister.



PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Remove the fuel tank cap.
(c) Disconnect the VSV connector for vapor pressure sensor.
(d) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(e) Start the engine.
(f) VSV for EVAP is ON by the LEXUS hand–held tester and remains on for 5 sec.

CHECK:

Measure voltage between terminals PTNK and E2 of ECM connectors 5 sec. after switching VSV for EVAP from ON to OFF.

OK:

Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

Check and replace ECM (See page IN–27).

OBD II scan tool (excluding LEXUS hand–held tester)

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

2	**Check vacuum hose between intake manifold and VSV for EVAP, VSV for EVAP and charcoal canister, charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI–87, IG–1).**

NG → **Check and replace ECM (See page IN–27).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–87, SF–6).**

OK → **Go to step 6.**

NG

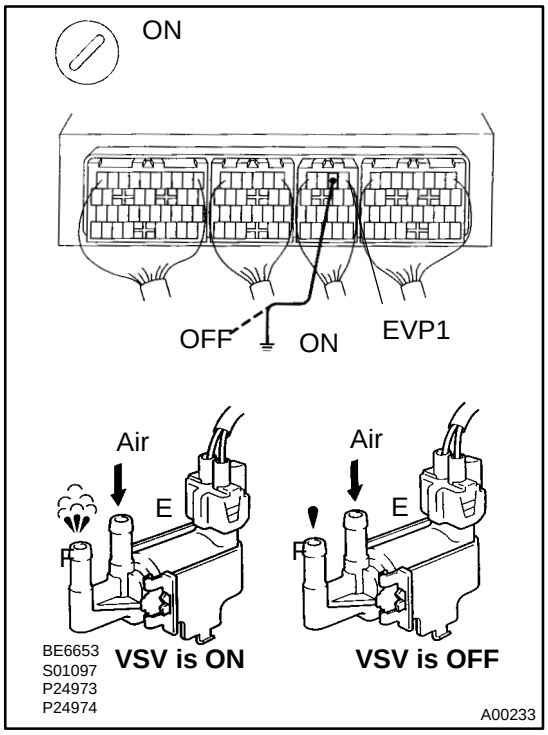
5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–27).**

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

OK

Replace vapor pressure sensor.

6	**Check VSV for EVAP.**



PREPARATION:

(a) Remove the glove compartment (See page SF–65).

(b) Turn ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal EVP1 of ECM and body ground.

(2) Disconnect between terminal EVP1 of ECM and body ground.

OK:

(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air does not flow from pipe E to pipe F.

OK → **Go to step 9.**

NG

7	**Check operation of VSV for EVAP (See page SF–52).**

NG → **Replace VSV for EVAP.**

OK

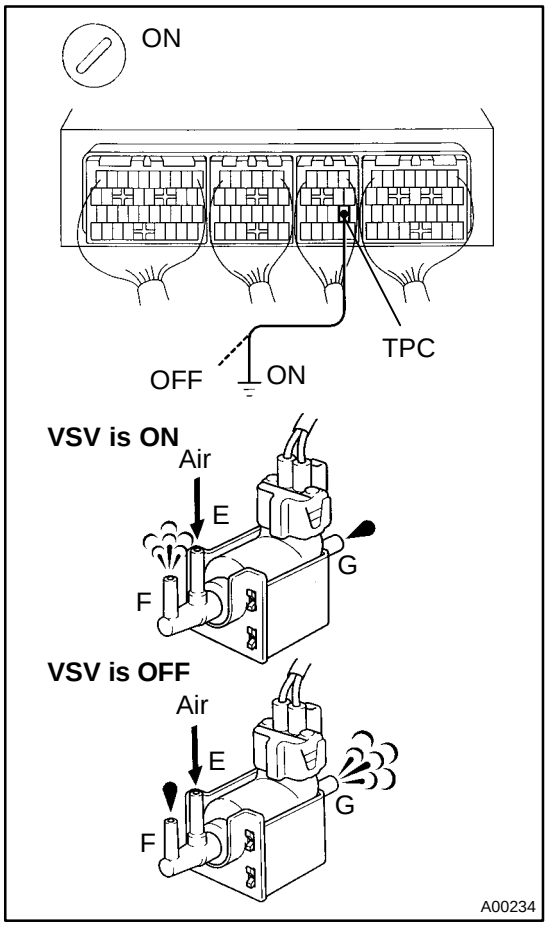
8	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP and ECM (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

9	**Check VSV for vapor pressure sensor.**



PREPARATION:

(a) Remove the glove compartment (See page SF–65).

(b) Turn ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal TPC of ECM and body ground (ON).

(2) Disconnect between terminal TPC of ECM and body ground (OFF).

OK:

(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air from pipe E flows out through pipe G.

OK → **Check and replace charcoal canister (See page EC–5).**

NG

10	Check operation of VSV for vapor pressure sensor (See page SF–56).

NG → Replace VSV for vapor pressure sensor.

OK

11	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor and ECM (See page IN–27).

NG → Repair or replace harness or connector.

OK

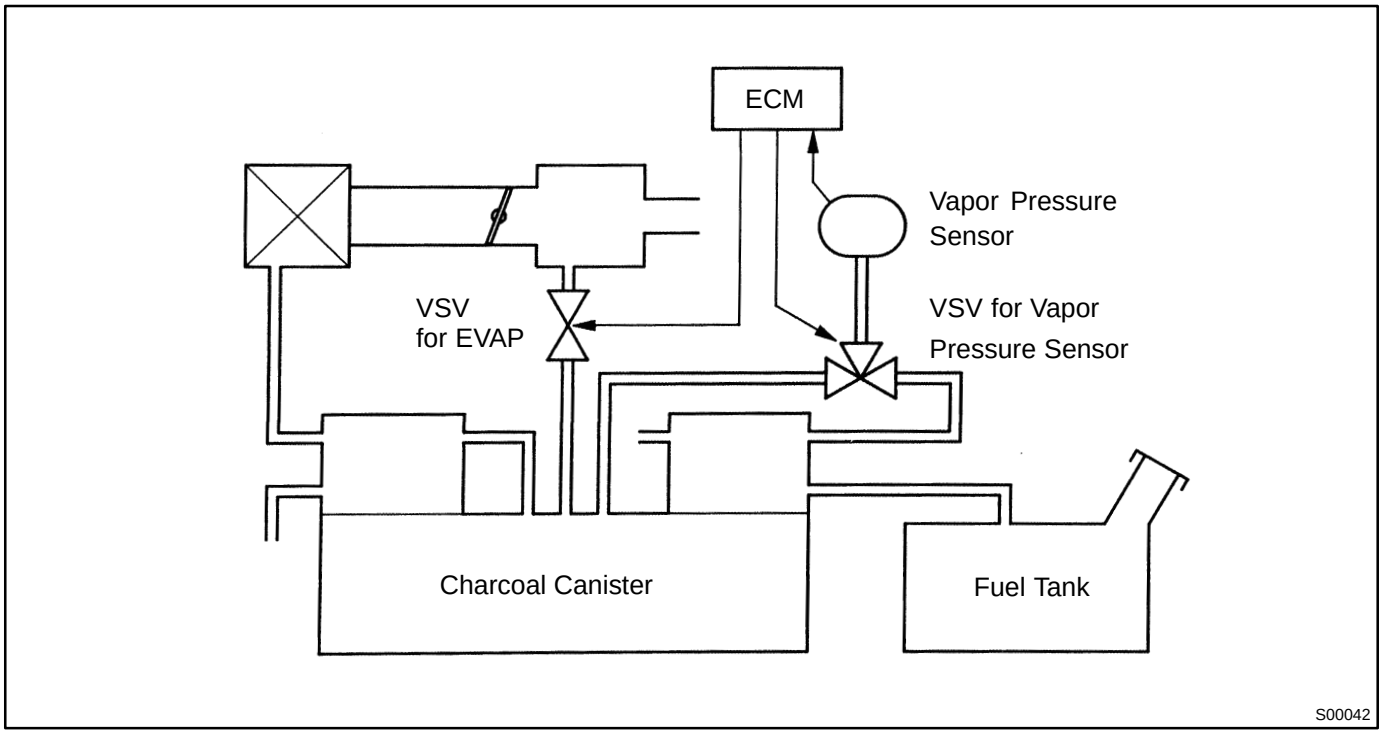
Check and replace ECM (See page IN–27).

DI09X–01

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detecting Condition	Trouble Area
P0450	10 seconds or more after engine starting condition (a) or (b) continues for 7 seconds or more: (2 trip detection logic) (a) Vapor Pressure Sensor Value ∼ –3.5 kPa (–26 mmHg, –1.0 in.Hg) (b) Vapor Pressure Sensor Value ⊖ 1.5 kPa (11 mmHg, 0.4 in.Hg)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM

WIRING DIAGRAM

Refer to DTC P0440 on page DI–87 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:If DTC P0441, P0446 or P0450 is output after DTC P0440, first troubleshoot DTC P0441, P0446 or P0450. If no malfunction is detected, troubleshoot DTC P0440 next.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI–87, IG–1).**

NG → **Check and replace ECM (See page IN–27).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–87, SF–6).**

OK → **Check and replace ECM (See page IN–27).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–27).**

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

OK

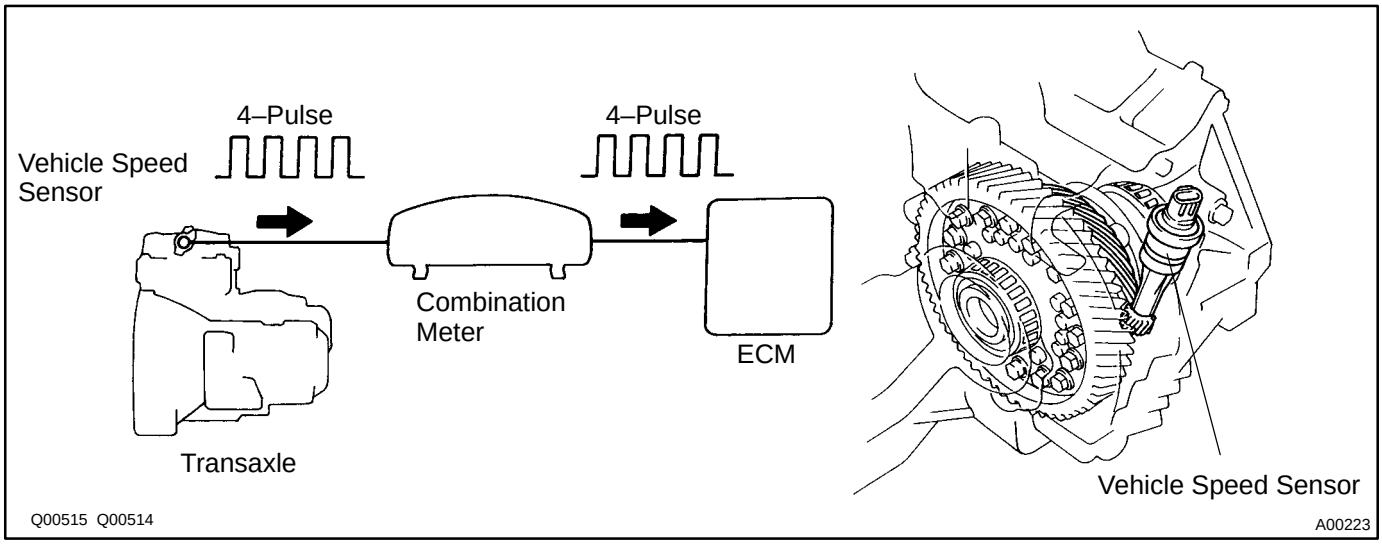
Replace vapor pressure sensor.

DI09Y–01

DTC	P0500	Vehicle Speed Sensor Malfunction

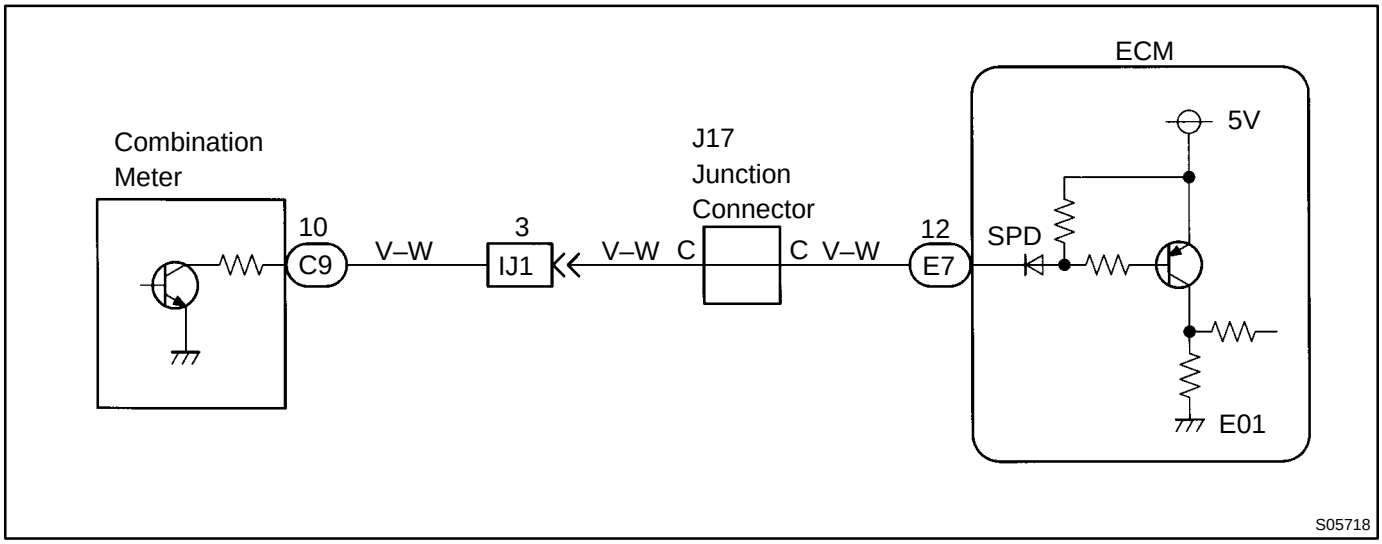
CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under conditions (a) and (b): (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	●Open or short in vehicle speed sensor circuit ●Vehicle speed sensor ●Combination meter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

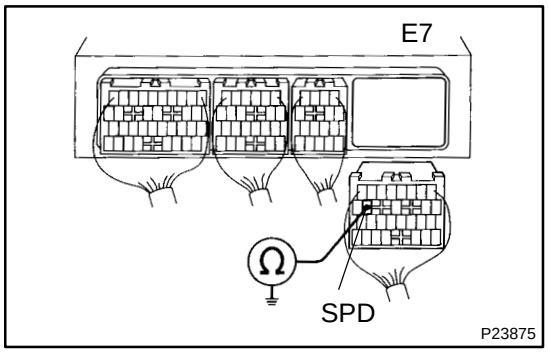
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

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

NG → **Check speedometer circuit.**

OK

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



PREPARATION:

(a) Remove the glove compartment (See page SF–65).

(b) Disconnect the E7 connector of ECM.

CHECK:

Check continuity between terminal SPD of ECM and body ground.

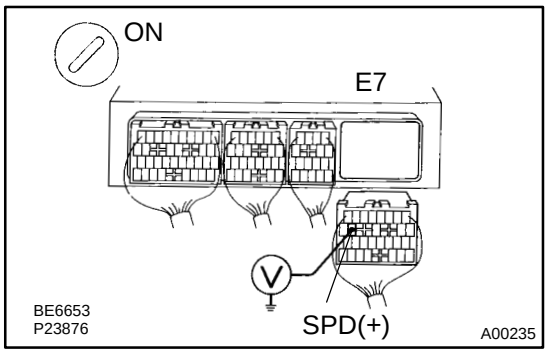
OK:

No continuity (1 MΩ or higher)

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

OK

3	**Check voltage between terminal SPD of ECM connector and body ground.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminal SPD of ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

NG → **Check for open in harness and connector between junction connector (J17) and ECM (See page IN–27).**

OK

4	**Check for open in harness and connector between junction connector (J17) and combination meter (See page IN–27).**

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

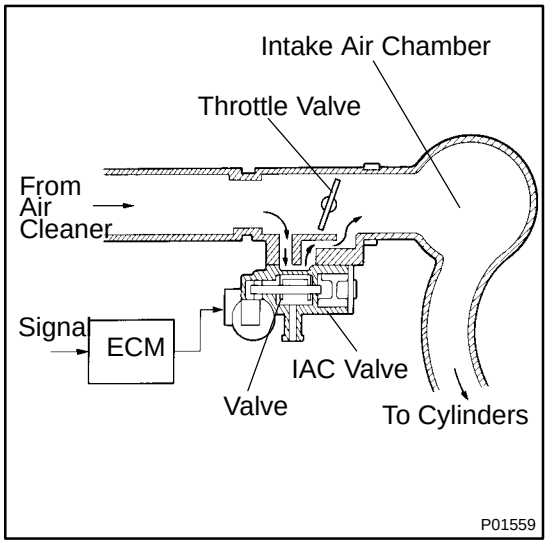
OK

Check and replace ECM (See page IN–27).

DI09Z–01

DTC	P0505	Idle Control System Malfunction

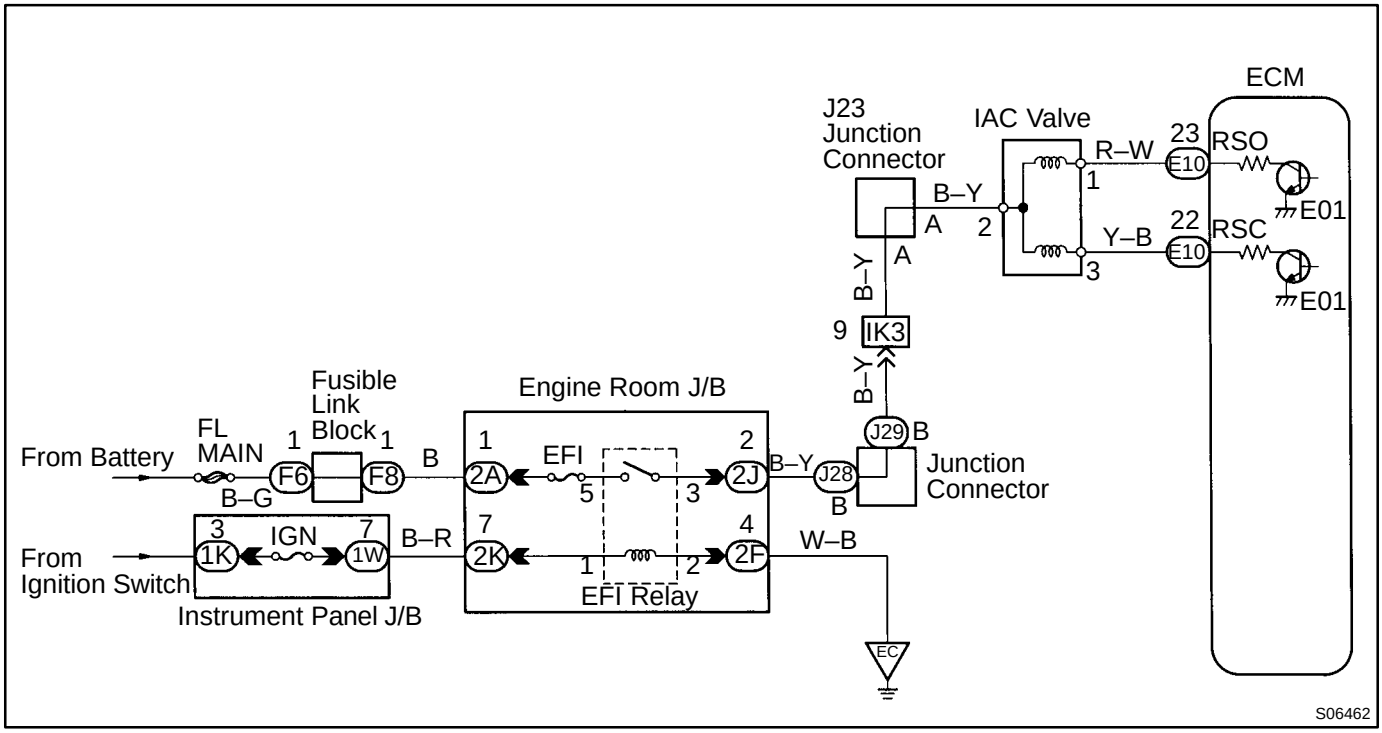
CIRCUIT DESCRIPTION



The rotary solenoid type IAC valve is located in front of the intake air chamber and intake air bypassing the throttle valve is directed to the IAC valve through a passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates only the IAC valve to perform idle–up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from the target speed (2 trip detection logic)	●IAC valve is stuck or closed ●Open or short in IAC valve circuit ●Open or short in A/C signal circuit ●Air intake (hose loose)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check air induction system (See page SF–63).

NG → Repair or replace.

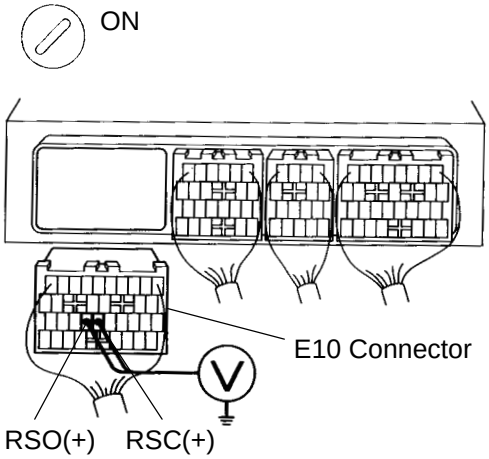
OK

2	Check A/C signal circuit (See page DI–569).

NG → Repair or replace.

OK

3	Check voltage terminals RSO, RSC of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–65).
(b) Disconnect the E10 connector of ECM.
(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminals RSO, RSC of ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK → Go to step 5.

NG

4	Check IAC valve (See page SF–36).

NG → Replace IAC valve.

OK →

Check for open and short in harness and connector between engine room J/B and IAC valve, IAC valve and ECM (See page IN–27).

5	Check operation of IAC valve (See page SF–40).

NG → Repair or replace IAC valve.

OK →

Check and replace ECM (See page IN–27).

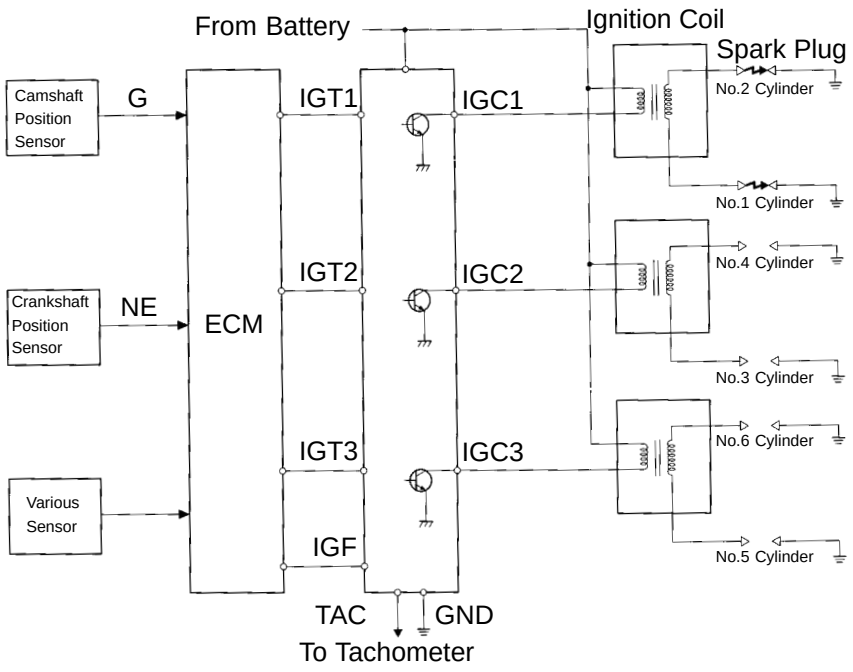
DI0A0–01

DTC	P1300	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 overall reliability of the ignition system by eliminating the distributor. The DIS is a 2–cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with one ignition coil. In the 2–cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plugs. The sparks of the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.

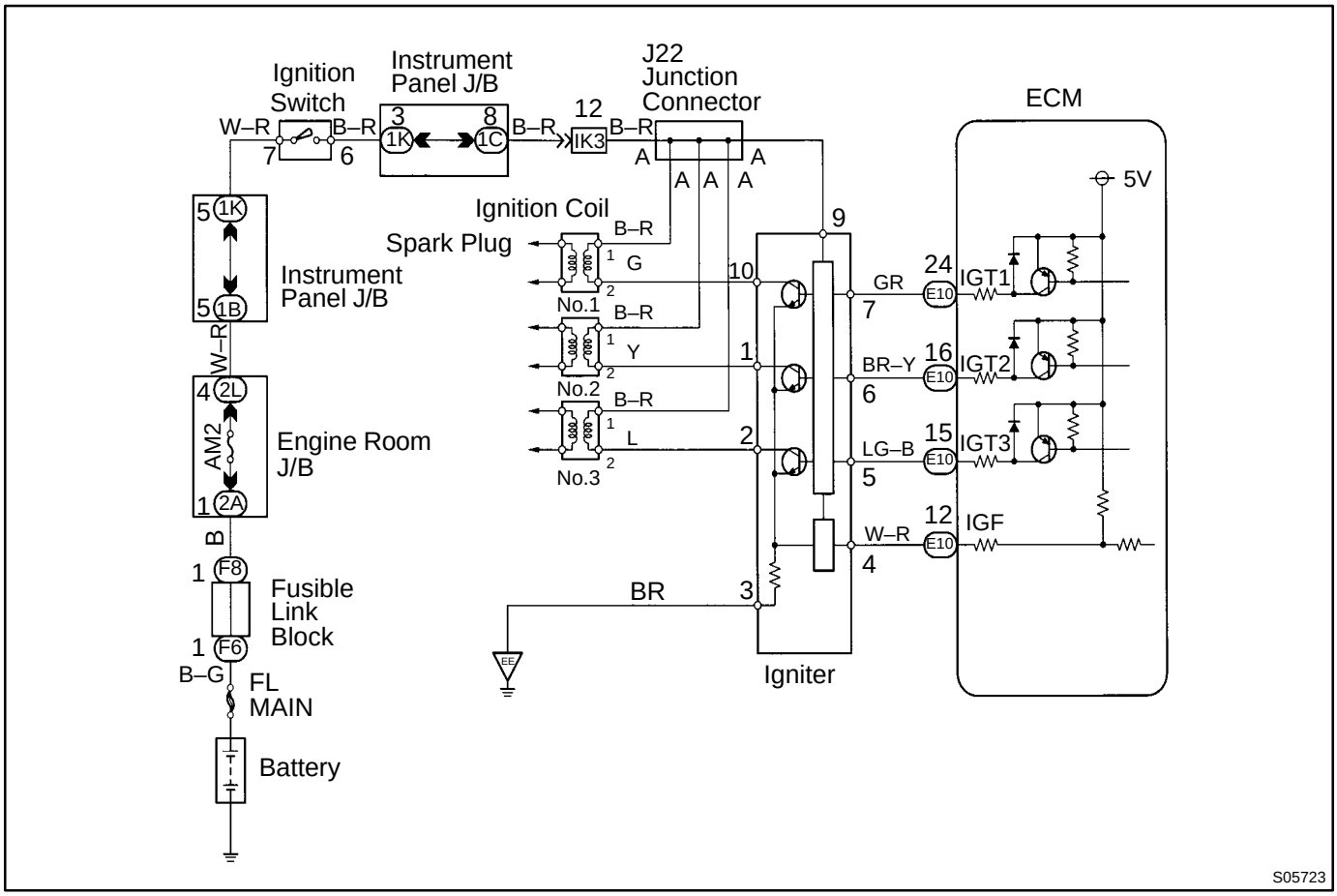
The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the ECM.



S00251

DTC No.	DTC Detecting Condition	Trouble Area
P1300	Condition (a) is repeated 3 times consecutively during 6 consecutively IGT signals while engine is running (a) IGF signal is not input to ECM for 2 or more ignitions	●Open or short in IGF or IGT circuit from igniter to ECM ●Igniter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check spark plug and spark of misfiring cylinder (See page DI–57).**

NG → **Go to step 4.**

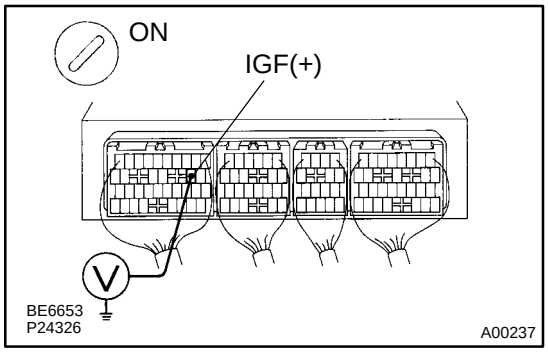
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page IN–27).**

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

OK

3	Disconnect igniter connector and check voltage between terminal IGF of ECM connector and body ground.



PREPARATION:
(a) Disconnect the igniter connector.
(b) Remove the glove compartment (See page SF–64).
(c) Turn ignition switch ON.

CHECK:
Measure voltage between terminal IGF of ECM connector and body ground.

OK:
Voltage: 4.5 ~ 5.5 V

OK	Replace igniter.

NG

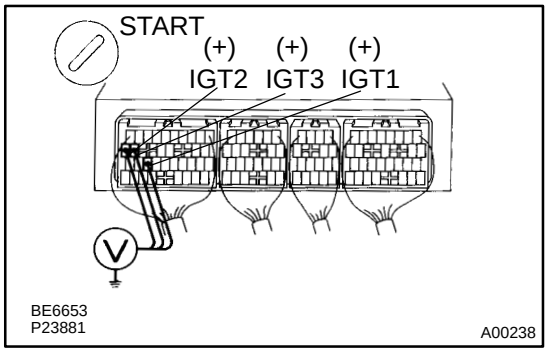
Check and replace ECM (See page IN–27).

4	Check for open and short in harness and connector in IGT 1 ~ 3 signal circuits between ECM and igniter (See page IN–27).

NG	Repair or replace harness or connector.

OK

5	Check voltage between terminals IGT 1 ~ 3 of ECM connector and body ground.

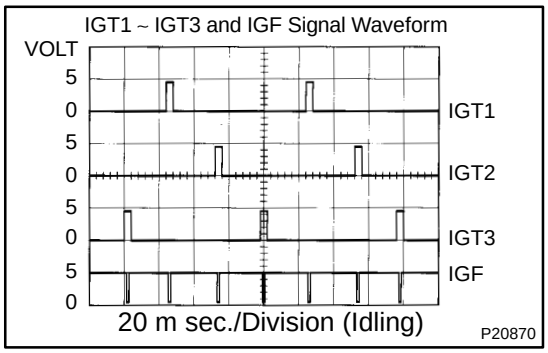


PREPARATION:
Remove the glove compartment (See page SF–64).

CHECK:
Measure voltage between terminals IGT 1 ~ 3 of ECM 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

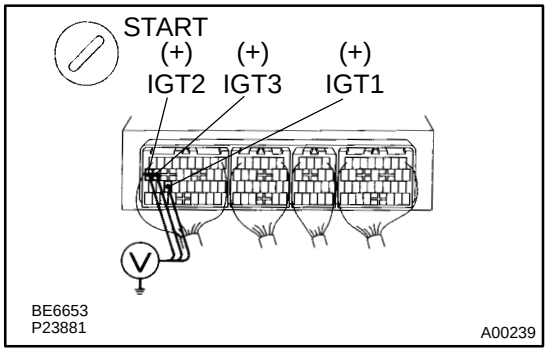


During idling, check waveform between terminals IGT 1 ~ 3, IGF and E1 of ECM.
HINT:The correct waveforms are as shown.

NG → **Check and replace ECM (See page IN–27).**

OK

6	**Disconnect igniter connector and check voltage between terminals IGT 1 ~ 3 of ECM connector and body ground.**



PREPARATION:
(a) Disconnect the igniter connector.
(b) Remove the glove compartment (See page SF–64).

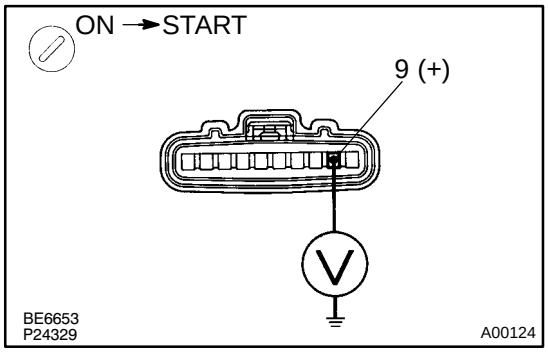
CHECK:
Measure voltage between terminals IGT 1 ~ 3 of ECM connector and body ground when engine is cranked.

OK:
Voltage: More than 0.1 V and less than 4.5 V

NG → **Check and replace ECM (See page IN–27).**

OK

7	**Check voltage between terminal 9 of igniter connector and body ground.**



PREPARATION:
Disconnect the igniter connector.

CHECK:
Measure voltage between terminal 9 of igniter connector and body ground, when ignition switch is turned to "ON" and "START" position.

OK:
Voltage: 9 ~ 14 V

NG → **Check and repair igniter power source circuit.**

OK

8	Check for open and short in harness and connector between ignition switch and ignition coil, ignition coil and igniter (See page IN–27).

NG → Repair or replace harness or connector.

OK ↓

9	Check ignition coil (See page IG–1).

NG → Replace ignition coil.

OK ↓

Replace igniter.

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (during engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–66.

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

WIRING DIAGRAM

Refer to DTC P0335 on page DI–66 for the WIRING DIAGRAM.

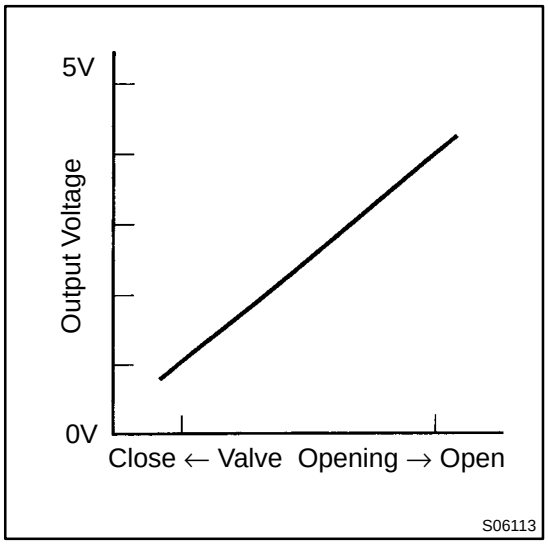
INSPECTION PROCEDURE

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–66.

DI0A2–01

DTC	P1410	EGR Valve Position Sensor Circuit Malfunction

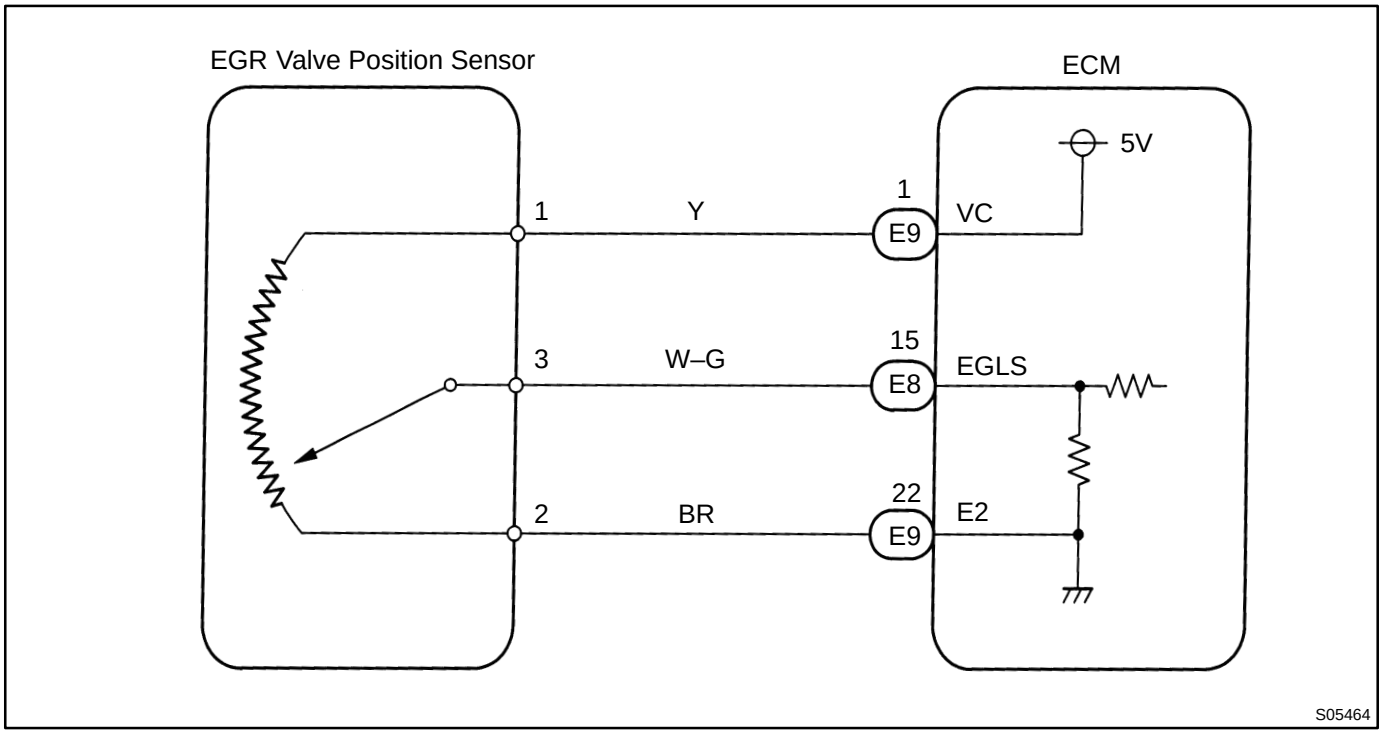
CIRCUIT DESCRIPTION



The EGR valve position sensor is mounted on the EGR valve and detects the lift amount of EGR valve. The lift amount of EGR valve which is detected by the EGR valve position sensor provides feedback to the ECM to control the lift amount of EGR valve in response to engine operating conditions.

DTC No.	DTC Detecting Condition	Trouble Area
P1410	Open or short in EGR valve position sensor circuit (2 trip detection logic)	●Open or short in EGR valve position sensor circuit ●EGR valve position sensor ●ECM

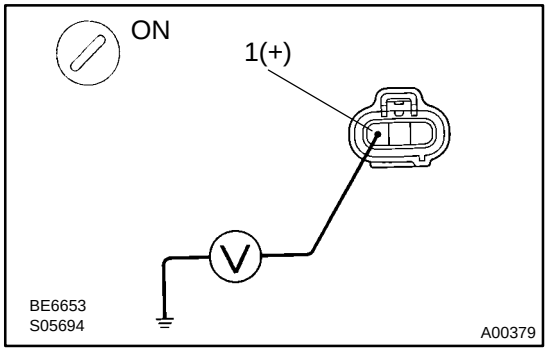
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:If DTC ”P0110” (Intake Air Temp. Circuit Malfunction), ”P0115” (Engine Coolant Temp. Circuit Malfunction), ”P0120” (Throttle/Pedal Position/Switch ”A” Circuit Malfunction), ”P1410” (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.

1	**Check voltage between terminal VC of wire harness side connector and body ground.**



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.
(b) Disconnect the EGR valve position sensor connector.
(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminal 1 of wire harness side connector and body ground.

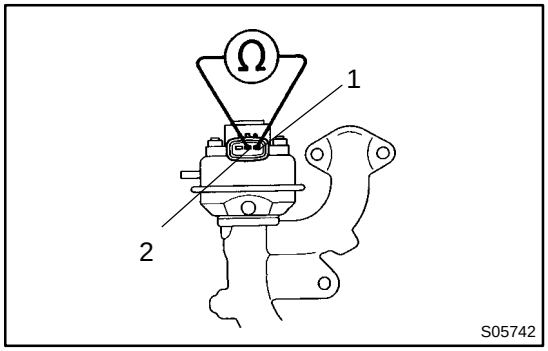
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Go to step 4.**

OK

2	**Check EGR valve position sensor.**



PREPARATION:

Disconnect the EGR valve position sensor connector.

CHECK:

Measure resistance between terminals 1(VC) and 2(E2) of EGR valve position sensor.

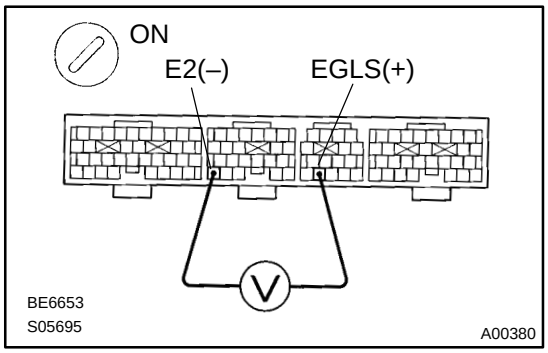
OK:

Resistance: 1.5 ~ 4.3 kΩ

NG → **Replace EGR valve position sensor.**

OK

3	Check voltage between terminals EGLS and E2 of ECM connectors.



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.
(b) Connect the hand–held vacuum pump to EGR valve.
(c) Remove the glove compartment (See page SF–64).
(d) Turn ignition switch ON.

CHECK:

Measure voltage between terminals EGLS and E2 of ECM connectors.

OK:

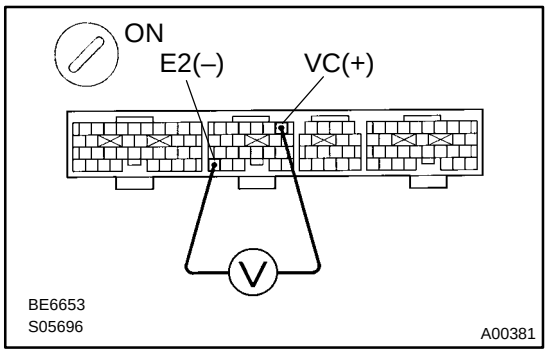
Condition	Condition	Voltage
EGR valve	Vacuum	Voltage
Fully closed	0 kPa (0 mmHg, 0 in.Hg)	0.4 ~ 1.6 V
Fully open	17.3 kPa (130 mmHg, 5.12 in.Hg)	3.2 ~ 5.1 V

NG → **Check for open and short in harness and connector between ECM and EGR valve position sensor (EGLS or E2 line).**

OK →

Check and replace ECM (See page IN–27).

4	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–65).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of ECM connector.

OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–27).**

OK

Check for open and short in harness and connector between ECM and EGR valve position sensor (VC line).

DI0A3–01

DTC	P1411	EGR Valve Position Sensor Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P1410 (EGR Valve Position Sensor Circuit Malfunction) on page DI–118.

DTC No.	DTC Detecting Condition	Trouble Area
P1411	Conditions (a) and (b) continue for 7 sec. or more: (2 trip detection logic) (a) Engine Coolant Temp. < 55°C (131°F) (b) EGLS ~ 1.65 V or EGLS < 0.35 V	●EGR valve position sensor

INSPECTION PROCEDURE

1	Are there any other codes (besides DTC P1411) being output?

YES → Go to relevant DTC chart.

NO →

Replace EGR valve position sensor.

DI0A4–01

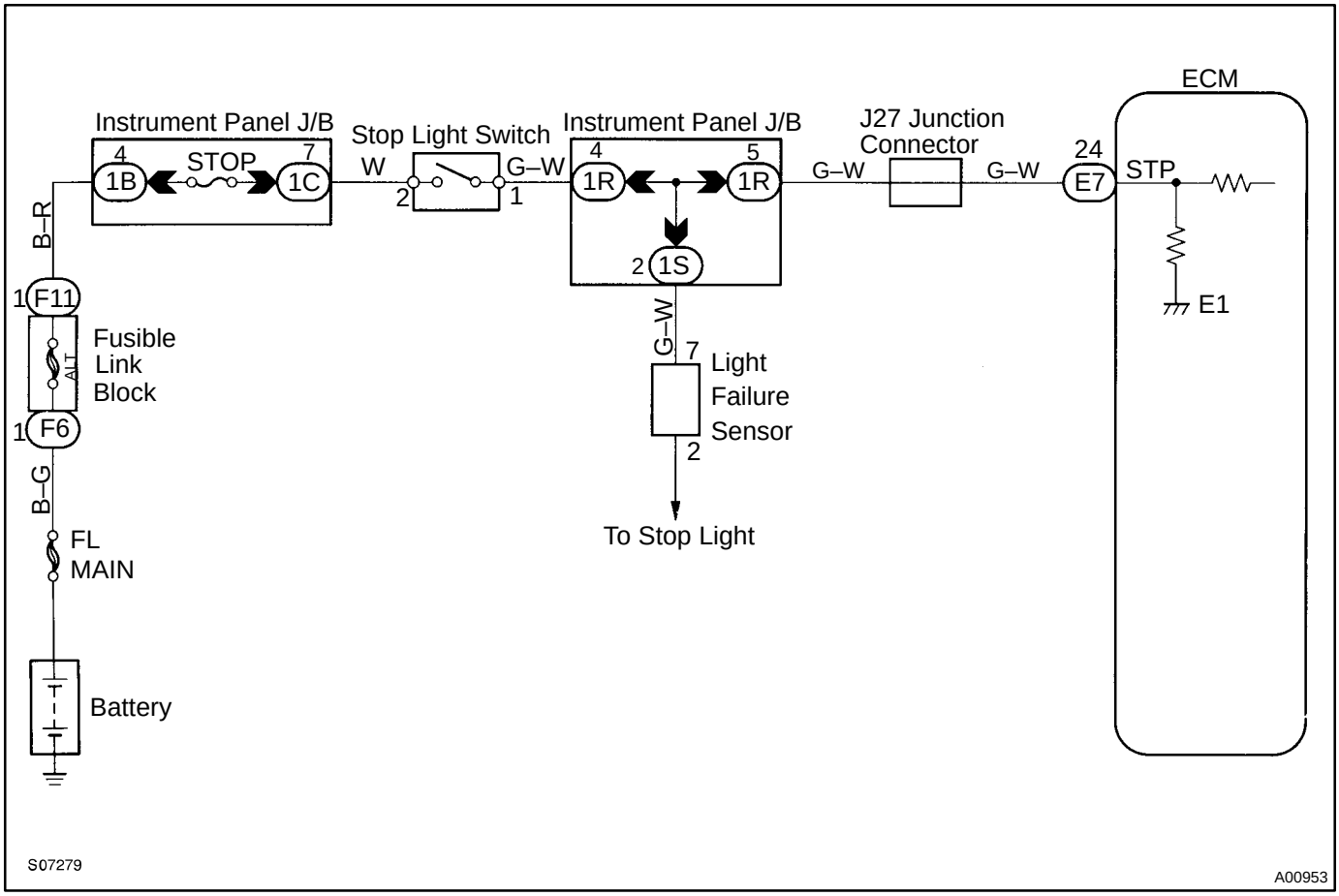
DTC	P1520	Stop Light Switch Signal Malfunction

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 ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1997 LEXUS ES300 (RM511U)

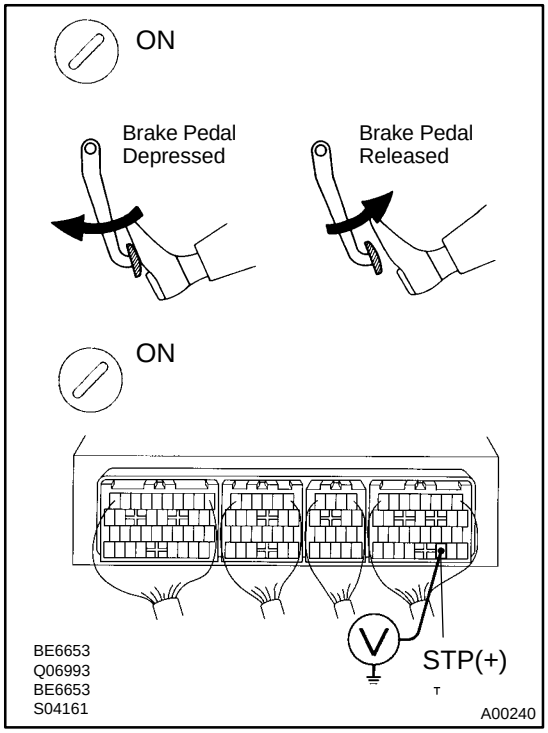
1	Check operation of stop light.

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 LEXUS hand–held tester:
PREPARATION:
(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn ignition switch ON and LEXUS hand–held tester main switch ON.
CHECK:
Read the STP signal on the LEXUS hand–held tester.
OK:
Brake pedal is depressed: STP.....ON
Brake pedal is released: STP.....OFF
When not using LEXUS hand–held tester:
PREPARATION:
Turn ignition switch ON.
CHECK:
Check voltage between terminal STP of ECM 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–3).**

NG

3	**Check harness and connector between ECM and stop light switch (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

DI0A5–01

DTC	P1600	ECM BATT Malfunction

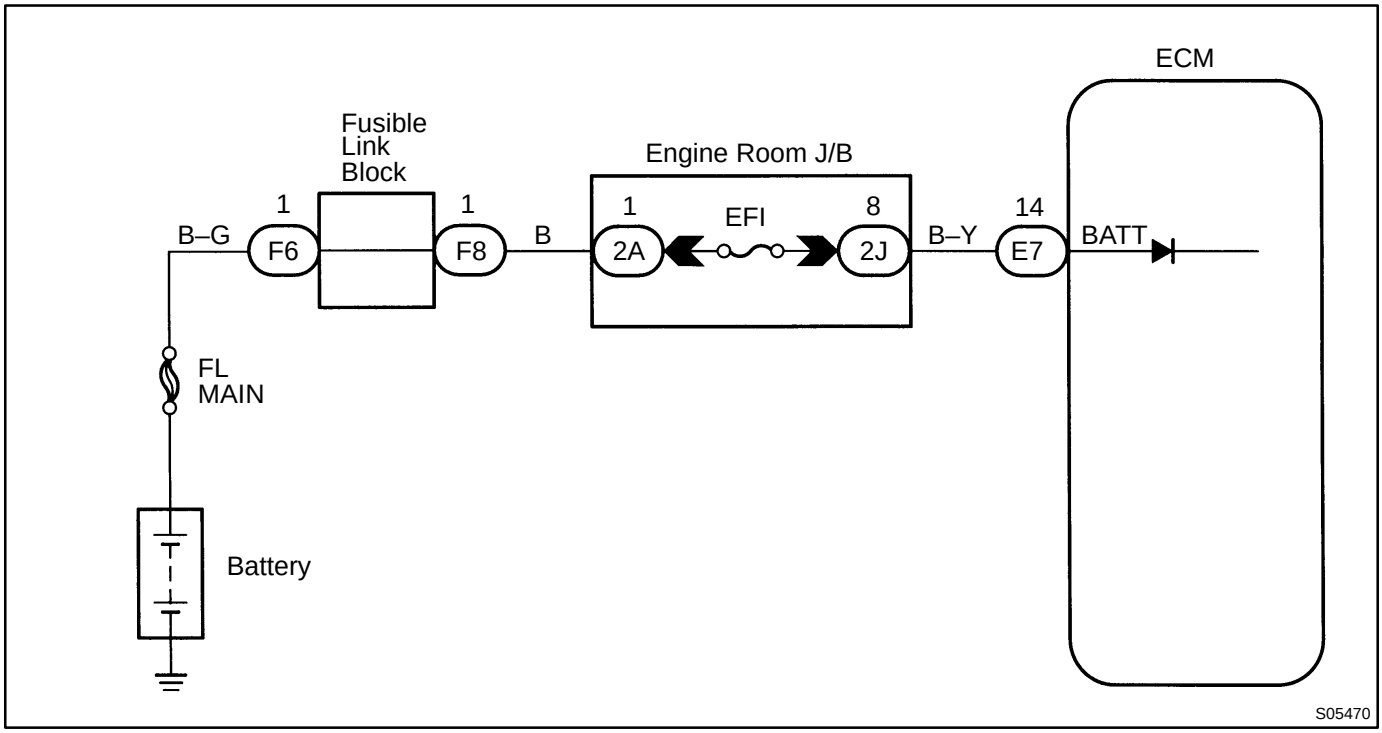
CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control value memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1600	Open in back up power source circuit	●Open in back up power source circuit ●ECM

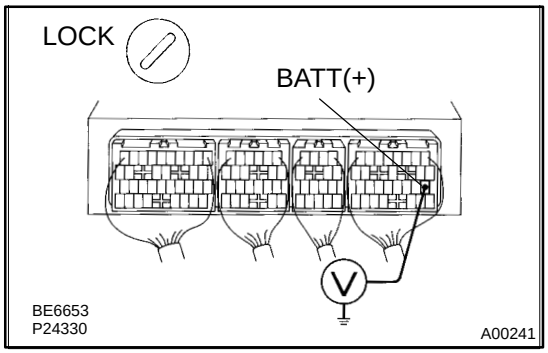
HINT:If DTC P1600 appear, the ECM does not store another DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

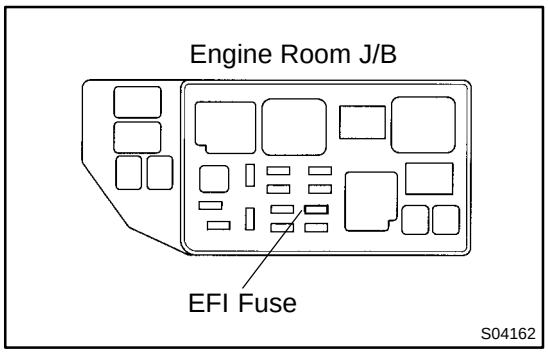


PREPARATION:
Remove the glove compartment (See page SF–64).
CHECK:
Measure voltage between terminal BATT of ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–27).**

NG

2	**Check EFI fuse.**



PREPARATION:
Remove the EFI fuse from the engine room 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 ECM.

DI0A6–01

DTC	P1780	Park/Neutral Position Switch Malfunction

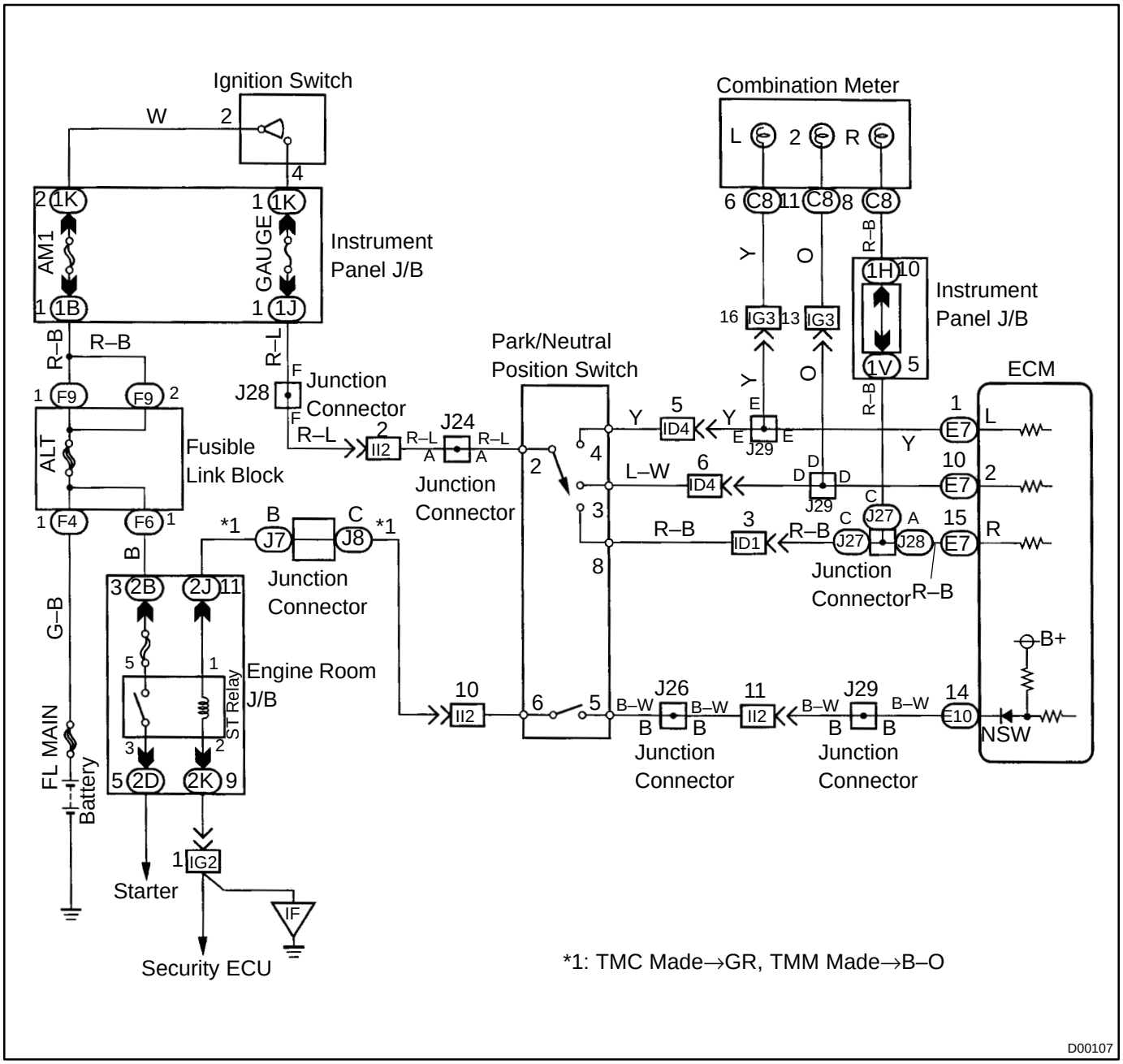
CIRCUIT DESCRIPTION

The park/neutral position switch go on when the shift lever is in the N or P shift position. When it goes on terminal NSW of the ECM is grounded to body ground via the starter relay, thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM. Terminal NSW becomes battery voltage, the voltage of the ECM internal power source. If the shift lever is moved from the N position to the D position, this signal is used for air–fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for ”N”, ”2”, ”L” and ”R” positions (2 trip detection logic)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM
	When driving under conditions (a) and (b) for 30 sec. or more the park/neutral position 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	

HINT:After confirming DTC P1780 use the LEXUS hand–held tester to confirm the PNP switch signal from ”CURRENT DATA”.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

When using LEXUS hand–held tester.

PREPARATION:

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

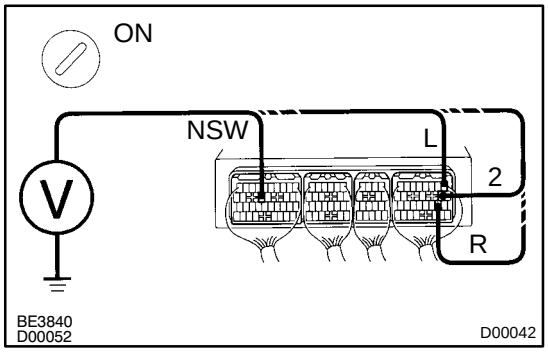
(b) Turn the ignition switch ON and LEXUS hand–held tester main switch ON.

CHECK:

Shift lever into the P, R, N, 2 and L positions, and read the PNP, REVERSE, 2ND and LOW signals on the LEXUS hand–held tester.

OK:

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



When not using LEXUS hand–held tester.

PREPARATION:

Turn the ignition switch ON.

CHECK:

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

OK:

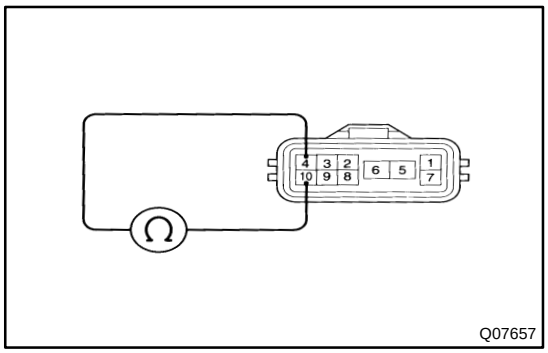
Position	NSW–Body ground	R–Body ground	2–Body ground	L–Body ground
P,N	0 V	0 V	0 V	0 V
R	9 ~ 14 V*	9 ~ 14 V*	0 V	0 V
D	9 ~ 14 V	0 V	0 V	0 V
2	9 ~ 14 V	0 V	9 ~ 14 V	0 V
L	9 ~ 14 V	0 V	0 V	9 ~ 14 V

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

OK → **Proceed to next circuit inspection shown on matrix chart. (See page DI–164).**

NG

2	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the park/neutral position switch.

CHECK:

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

Shift Position	Terminal No. to continuity	
P	2 – 7	5 – 6
R	2 – 8	–
N	2 – 9	5 – 6
D	2 – 10	–
2	2 – 3	–
L	2 – 4	–

OK:

There is continuity.

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

OK ↓

3	Check harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN–27).

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

OK ↓

Check and replace ECM (See page IN–27).

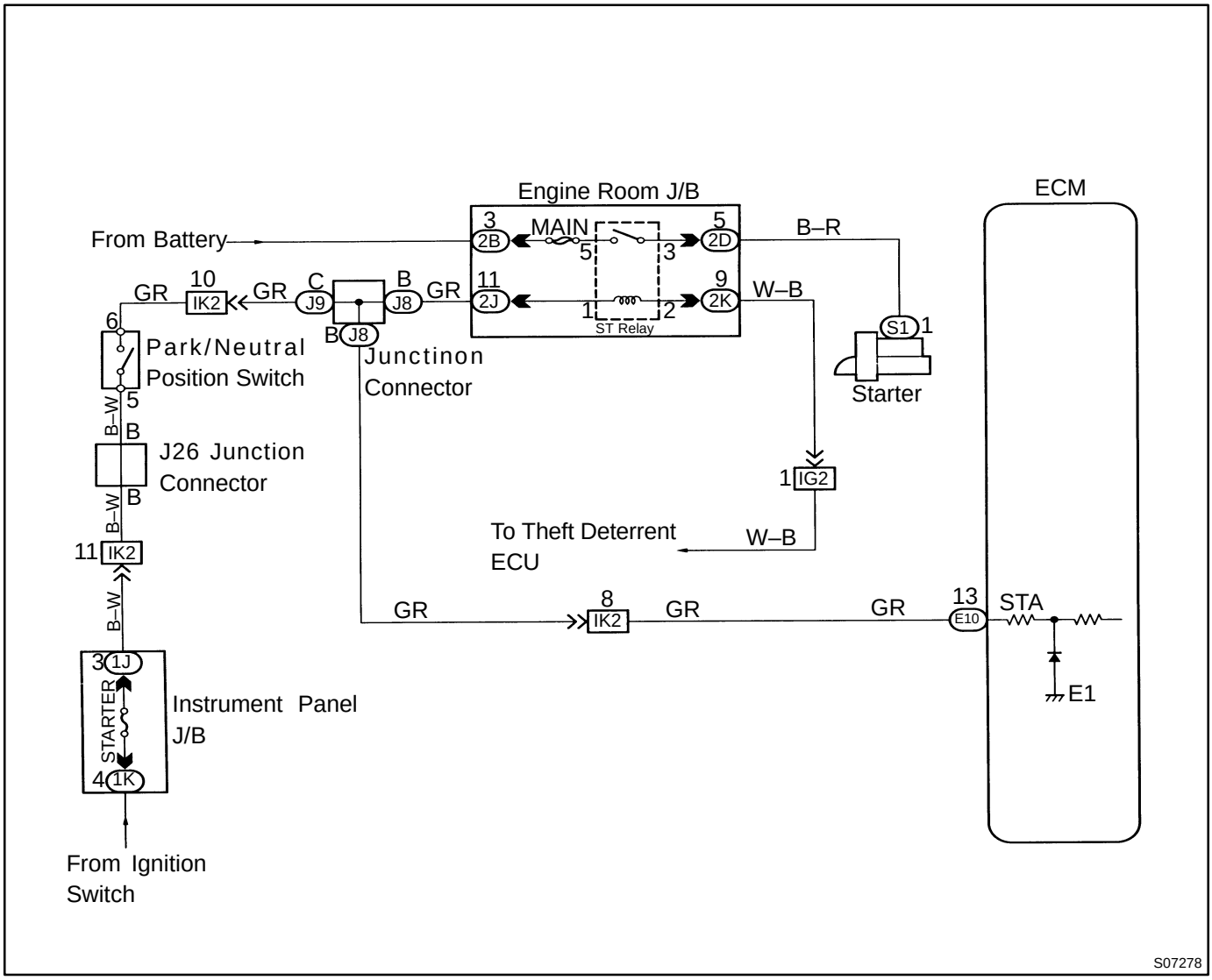
DI0A7–01

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 ECM. The starter signal is 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–22.

hand–held tester

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

PREPARATION:

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

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

CHECK:

Read STA signal on the LEXUS 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 symptom table (See page DI–22).**

NG

2	**Check for open in harness and connector between ECM and starter relay (See page IN–27).**

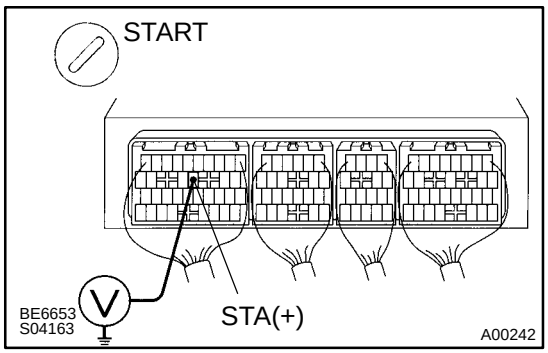
NG → **Repair or replace or connector.**

OK

Check and replace ECM (See page IN–27).

OBD II scan tool (excluding LEXUS hand–held tester)

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:

Remove the glove compartment (See page SF–65).

CHECK:

Measure voltage between terminal STA of ECM connector and body ground during engine cranking.

OK:

Voltage: 6 V or more

OK	**Proceed to next circuit inspection shown on problem symptom table (See page DI–22).**

NG

2	**Check for open in harness and connector between ECM and starter relay (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

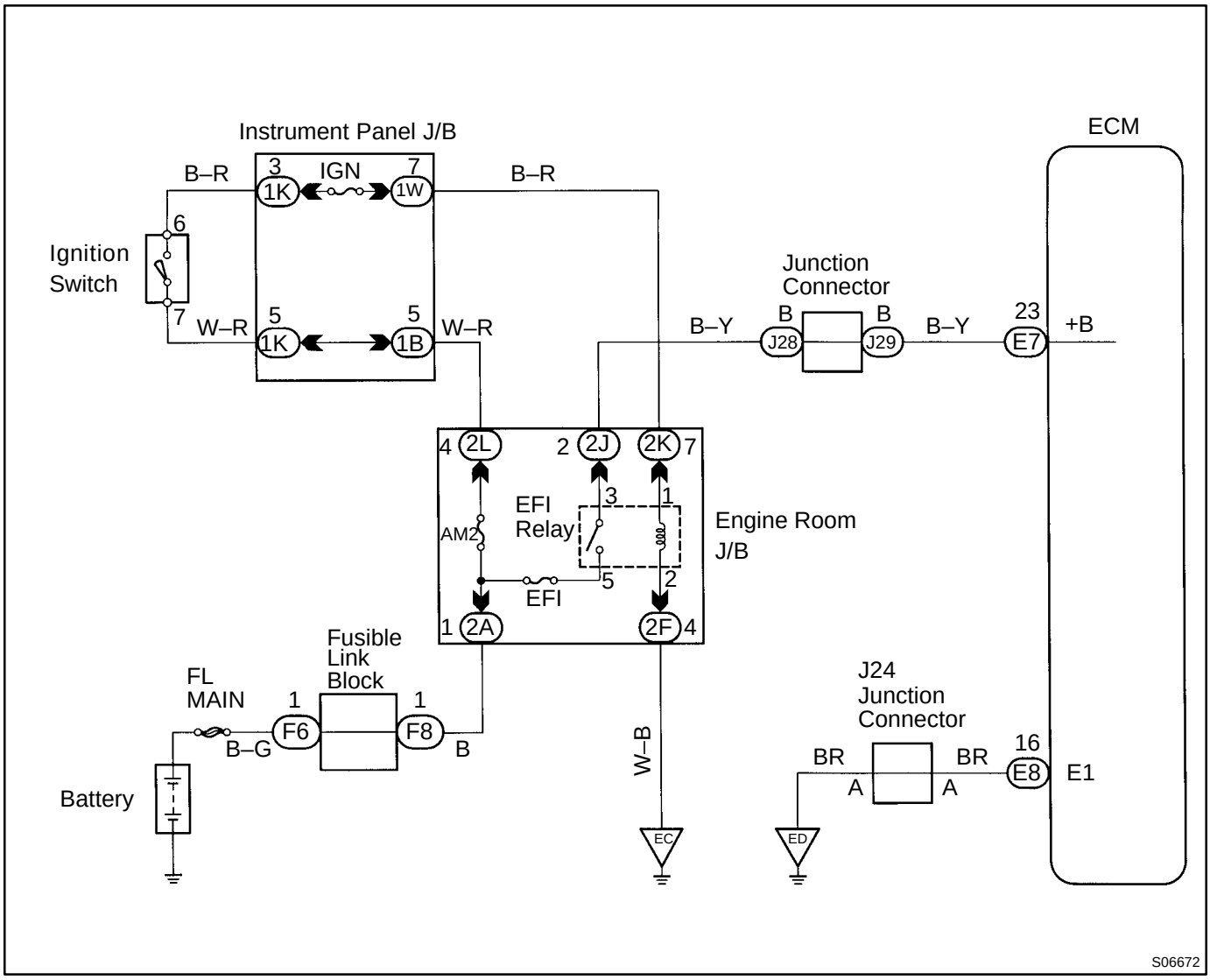
DI0A8–01

ECM Power Source Circuit

CIRCUIT DESCRIPTION

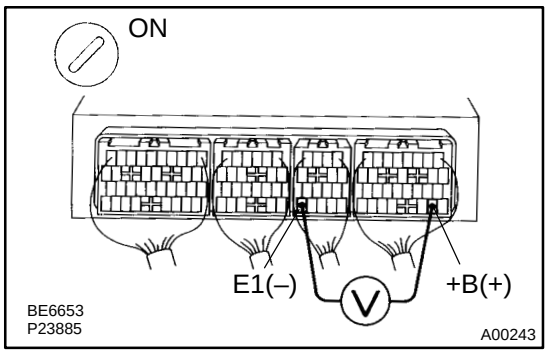
When the ignition switch is turned ON, battery positive voltage is applied to the coil, closing the contacts of the EFI main relay (Marking: EFI) and supplying power to the terminal +B of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals + B and E1 of ECM connectors.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals + B and E1 of ECM connectors.

OK:

Voltage: 9 ~ 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–22).**

NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–27).**

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

OK

3	**Check EFI main relay (Marking: EFI) (See page SF–47).**

NG	**Replace EFI main relay.**

OK

4	**Check EFI fuse (See page DI–126, DI–3).**

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

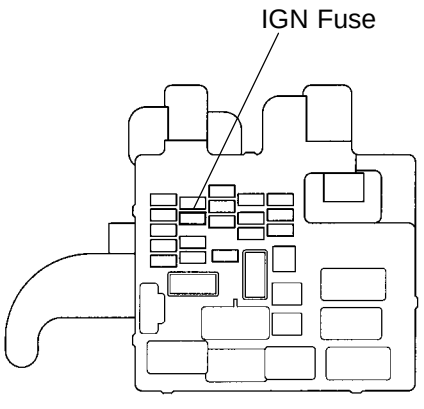
OK

5	**Check for open in harness and connector between EFI main relay (Marking: EFI) and battery, EFI main relay (Marking: EFI) and ECM (See page IN–27).**

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

OK

6	**Check IGN fuse.**



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

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

OK

7	**Check ignition switch (See page BE–19).**

NG → **Replace ignition switch.**

OK

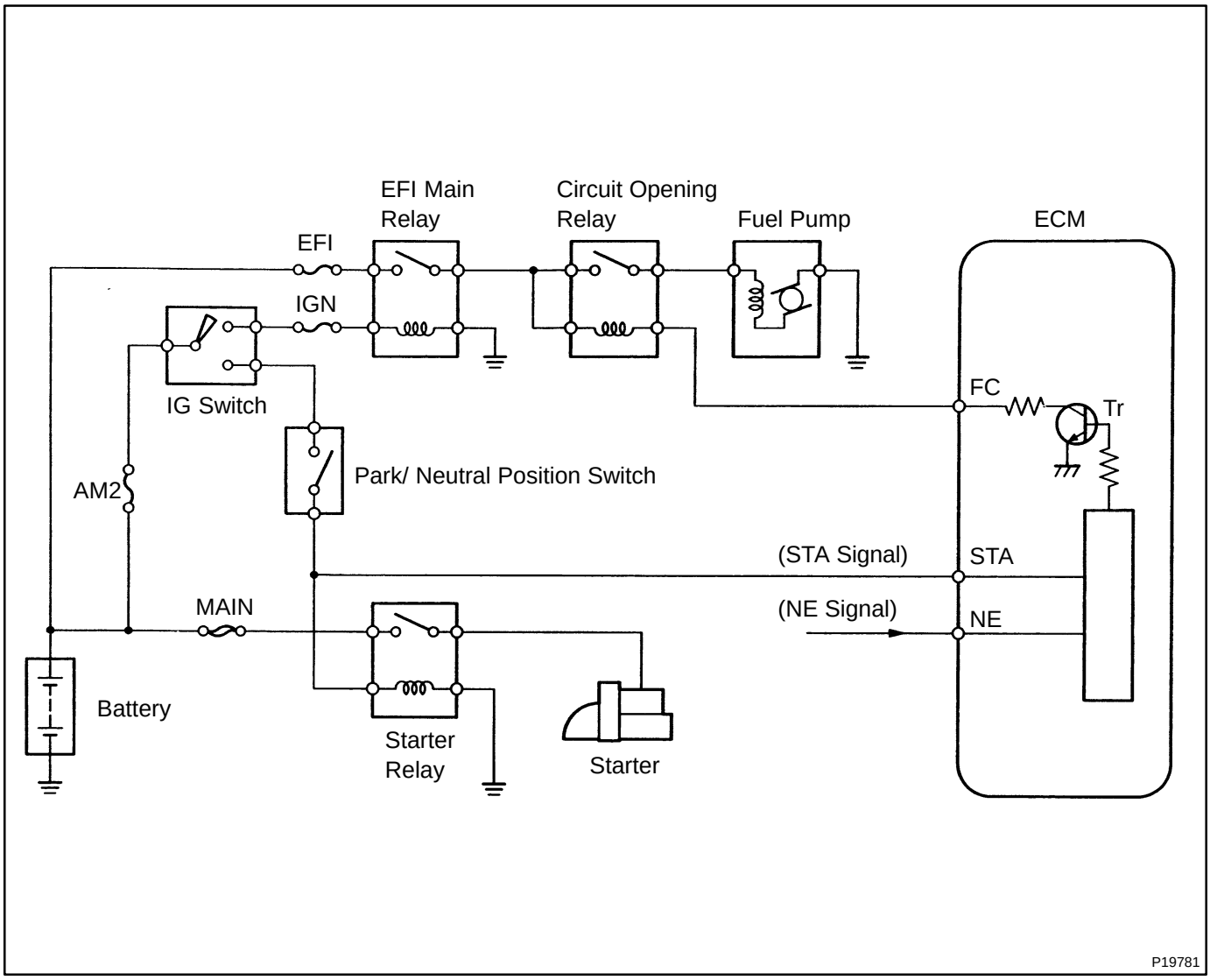
Check for open in harness and connector between IG switch and EFI main relay, EFI main relay and body ground (See page IN–27).

DI0A9–01

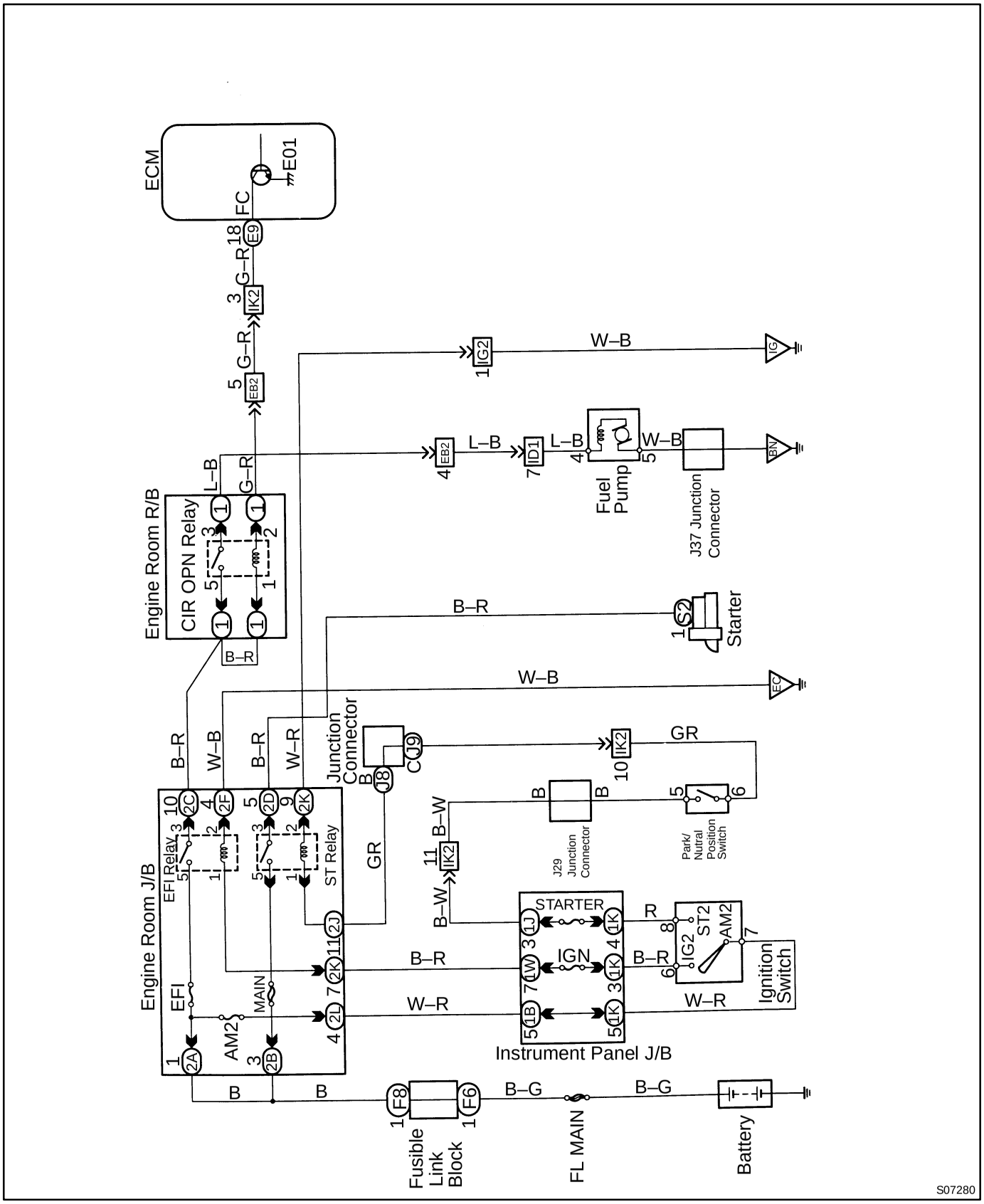
Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.



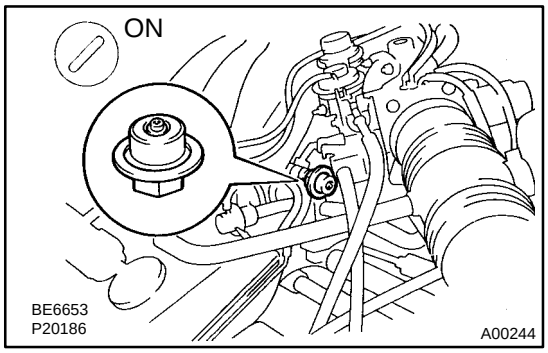
WIRING DIAGRAM



INSPECTION PROCEDURE

LEXUS hand–held tester

1	**Connect LEXUS hand–held tester and check operation of fuel pump.**



PREPARATION:

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

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

(c) Use ACTIVE TEST mode to operate the fuel pump.

CHECK:

Check that pulsation damper screw rises up when fuel pump is on by LEXUS hand–held tester.

OK:

The pulsation damper screw rises up.

OK	**Check for starter signal circuit (See page DI–132).**

NG

2	**Check for ECM power source circuit (See page DI–135).**

NG	**Repair or replace.**

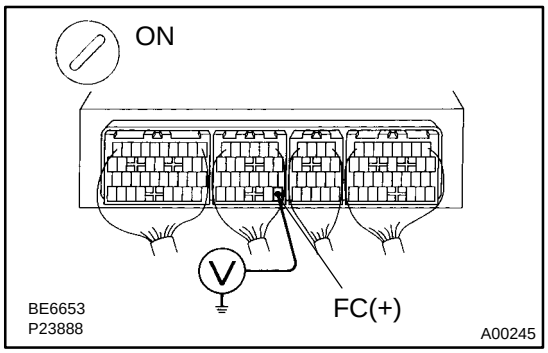
OK

3	**Check circuit opening relay (Marking: CIR OPN) (See page SF–48).**

NG	**Replace circuit opening relay.**

OK

4	**Check voltage between terminal FC of ECM and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–65).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal FC of ECM and body ground.

OK:

Voltage: 9 ~ 14 V

NG → **Check for open in harness and connector between EFI main relay and circuit opening relay, circuit opening relay and ECM.**

OK

5	**Check fuel pump (See page SF–6).**

NG → **Repair or replace fuel pump.**

OK

6	**Check for open in harness and connector between circuit opening relay (Marking:CIR OPN) and fuel pump, fuel pump and body ground (See page IN–27).**

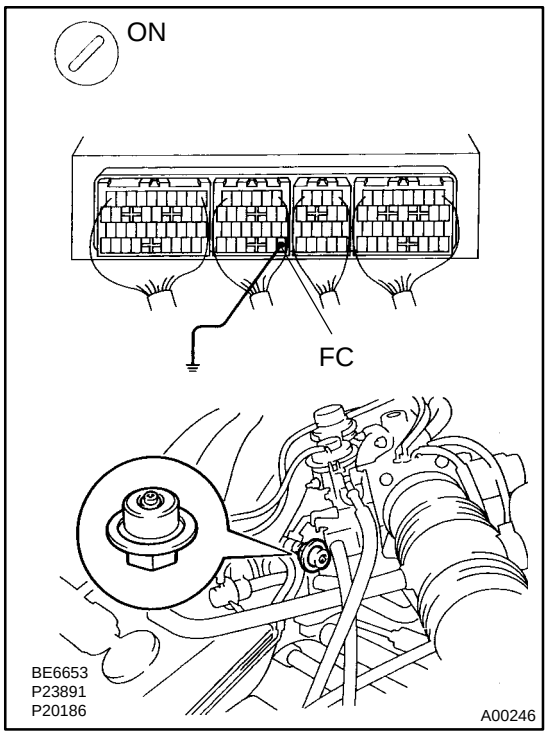
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–27).

OBD II scan tool (excluding LEXUS hand–held tester)

1	**Check operation of fuel pump.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

(a) Connect between terminal FC of ECM and body ground.

(b) Check that pulsation damper screw rises up when connect between terminal FC of ECM and body ground.

OK:

The pulsation damper screw rises up.

OK → **Check for starter signal circuit (See page DI–132).**

NG

2	**Check for ECM power source circuit (See page DI–135).**

NG → **Repair or replace.**

OK

3	**Check circuit opening relay (Marking: CIR OPN) (See page SF–48).**

NG → **Replace circuit opening relay.**

OK

4	Check voltage between terminal FC of ECM and body ground (See page DI–138, DI–14).

NG → Check for open in harness and connector between EFI main relay and circuit opening relay, circuit opening relay and ECM.

OK

5	Check fuel pump (See page SF–6).

NG → Repair or replace fuel pump.

OK

6	Check for open in harness and connector between circuit opening relay and fuel pump, fuel pump and body ground (See page IN–27).

NG → Repair or replace harness or connector.

OK

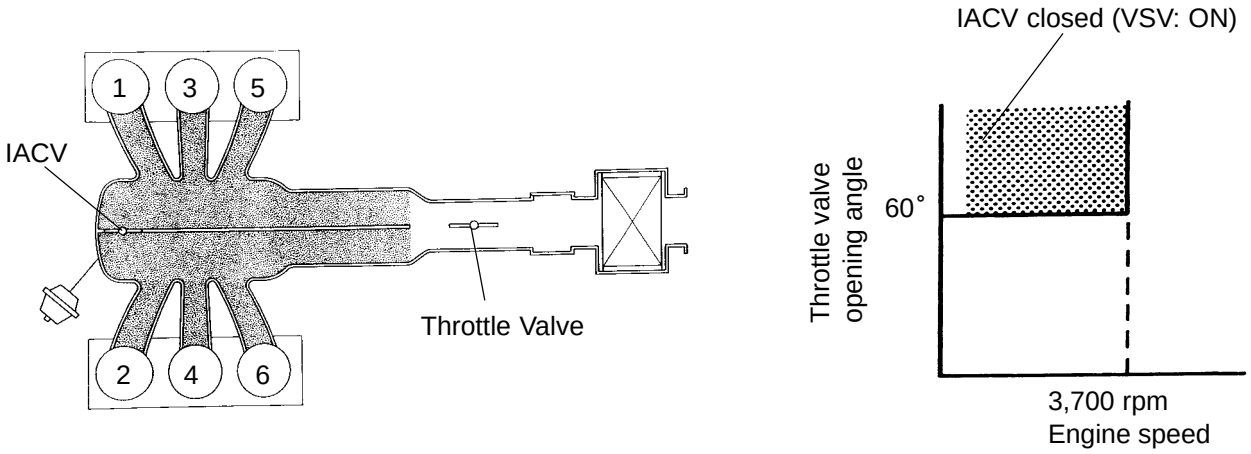
Check and replace ECM (See page IN–27).

DI0AA–01

IACV Control VSV Circuit

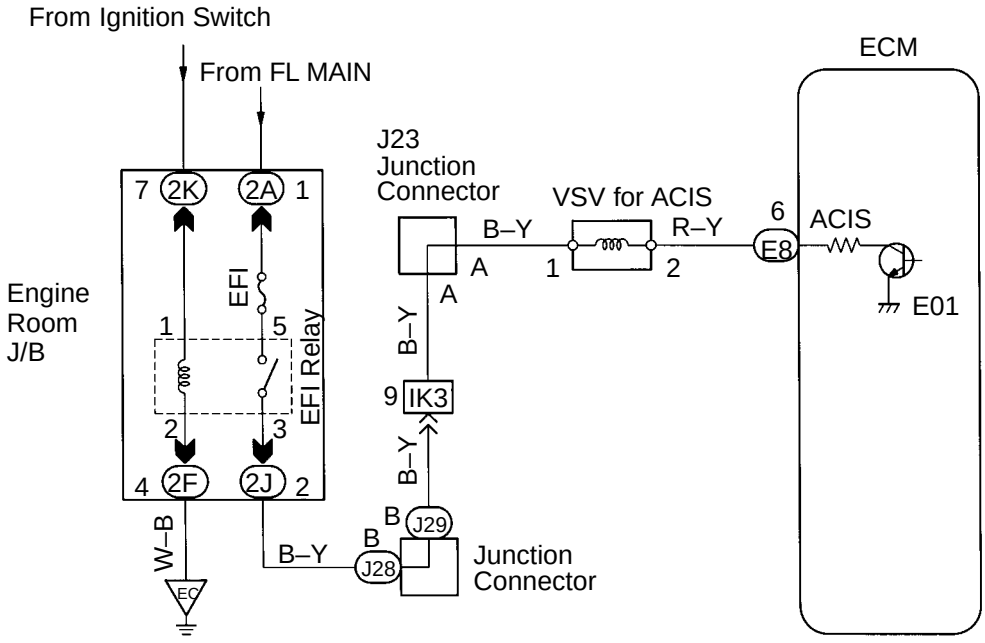
CIRCUIT DESCRIPTION

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 3,700 rpm or less and the throttle valve opening angle is 60° or more, the ECM turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.



FI7011 FI6570 A00306

WIRING DIAGRAM

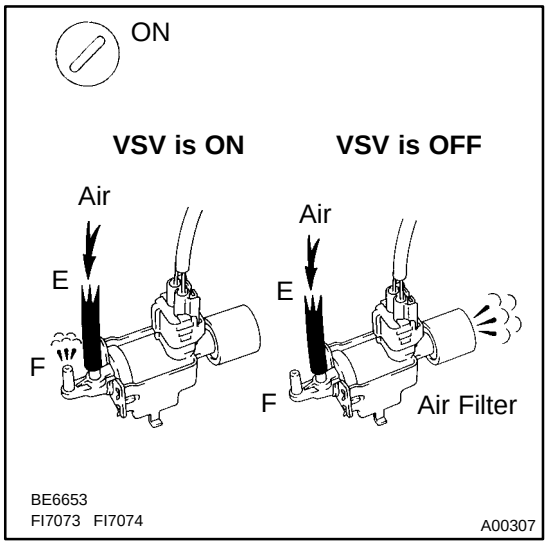


S06464

INSPECTION PROCEDURE

LEXUS hand–held tester

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



PREPARATION:

(a) Remove the fuse cover on the instrument panel.
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Turn ignition switch ON and LEXUS hand–held tester main switch ON.
(d) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check operation of VSV when VSV is operated by the LEXUS 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 SF–40).**

NG

2	**Check VSV for ACIS (See page SF–54).**

NG	**Replace VSV for ACIS.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–27).**

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

OK

Check and replace ECM (See page IN–27).

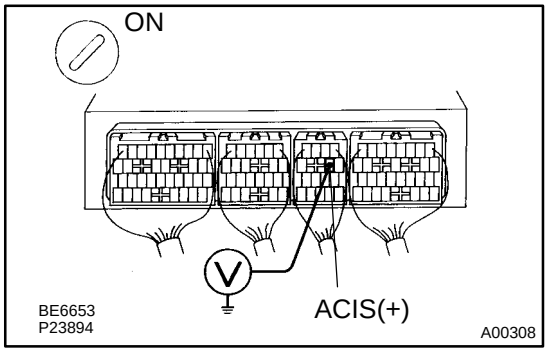
OBD II scan tool (excluding LEXUS hand–held tester)

1	**Check VSV for ACIS (See page SF–54).**

NG → **Replace VSV for ACIS.**

OK

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



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal ACIS of ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

NG → **Check for open and short in harness and connector between EFI main relay and ECM (See page IN–27).**

OK

3	Check for vacuum tank (See page SF–45).

NG → Repair or replace.

OK

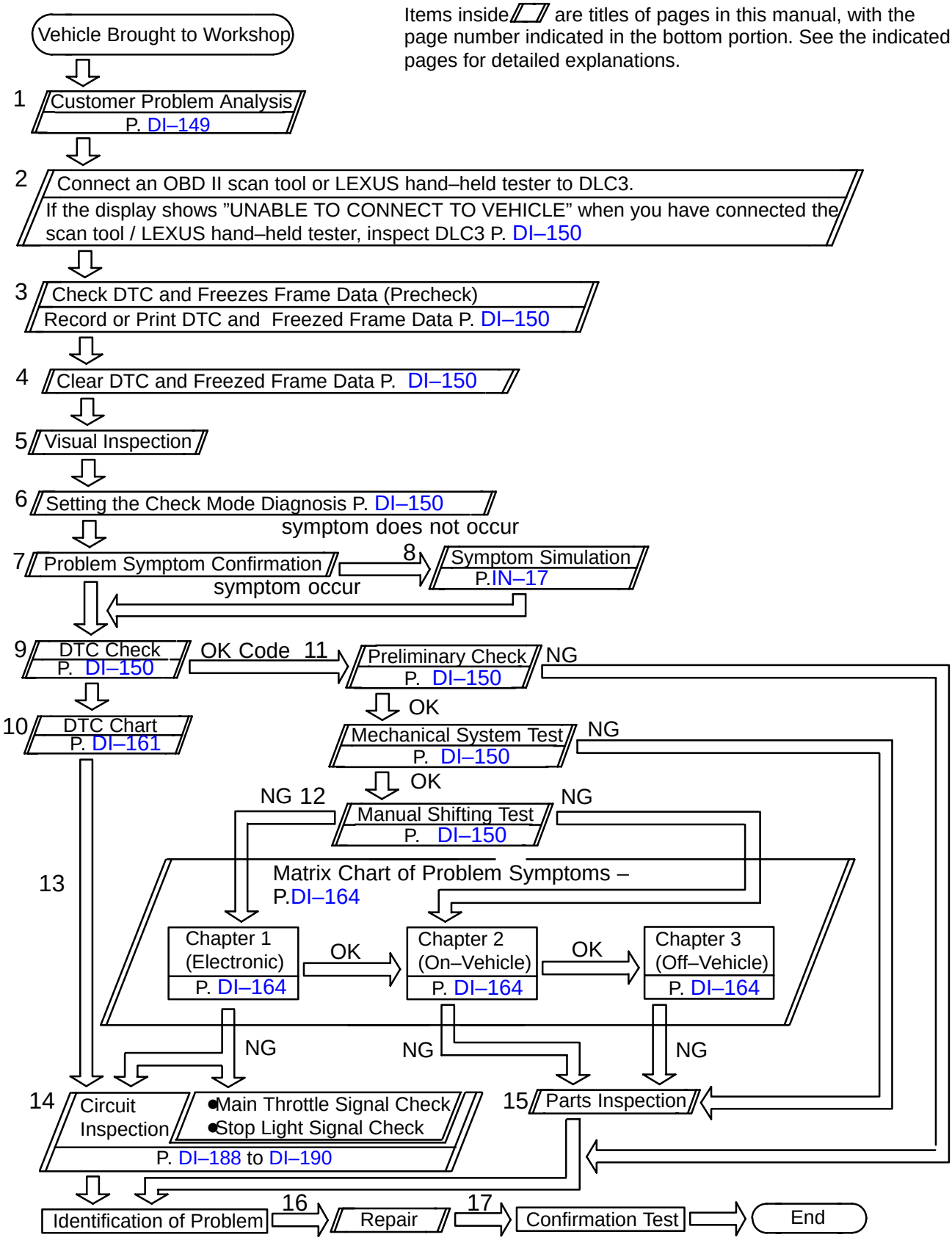
Check and replace ECM (See page IN–27).

AUTOMATIC TRANSAXLE

HOW TO PROCEED WITH TROUBLESHOOTING

DI0C9–01

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.



DI0CB–02

CUSTOMER PROBLEM ANALYSIS CHECK

Transaxle Control System Check Sheet	Inspector's Name :

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

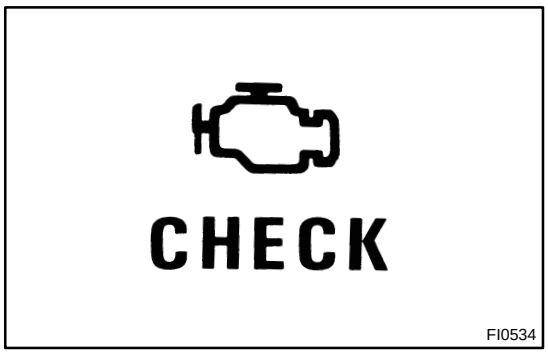
Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

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

Check Item	Malfunction Indicator Lamp	☐ Normal	☐ Remains ON

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

DI0CF–01



PRE–CHECK

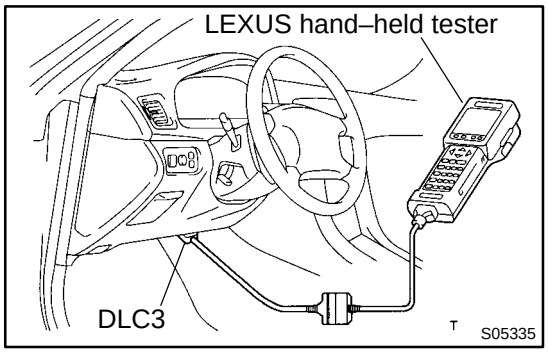
1. DIAGNOSIS SYSTEM

(a) DESCRIPTION

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

OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI–14).

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



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

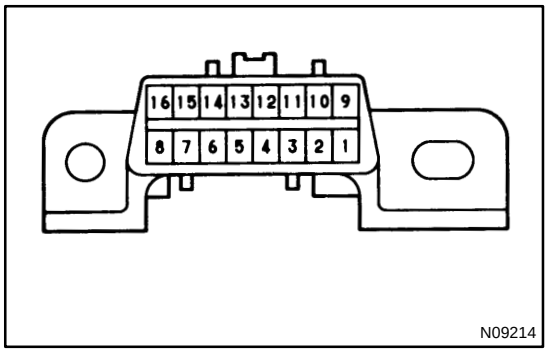
DTCs include SAE controlled codes and Manufacturer controlled codes.

SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–161).

The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up and for a malfunction that is only detected once or momentarily.

(LEXUS hand–held tester) (See page DI–150)

*2 trip detection logic:
When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up .

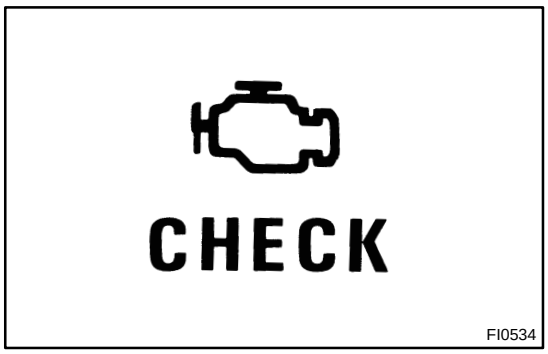


(b) DLC3 INSPECTION
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

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

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or LEX-US 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.

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



2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) MIL CHECK

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

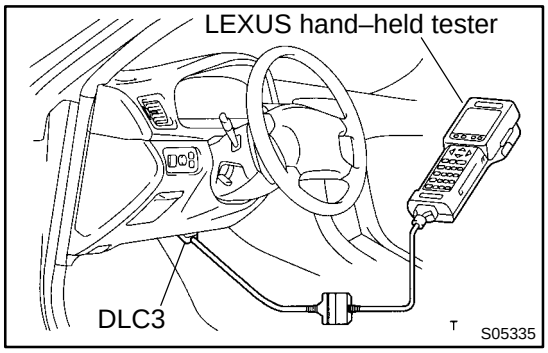
HINT:If the MIL does not light up, troubleshoot the combination meter (See page BE–58).

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

(b) DTC CHECK

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

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



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

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

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

(5) See page DI–161 to confirm the details of the DTCs.

NOTICE:

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

3. INSPECT DIAGNOSIS (CHECK MODE)

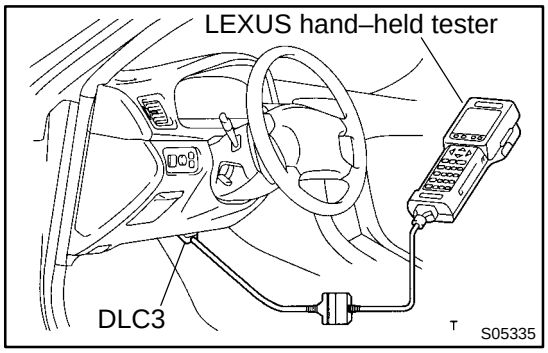
LEXUS hand–held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

(a) DTC CHECK

(1) Check the initial conditions.
- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- transaxle in P position.
- Air conditioning switched off.

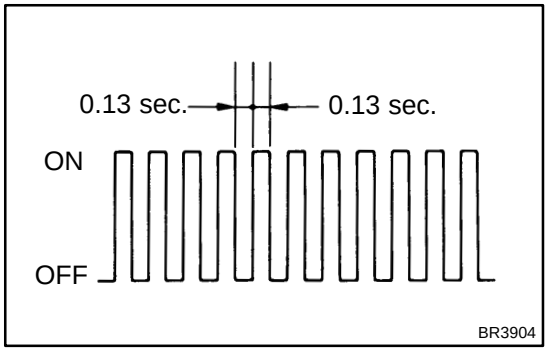
(2) Turn the ignition switch OFF.

(3) Prepare a LEXUS hand–held tester.



(4) Connect the LEXUS hand–held tester to DLC3 at the lower of the instrument panel.

(5) Turn the ignition switch ON and switch the LEXUS hand–held tester ON.



(6) Switch the LEXUS hand–held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out after the engine starts).

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

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

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

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

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

(b) DTC CLEARANCE

The following actions will erase the DTC and freezed frame data. Operating an OBD II scan tool (complying with SAE J1978) or LEXUS hand–held tester to erase the codes.

(See the OBD II scan tool's instruction book for operating instructions.)

4. ROAD TEST

NOTICE:Perform the test at normal operating ATF temperature 50 – 80 ˚C (122 – 176 ˚F).

(a) D POSITION TEST

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

(1) Check up–shift operation.

1 → 2, 2 → 3 and 3 → O/D up–shift takes place, at the shift point shown in the automatic shift schedule (See page SS–24).

HINT:

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

(2) Check for shift shock and slip.

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

(3) Check for abnormal noises and vibration.

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

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

(4) Check kick–down operation.

While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick–down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick–downs conform to those indicated on the automatic shift schedule (See page SS–24).

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

(6) Check the lock–up mechanism.

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

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

(b) 2 POSITION TEST

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

(1) Check up–shift operation.

Check to see that the 1 → 2 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–24).

HINT:There is no O/D up–shift and lock–up in the 2 position.

(2) Check engine braking.

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

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

(c) L POSITION TEST

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

(1) Check no up–shift.

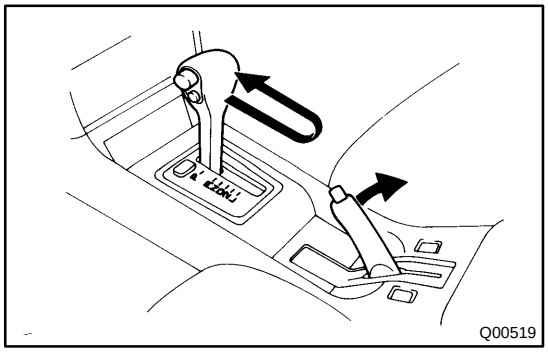
While running in the L position, check that there is no up–shift to 2nd gear.

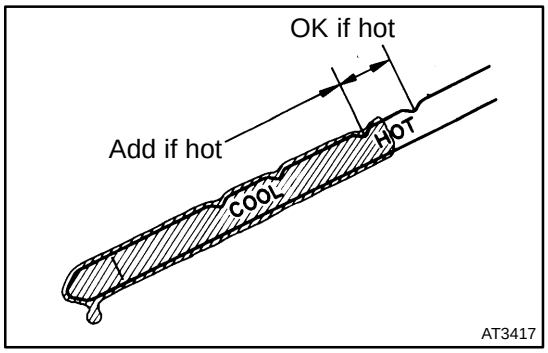
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

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

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

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


Q00519



AT3417

5. BASIC INSPECTION

(a) CHECK FLUID LEVEL

HINT:

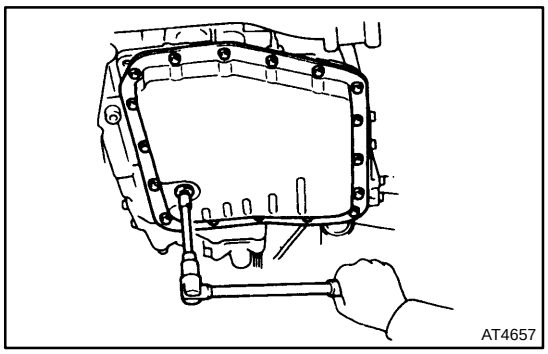
- Drive the vehicle so that the engine and transaxle are at normal operating temperature.
  Fluid temp.: 70 – 80 ˚C (158 – 176 ˚F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

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

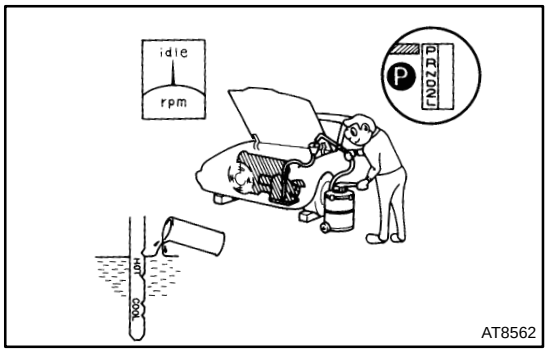
Fluid type: ATF D–II or DEXRON®III (DEXRON®II)

NOTICE:do not overfill.

(b) CHECK FLUID CONDITION
If the level is at the low side, add new fluid.


AT4657

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

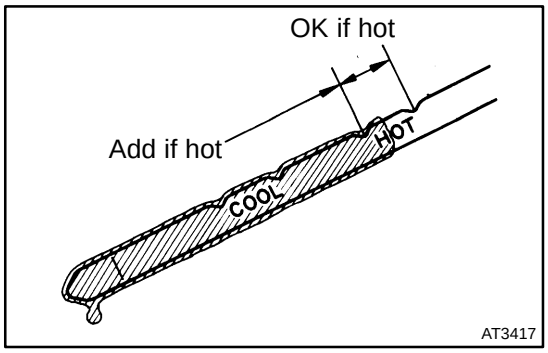


AT8562

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

Fluid type: ATF D–II or DEXRON®III (DEXRON®II)
Capacity: 3.5 liters (3.7 US qts, 3.1 Imp. qts)

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

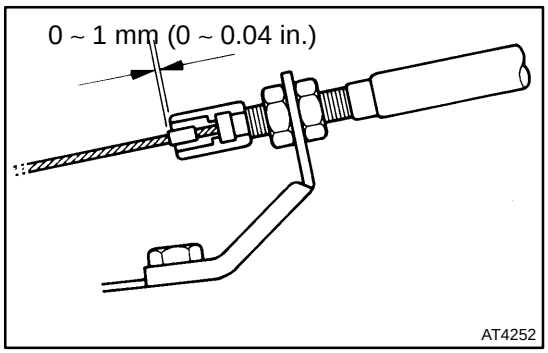


AT3417

(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 FLUID LEAKS
Check for leaks in the transaxle.
If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other parts.

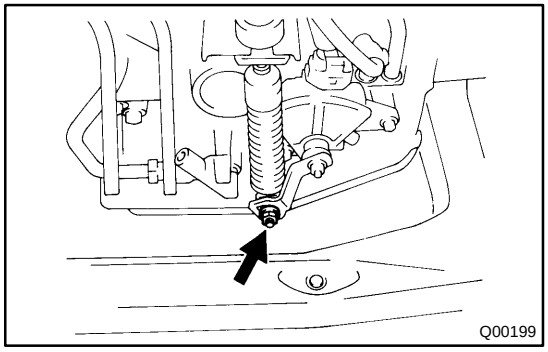


AT4252

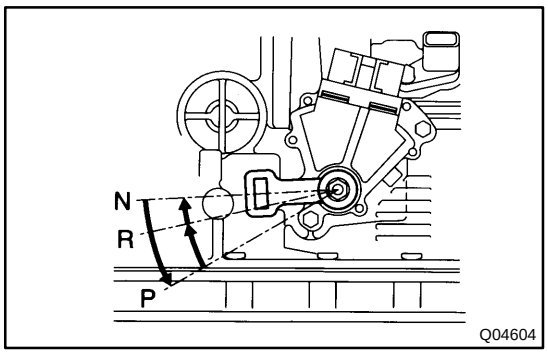
(e) INSPECT AND ADJUST THROTTLE CABLE
(1) Check that the accelerator pedal is fully released.
(2) Check that the inner cable is not slack.
(3) Measure the distance between the outer cable end and stopper on the cable.

Standard distance: 0 – 1 mm (0 – 0.04 in.)

If the distance is not standard, adjust the cable by the adjusting nuts.


Q00199

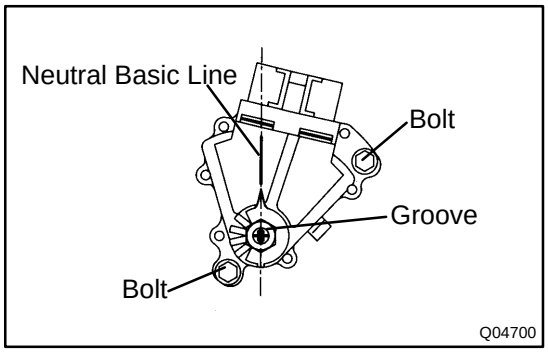
(f) INSPECT AND ADJUST SHIFT LEVER POSITION
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is not aligned with the correct position.
If the indicator is not aligned with the correct position, carry out the following adjustment procedures.
(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully rearward.



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

Torque:13 N·m (130 kgf·cm, 9 ft·lbf)

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



(g) INSPECT AND ADJUST PARK/NEUTRAL POSITION

Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

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

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

Torque:5.4 N·m (55 kgf·cm, 48 in·lbf)

For continuity inspection of the park/neutral position switch, see page DI–185.

(h) CHECK IDLE SPEED

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

6. MECHANICAL SYSTEM TESTS

(a) MEASURE STALL SPEED

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

NOTICE:

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

(1) Chock the 4 wheels.
(2) Connect an OBD II scan tool or LEXUS hand–held tester to DLC3.
(3) Fully apply the parking brake.
(4) Keep your left foot pressed firmly on the brake pedal.
(5) Start the engine.
(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,600 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,600 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R positions	●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 position	●Line pressure too low ●Forward clutch slipping ●No.2 one–way clutch not operating properly ●O/D clutch slipping
(c) Stall speed high in R position	●Line pressure too low ●Direct clutch slipping ●1st and reverse brake slipping ●O/D clutch slipping
(d) Stall speed high in D and R positions	●Line pressure too low ●Improper fluid level ●O/D one–way clutch not operating properly

(b) MEASURE TIME LAG

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

NOTICE:

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

(1) Connect an OBD II scan tool or LEXUS hand–held tester to DLC3.

(2) Fully apply the parking brake.

(3) Start the engine and check idle speed.

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

(4) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

In the same manner, measure the time lag for N → R.

Time lag:

N → D Less than 1.2 seconds

N → R Less than 1.5 seconds

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

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

7. HYDRAULIC TEST

(a) MEASURE LINE PRESSURE

NOTICE:

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

(1) Warm up the ATF.

(2) Remove the test plug on the transaxle case front left side and connect SST.
(See page AX–18 for the location to connect SST)

SST 09992–00094 (09992–00230)

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

(4) Connect an OBD II scan tool or LEXUS hand–held tester to DLC3.

(5) Start the engine and check idling speed.

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

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

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

(9) In the same manner, do the test in R position.

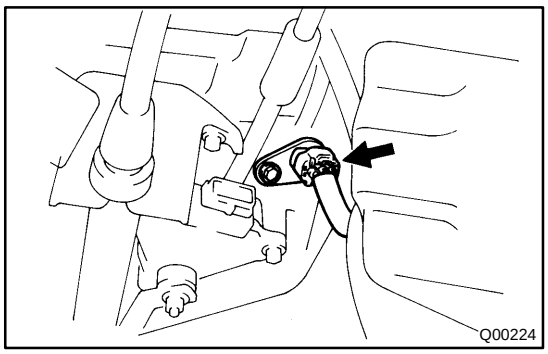
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	401 – 461 (4.1 – 4.7, 58 – 66)	804 – 882 (8.2 – 9.0, 117 – 128)
Stall	1,138 – 1,236 (11.6 – 12.6, 165 – 179)	1,716 – 1,854 (17.5 – 18.9, 249 – 269)

If the measured pressure is not up to specified value, recheck the throttle cable adjustment and retest.

Evaluation

Problem	Possible cause
If the measured values at all position are higher	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective
If the measured values at all position are lower	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective ●Oil pump defective ●O/D direct clutch defective
If pressure is low in the D position only	●D position circuit fluid leakage ●Forward clutch defective
If pressure is low in the R position only	●R position circuit fluid leakage ●Direct clutch defective ●1st and reverse brake defective



8. MANUAL SHIFTING TEST

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

(a) DISCONNECT SOLENOID WIRE

(b) INSPECT MANUAL DRIVING OPERATION

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

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

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

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

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

(c) CONNECT SOLENOID WIRE

(d) CANCEL OUT DTC (See page DI–150).

DI0CH–01

DIAGNOSTIC TROUBLE CODE CHART

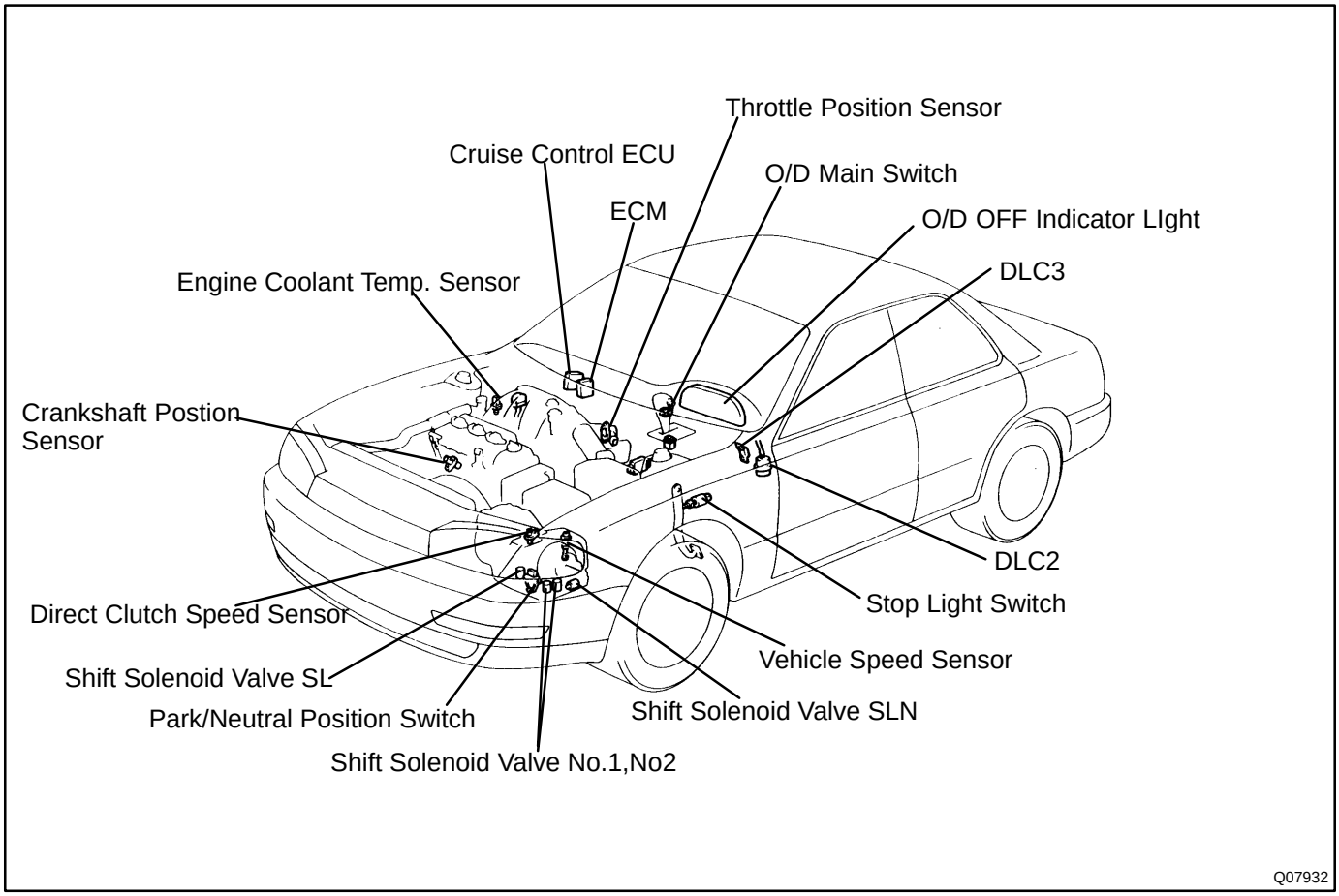
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

* : –...MIL does not light /● ...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0500 (DI–106)	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)	□Open or short in No.1 vehicle speed sensor circuit □No.1 vehicle speed sensor □Combination meter □ECM	●	○
P0750 (DI–169)	Shift Solenoid A Malfunction (Shift Solenoid Valve No.1)	□Shift solenoid valve No.1 is stuck open or closed □Valve body is blocked up or stuck	●	○
P0753 (DI–170)	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve No.1)	□Open or short in shift solenoid valve No.1 circuit □Shift solenoid valve No.1 □ECM	●	○
P0755 (DI–169)	Shift Solenoid B Malfunction (Shift Solenoid Valve No.2)	□Shift solenoid valve No.2 is stuck open or closed □Valve body is blocked up or stuck	●	○
P0758 (DI–170)	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve No.2)	□Open or short in shift solenoid valve No.2 circuit □Shift solenoid valve No.2 □ECM	●	○
P0770 (DI–174)	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)	□Shift solenoid valve SL is stuck open or closed □Valve body is blocked up or stuck □Lock–up clutch	●	○
P0773 (DI–176)	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)	□Open or short in shift solenoid valve SL circuit □Shift solenoid valve SL □ECM	●	○
P1520 (DI–179)	Stop Light Switch Signal Malfunction	□Open or short in stop light switch circuit □Stop light switch □ECM	●	○
P1705 (DI–180)	NC2 Revolution Sensor Circuit Malfunction (Direct Clutch Speed Sensor)	□Open or short in direct clutch speed sensor circuit □Direct clutch speed sensor □ECM	●	○
P1765 (DI–182)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (Shift Solenoid Valve SLN)	□Open or short in shift solenoid valve SLN circuit □Shift solenoid valve SLN □ECM	●	○
P1780 (DI–185)	Park/Neutral Position Switch Malfunction	□Short in park/neutral position switch circuit □Park/neutral position switch □ECM	●	○

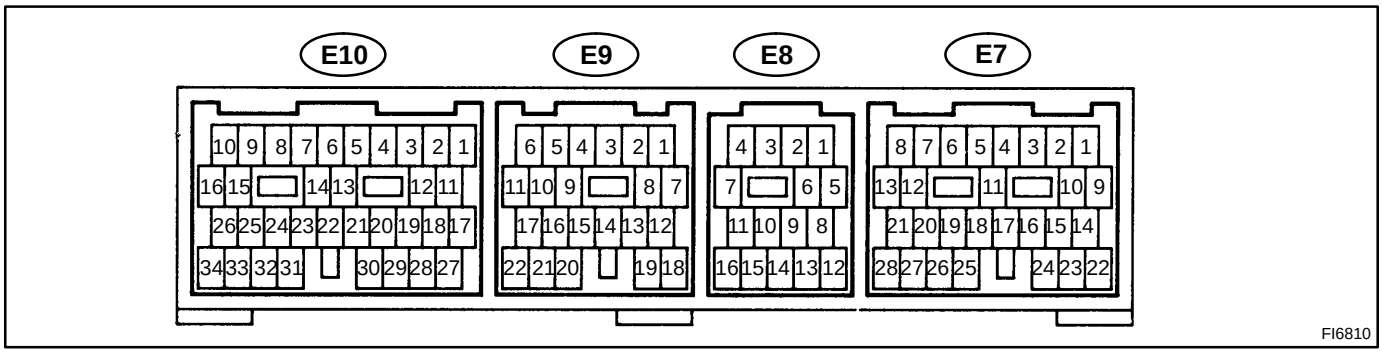
DI0CJ–01

PARTS LOCATION



DI0CL–01

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SPD ↔ E1 (E7–12 ↔ E8–16)	V–W ↔ BR	IG ON and Vehicle stationary	Below 1
		IG ON and Turn one rear wheel slowly	Pulse signal is output Below 1 ↔ 5
S1 ↔ E1 (E10–11 ↔ E8–16)	V ↔ BR	IG ON	10 ~ 14
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
S2 ↔ E1 (E10–17 ↔ E8–16)	L–B ↔ BR	IG ON	Below 1
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
SL ↔ E1 (E10–27 ↔ E8–16)	P–L ↔ BR	IG ON	Below 1
		Vehicle driving under lock–up position	10 ~ 14
$NC2^{+}$ ↔ $NC2^{-}$ (E9–9 ↔ E9–4)	Y–B ↔ W–L	Engine is running	Pulse signal is output Below 1 ↔ 4 ~ 5
SLN^{+} ↔ SLN^{-} (E10–2 ↔ E 8–2)	B–O ↔ LG–R	IG ON	10 ~ 14
OD1 ↔ E1 (E7–7 ↔ E8–16)	Y–B ↔ BR	IG ON	5 ~ 6
OD2 ↔ E1 (E7–6 ↔ E8–16)	G–O ↔ BR	O/D main switch ON	10 ~ 14
		O/D main switch OFF	Below 1
L ↔ E1 (E7–1 ↔ E8–16)	Y ↔ BR	IG ON and Shift lever L position	10 ~ 14
		IG ON and Shift lever other than L position	Below 1
2 ↔ E1 (E7–10 ↔ E8–16)	O ↔ BR	IG ON and Shift lever 2 position	10 ~ 14
		IG ON and Shift lever other than 2 position	Below 1
R ↔ E1 (E7–15 ↔ E8–16)	R–B ↔ BR	IG ON and Shift lever R position	10 ~ 14
		IG ON and Shift lever other than R position	Below 1
NSW ↔ E1 (E10–14 ↔ E8–16)	B–W ↔ BR	IG ON and Shift lever P or N position	10 ~ 14
		IG ON and Shift lever other than P or N position	Below 1
STP ↔ E1 (E7–24 ↔ E8–16)	G–W ↔ BR	IG ON and Brake pedal is depressed	7.5 ~ 14
		IG ON and Brake pedal is released	Below 1

DI0CO–01

PROBLEM SYMPTOMS TABLE

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

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart

Chapter 2: On–vehicle Repair Matrix Chart

Chapter 3: Off–vehicle repair Matrix Chart

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

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	DI–164 DI–164
No up–shift (1st → 2nd)	1. Shift solenoid valve No.1 and No.2 circuit 2. Throttle position sensor circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Off–vehicle repair matrix chart 6. ECM	DI–170 DI–38 DI–106 DI–164 DI–164 IN–27
No up–shift (2nd → 3rd)	1. Shift solenoid valve No.1 and No.2 circuit 2. Throttle position sensor circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Off–vehicle repair matrix chart 6. ECM	DI–170 DI–38 DI–106 DI–164 DI–164 IN–27
No up–shift (3rd → O/D)	1. O/D main switch circuit 2. O/D cancel signal circuit 3. Shift solenoid valve No.1 and No.2 circuit 4. Throttle position sensor circuit 5. Vehicle speed sensor circuit 6. On–vehicle repair matrix chart 7. Off–vehicle repair matrix chart 8. ECM	DI–190 DI–188 DI–170 DI–38 DI–106 DI–164 DI–164 IN–27
No down–shift (O/D → 3rd)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. ECM	DI–38 DI–170 DI–106 DI–164 IN–27
No down–shift (3rd → 2nd)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. ECM	DI–38 DI–170 DI–106 DI–164 IN–27
No down–shift (2nd → 1st)	1. Throttle position sensor circuit 2. Shift solenoid valve No.1 and No.2 circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. ECM	DI–38 DI–170 DI–106 DI–164 IN–27

No lock–up or No lock–up off	1. Shift solenoid valve SL circuit 2. Stop light switch circuit 3. Throttle position sensor circuit 4. Vehicle speed sensor circuit 5. On–vehicle repair matrix chart 6. Off–vehicle repair matrix chart 7. ECM	DI–176 DI–123 DI–38 DI–106 DI–164 DI–164 IN–27
Shift point too high or too low	1. Throttle position sensor circuit 2. Vehicle speed sensor circuit 3. ECM	DI–38 DI–106 IN–27
Up–shift to 2nd while in L position	1. Park/neutral position switch circuit 2. ECM	DI–185 IN–27
Up–shift to 3rd while in L position	1. Park/neutral position switch circuit 2. ECM	DI–185 IN–27
Up–shift to O/D from 3rd	1. O/D main switch circuit 2. ECM	DI–190 IN–27
Up–shift to O/D from 3rd while engine is cold	1. Engine coolant temp. sensor circuit 2. ECM	DI–33 IN–27
Harsh engagement (N → D)	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart 3. ECM	DI–164 DI–164 IN–27
Harsh engagement (Lock–up)	1. Shift solenoid valve SL circuit 2. Throttle position sensor circuit 3. Vehicle speed sensor circuit 4. On–vehicle repair matrix chart 5. Off–vehicle repair matrix chart 6. ECM	DI–176 DI–38 DI–106 DI–164 DI–164 IN–27
Harsh engagement (Any driving position)	1. Throttle position sensor circuit 2. Vehicle speed sensor circuit 3. On–vehicle repair matrix chart 4. Off–vehicle repair matrix chart 5. ECM	DI–38 DI–106 DI–164 DI–164 IN–27
Slip or shudder (Forward and reverse)	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	DI–164 DI–164
No engine braking	1. On–vehicle repair matrix chart 2. Off–vehicle repair matrix chart	DI–164 DI–164
Poor acceleration	1. Throttle position sensor circuit 2. Vehicle speed sensor circuit 3. Shift solenoid valve No.1 and No.2 circuit 4. Shift solenoid valve SL circuit 5. Off–vehicle repair matrix chart 6. ECM	DI–38 DI–106 DI–170 DI–176 DI–164 IN–27
Large shift shock or engine stalls when starting off or stopping	1. Shift solenoid valve SL circuit 2. Off–vehicle repair matrix chart 3. ECM	DI–176 DI–164 IN–27

2. Chapter 2: On–Vehicle Repair (● : A541E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM530U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Manual valve 2. Throttle valve 3. Primary regulator valve 4. Off–vehicle repair matrix chart	● ● ● DI–164
Vehicle does not move in R position	1. Off–vehicle repair matrix chart	DI–164
No up–shift (1st → 2nd)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	● DI–164
No up–shift (2nd → 3rd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	● DI–164
No up–shift (3rd → O/D)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	● DI–164
No down–shift (O/D → 3rd)	1. 3–4 shift valve	●
No down–shift (3rd → 2nd)	1. 2–3 shift valve	●
No down–shift (2nd → 1st)	1. 1–2 shift valve	●
No lock–up or No lock–up off	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● DI–164
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle repair matrix chart	● DI–164
Harsh engagement (N → R)	1. C_2 accumulator 2. No.1 accumulator control valve 3. Off–vehicle repair matrix chart	● ● DI–164
Harsh engagement (N → L)	1. Low coast modulator valve	●
Harsh engagement (Lock–up)	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● DI–164
Harsh engagement (1st → 2nd → 3rd → O/D)	1. Throttle modulator valve 2. Cut back valve 3. Throttle valve	● ● ●
Harsh engagement (2nd → 3rd)	1. C_2 accumulator	●
Harsh engagement (3rd → O/D)	1. B_0 accumulator	●
Harsh engagement (O/D → 3rd)	1. C_0 accumulator 2. B_0 accumulator	● ●
Slip or shudder (Forward and reverse)	1. Throttle valve 2. Oil strainer 3. Off–vehicle repair matrix chart	● ● DI–164
No engine braking (1st: L position)	1. Low coast modulator valve 2. Off–vehicle repair matrix chart	● DI–164
No engine braking (2nd: 2 position)	1. 2nd coast modulator valve 2. Off–vehicle repair matrix chart	● DI–164
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	● ● ●

3. Chapter 3: Off–Vehicle Repair (● : A541E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM530U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Front and rear planetary gear 2. O/D planetary gear 3. O/D one–way clutch (F_0) 4. O/D direct clutch (C_0) 5. Forward clutch (C_1) 6. O/D brake (B_0)	● ● ● ● ● ●
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. Direct clutch (C_2) 3. O/D direct clutch (C_0) 4. 1st and reverse brake (B_3)	● ● ● ●
No up–shift (1st → 2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
No up–shift (2nd → 3rd)	1. Direct clutch (C_2)	●
No up–shift (3rd → O/D)	1. O/D brake (B_0)	●
No lock–up or No lock–up off	1. Torque converter clutch	●
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. No. 2 one–way clutch (F_2)	● ● ●
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	● ●
Harsh engagement (Lock–up)	1. Torque converter clutch	●
Slip or shudder (Forward position: After warm–up)	1. Torque converter clutch 2. O/D direct clutch (C_0) 3. Forward clutch (C_1) 4. O/D one–way clutch (F_0)	● ● ● ●
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3) 3. O/D direct clutch (C_0)	● ● ●
Slip or shudder (1st)	1. No. 2 one–way clutch (F_2)	●
Slip or shudder (2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
Slip or shudder (3rd)	1. Direct clutch (C_2)	●
Slip or shudder (O/D)	1. O/D brake (B_0)	●
No engine braking (1st ~ 3rd: D position)	1. 2nd brake (B_2)	●
No engine braking (1st: L position)	1. 1st and reverse brake (B_3)	●
No engine braking (2nd: 2 position)	1. 2nd coast brake (B_1)	●
Poor acceleration (All position)	1. Torque converter clutch 2. O/D planetary gear	● ●
Poor acceleration (O/D)	1. O/D direct clutch (C_0) 2. O/D planetary gear	● ●
Large shift shock or engine stalls when starting off or stopping	1. Torque converter clutch	●

DI0CQ–01

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)

See page DI–106.

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

SYSTEM DESCRIPTION

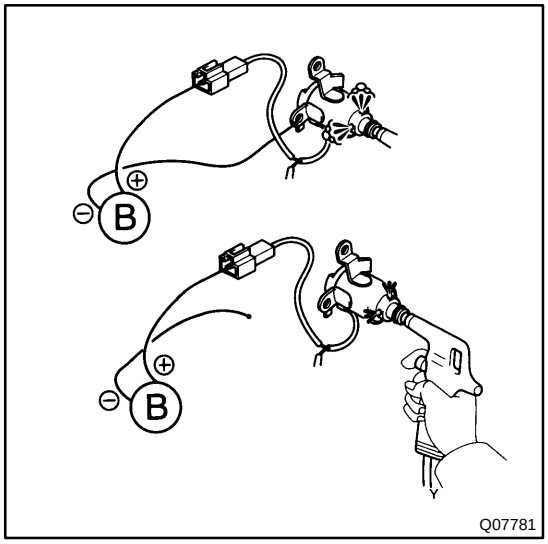
The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves and valve body.

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

Check the shift solenoid valve No.1 when DTC P0750 is output and check the shift solenoid valve No.2 when DTC P0755 is output.

INSPECTION PROCEDURE

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



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

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

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

OK →

Check the valve body (See page DI–164).

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

CIRCUIT DESCRIPTION

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

Fail Safe Function:

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

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

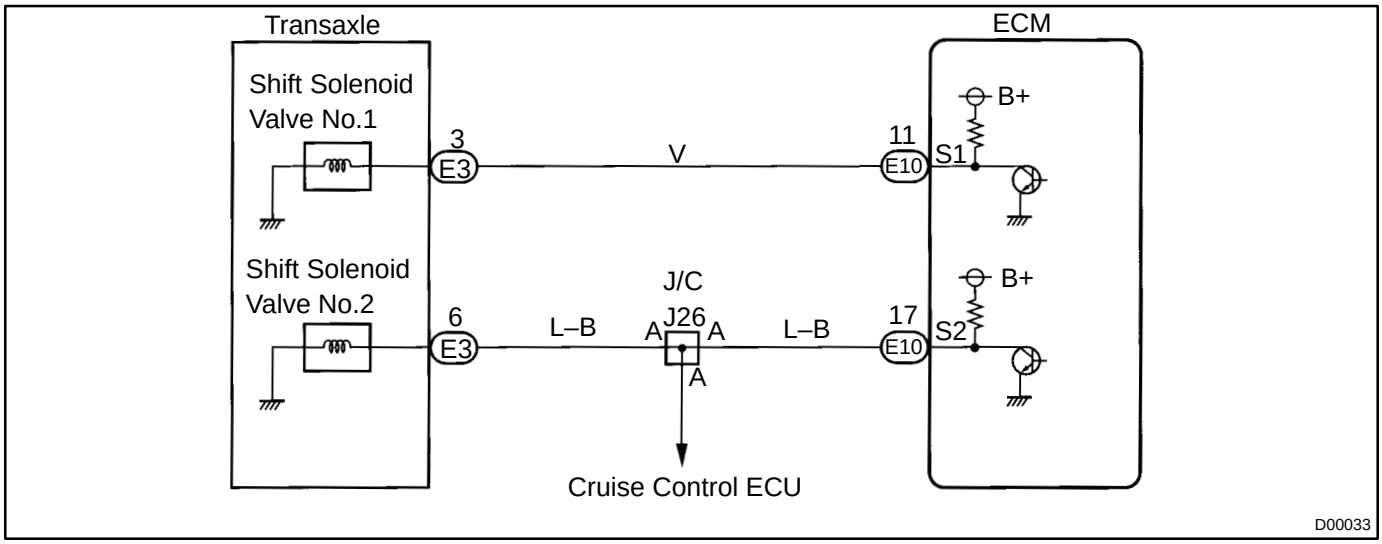
Position	NORMAL			SHIFT SOLENOID NO.1 MALFUNCTIONING			SHIFT SOLENOID NO.2 MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No.1	No.2		No.1	No.2		No.1	No.2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D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

X: Malfunctions

Check the shift solenoid valve No.1 when DTC P0753 is output and check the shift solenoid valve No.2 when DTC P0758 is output.

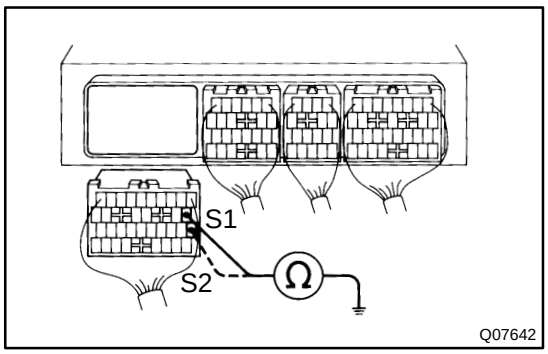
DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The ECM checks for an open or short circuit in the shift solenoid valves No.1 and No.2 circuit when it changes. The ECM records DTC P0753 or P0758 if condition (a) or (b) is detected once, but it does not light up MIL. After ECM detects condition a) or b) continuously 8 times or more in a trip and the MIL light up. (a) When the solenoid is energized, the solenoid resistance is 8 Ω or less and is counted. (b) When the solenoid is not energized, the solenoid resis tance is 100 kΩ or more and is counted.	●Open or short in shift solenoid valve No.1/No.2 circuit ●Shift solenoid valve No.1/No.2 ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

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

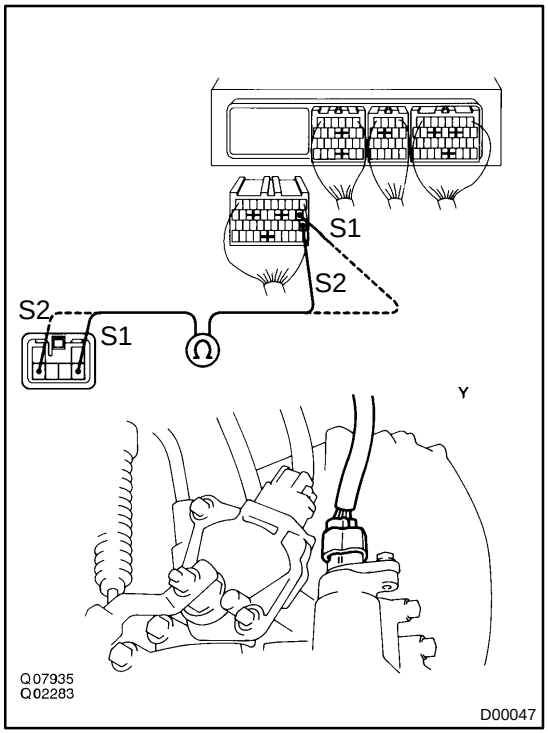


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal S1 or S2 of ECM and body ground.
OK:
Resistance: 11 ~ 15 Ω

OK → **Check and replace the ECM.**

NG

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



PREPARATION:

Disconnect the solenoid connector from the automatic transaxle.

CHECK:

Check the harness and connector between terminal S1 or S2 of ECM and terminal S1 or S2 of solenoid connector.

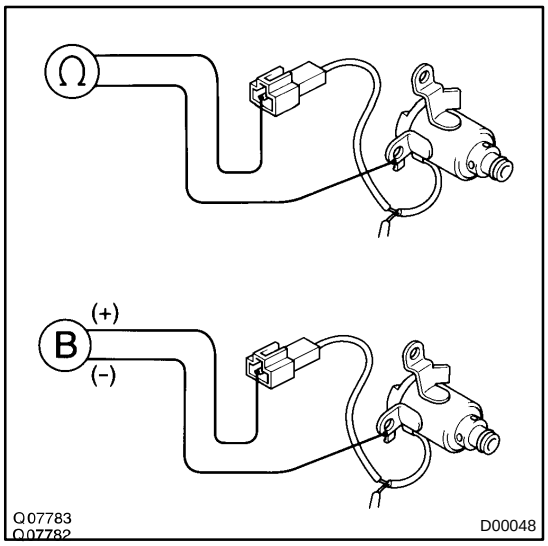
OK:

There is no open and no short circuit.

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

OK

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



PREPARATION:

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

CHECK:

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

OK:

(a) Resistance: 11 ~ 15 Ω
(b) The solenoid makes an operating noise.

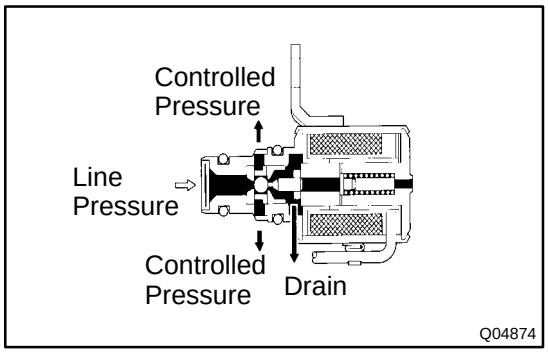
NG → **Replace the solenoid valve.**

OK

Repair or replace the solenoid wire.

DI0CU–01

DTC	P0770	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)



SYSTEM DESCRIPTION

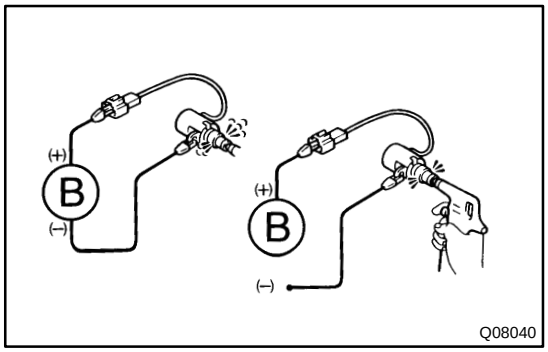
The ECM uses the signals from the Throttle position sensor, Air–flow meter and crankshaft position sensor to monitor the engagement condition of the lock–up clutch.

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

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

INSPECTION PROCEDURE

1	Check solenoid valve SL operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SL.

CHECK:

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

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

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

OK

2	Check valve body (See page DI–164).

NG → Repair or replace the valve body.

OK →

Replace the torque converter clutch (See page AX–18).

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

CIRCUIT DESCRIPTION

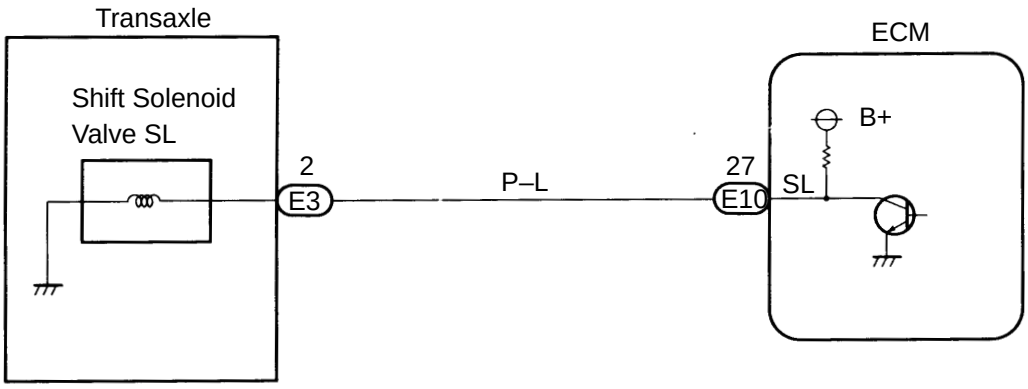
The shift solenoid valve SL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock–up relay valve, which then controls operation of the lock–up clutch.

Fail safe function

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

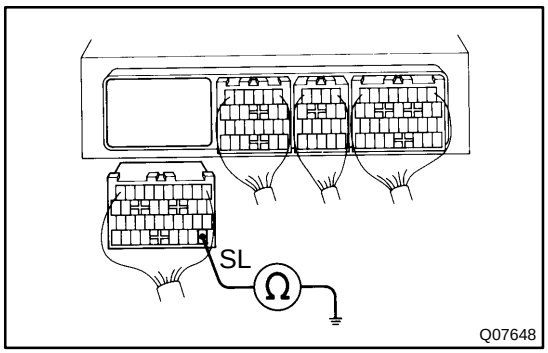
DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) are detected for 1 time. (2 trip detection logic) (a) Solenoid resistance is 8 Ω or less short circuit when sole noid is energized. (b) Solenoid resistance is 100 kΩ or more open circuit when solenoid is not energized.	●Open or short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

WIRING DIAGRAM



INSPECTION PROCEDURE

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

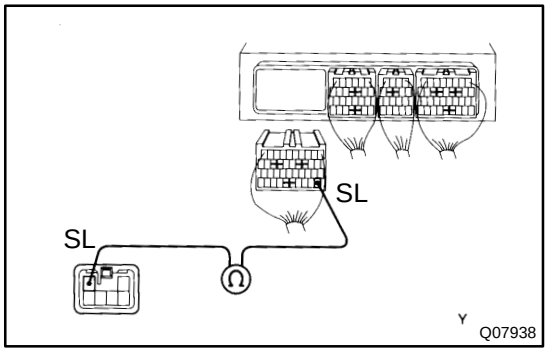


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal SL of ECM and body ground.
OK:
Resistance: 8 ~ 100,000 Ω

OK	**Check and replace the ECM.**

NG

2	**Check harness and connector between ECM and automatic transaxle solenoid connector (See page IN–27).**

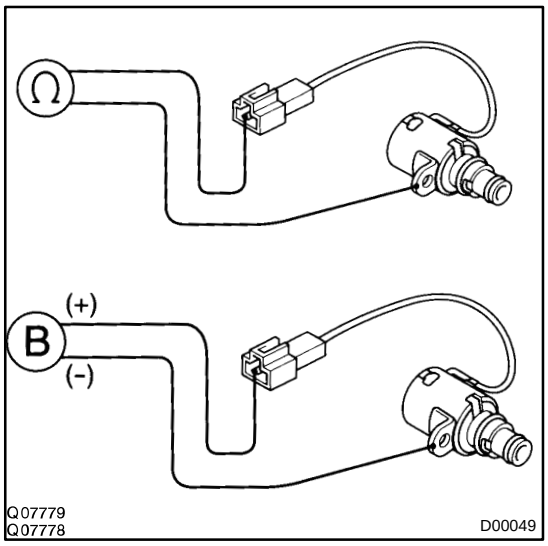


PREPARATION:
Disconnect the solenoid connector from the transaxle.
CHECK:
Check the harness and connector between terminal SL of ECM and terminal SL of solenoid connector.
OK:
There is no open or short circuit.

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

OK

3	Check shift solenoid valve SL.



PREPARATION:

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

CHECK:

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

OK:

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

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

OK

Check and replace or repair the solenoid wire.

DI0CW–04

DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to ECM during driving. (2 trip detection logic)	●Open or short in stop light switch circuit ●Stop light switch ●ECM

WIRING DIAGRAM

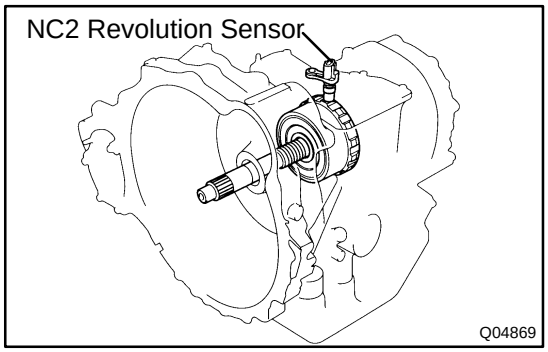
See page DI–123.

INSPECTION PROCEDURE

See page DI–123.

DTC	P1705	NC2 Revolution Sensor Circuit Malfunction (Direct Clutch Speed Sensor)

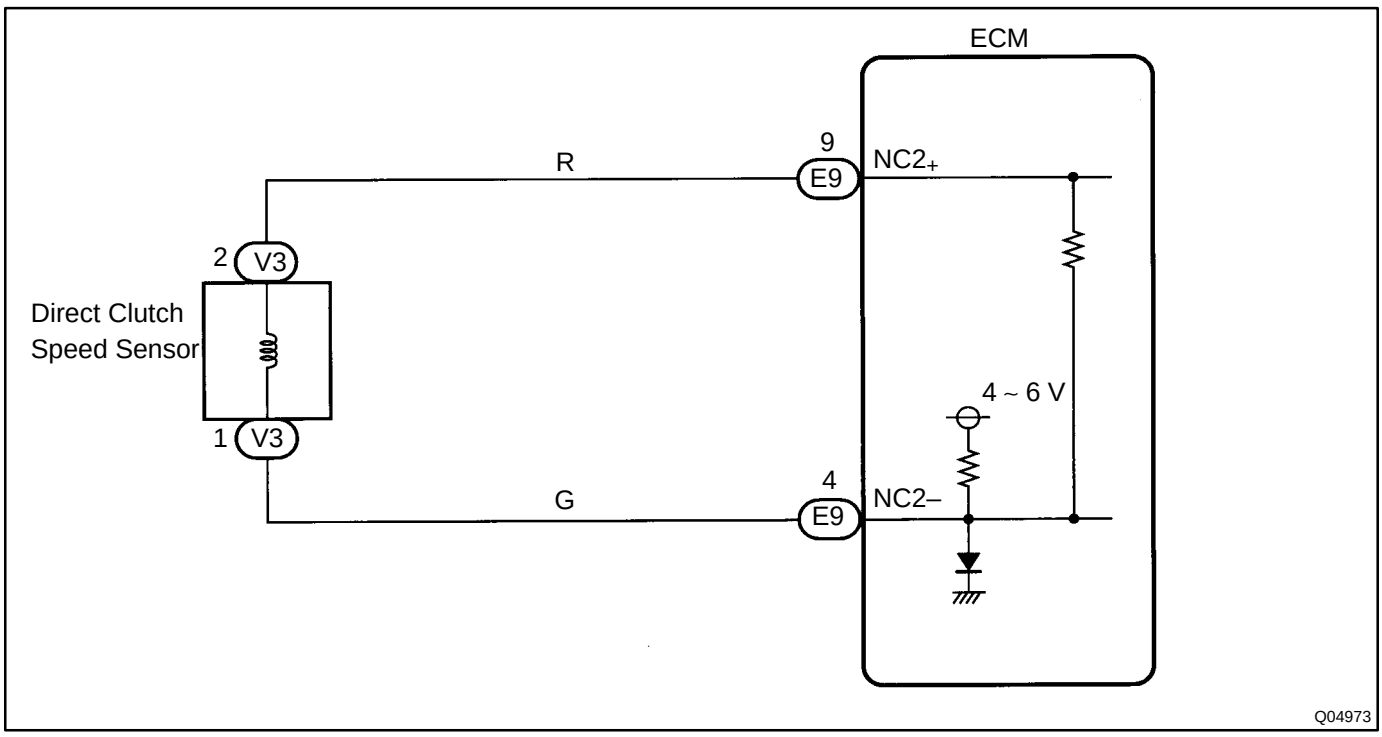
CIRCUIT DESCRIPTION



This sensor detects the rotation speed of the direct clutch drum. By comparing the direct clutch speed signal and the vehicle speed sensor signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

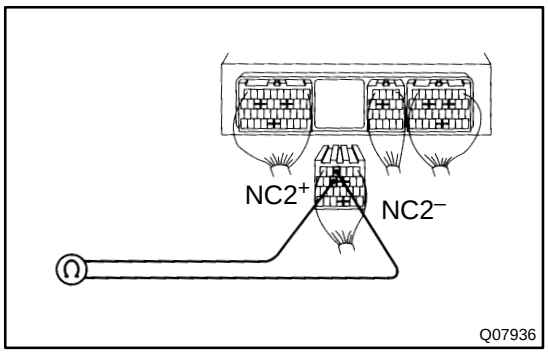
DTC No.	DTC Detecting Condition	Trouble Area
P1705	The ECM detects conditions (a), (b), (c), (d), (e) and f) continuity for 4 secs or more. (2 trip detection logic) (a) Vehicle speed : 32 km/h (20 mph) or more (b) 3rd or 4th gear (c) NC2 < 300 rpm (d) Park/neutral position switch: OFF (e) Solenoid valves and vehicle speed sensor are normal (f) L position: OFF	●Open or short in direct clutch speed sensor circuit ●Direct clutch speed sensor ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check resistance between terminals NC2+ and NC2– of ECM.

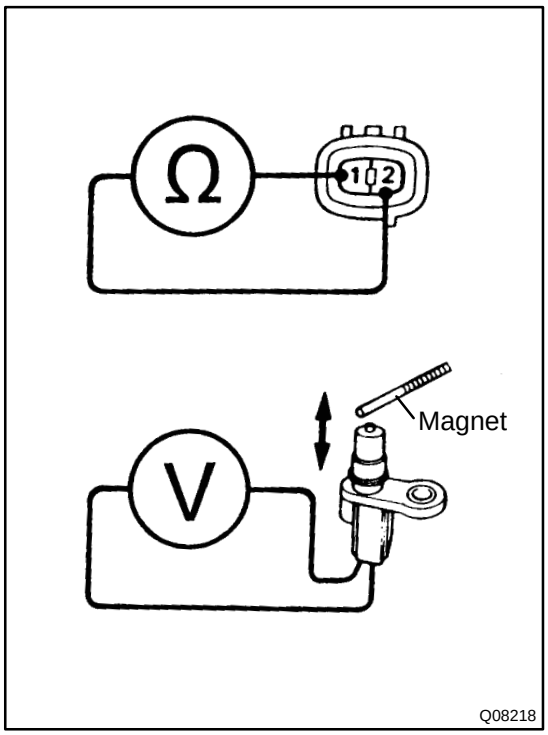


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Check resistance between terminals NC2+ and NC2– of ECM.
OK:
Resistance: 560 ~ 680 Ω

OK → **Check and replace the ECM.**

NG

2	Check No.2 vehicle speed sensor.



PREPARATION:
Remove the Direct clutch speed sensor from transaxle.
CHECK:
(a) Measure resistance between terminals 1 and 2 of speed sensor.
(b) Check voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.
OK:
(a) Resistance: 560 ~ 680 Ω
(b) Voltage is generated intermittently.
HINT:The voltage generated is extremely low.

NG → **Replace the Direct clutch speed sensor.**

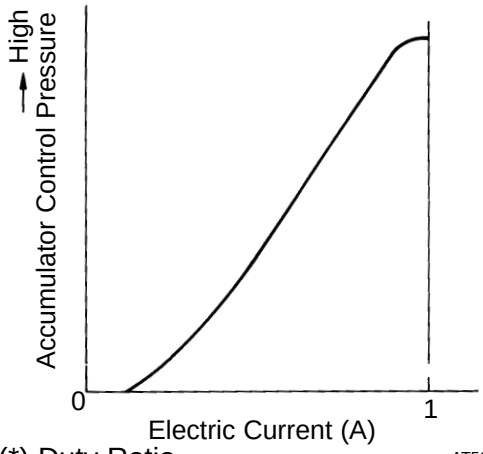
OK

Check and repair the harness and connector between ECM and Direct clutch speed sensor (See page IN–27).

DI0CY–01

DTC	P1765	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (Shift Solenoid Valve SLN)

CIRCUIT DESCRIPTION

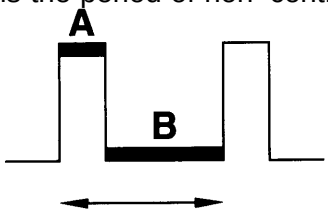


AT5608

The shift solenoid valve SLN controls the hydraulic pressure acting on the accumulator control valve when gears are shifted and performs smooth gear shifting.
The ECM determines optimum operating pressure according to the signals from the throttle position sensor, vehicle speed sensor and 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 ECM output signals, causing a momentary change 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.

(*) 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

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



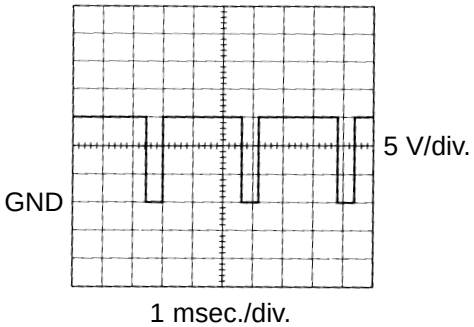
D00061 BE4056

D00060

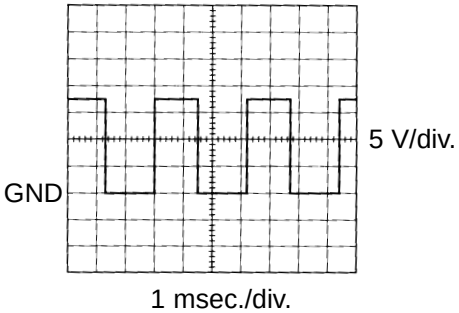
DTC No.	DTC Detecting Condition	Trouble Area
P1765	After the engine is warmed up, the current flow to the shift solenoid valve SLN for 1 sec or more under condition (a) or (b): (a) Engine speed: 500 rpm or more (b) Park/neutral position switch: ON (P or N position)	●Open or short in shift solenoid valve SLN circuit ●Shift solenoid valve SLN ●ECM

Reference

Waveform between terminals SLN^+ and SLN^- when engine is idling.



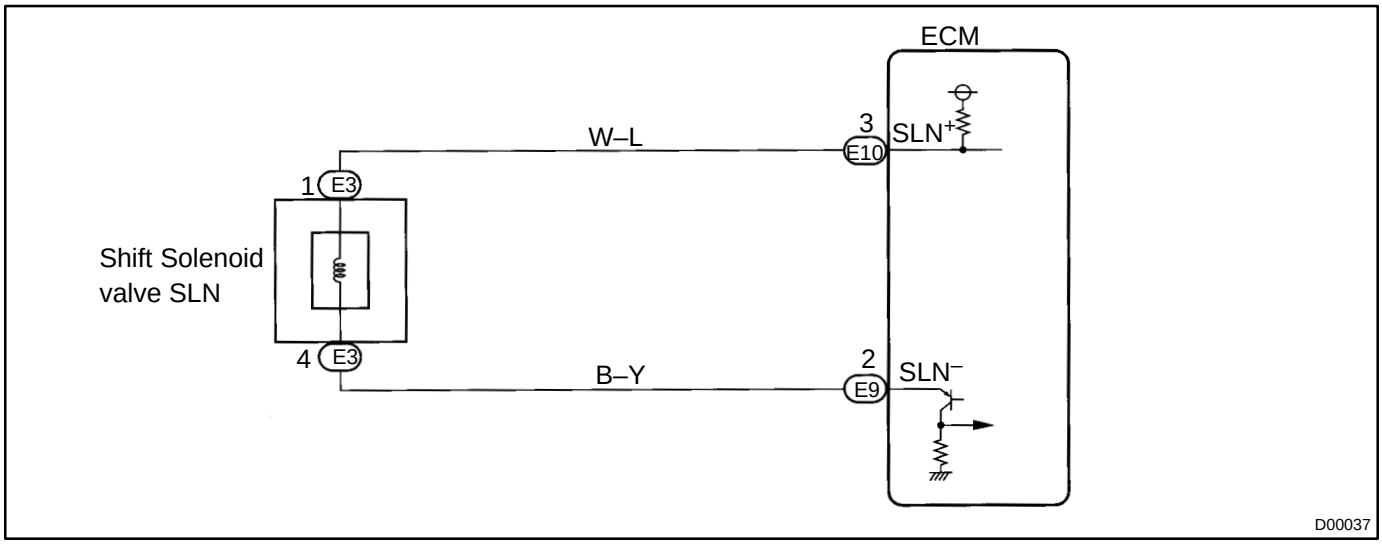
Waveform between terminals SLN^+ and SLN^- when during shift change.



AT8764 AT8766

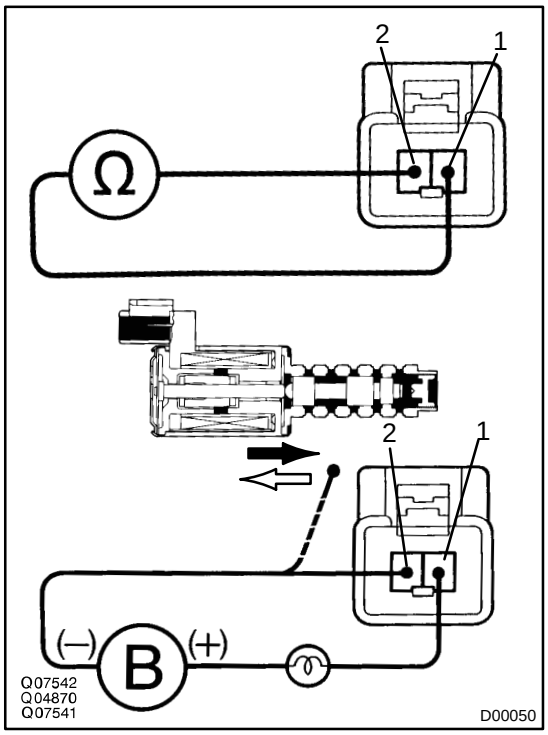
D00062

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift solenoid valve SLN.**



PREPARATION:

Disconnect the shift solenoid valve SLN connector.

CHECK:

(a) Measure resistance between terminals 1 and 2 of solenoid connector.

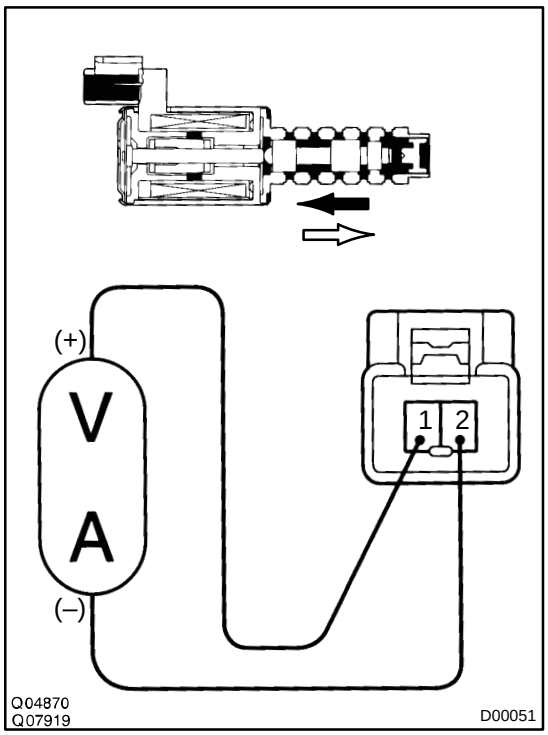
(b) Connect positive ⊕ lead with an 8 ~10 W bulb to terminal 1 of solenoid connector and negative ⊖ lead to terminal 2, then check the movement of the valve.

OK:

(a) Resistance: 5.1 ~ 5.5 Ω

(b)

When battery positive voltage is applied.	Valve move in direction in illustration. (on the left)
When battery positive voltage is cut off.	Valve move in direction in illustration. (on the right)



<Reference>

PREPARATION:

Connect positive ⊕ lead of the variable power supply to terminal 1 of solenoid connector and negative ⊖ lead to terminal 2.

CHECK:

(a) Check the movement of the valve when the voltage is gradually increased.
(A current greater than 1A should not be supplied.)

(b) Check the movement of the valve when the voltage is cut off.

OK:

(a) As the voltage is increased, the valve should move slowly in the ⇐ direction.
(b) The valve should return in the ⇒ direction.

NG	**Replace the shift solenoid valve SLN.**

OK

2	**Check harness and connector between battery and shift solenoid valve SLN, shift solenoid valve SLN and ECM (See page IN–27).**

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

OK

Check and replace the ECM.

DI0CZ–01

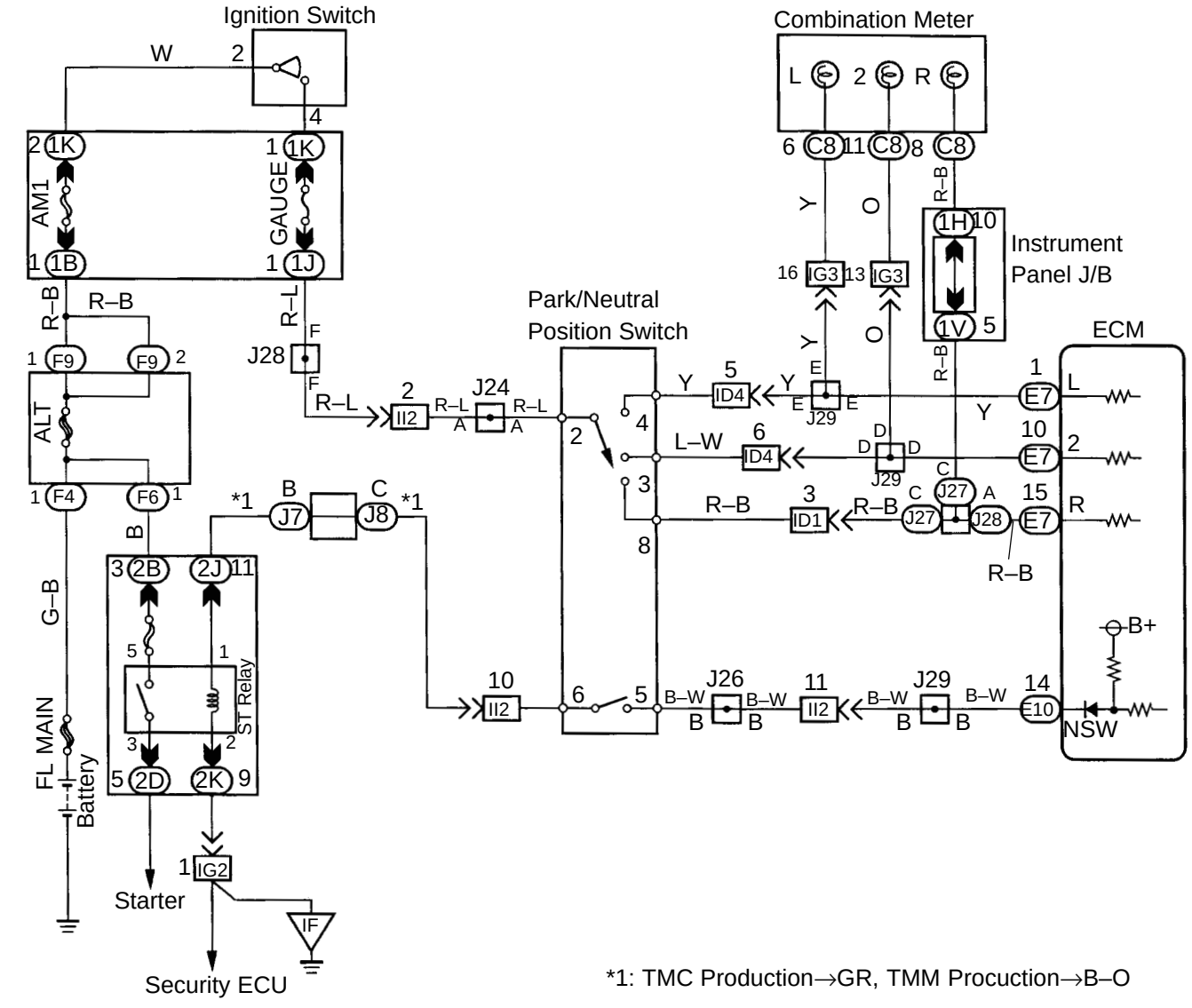
DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P1780	When driving under conditions (a) and (b) for 30 seconds or more, the park/neutral position 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	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM

WIRING DIAGRAM



1997 LEXUS ES300 (RM511U)

D00107

INSPECTION PROCEDURE

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

When using LEXUS hand–held tester.

PREPARATION:

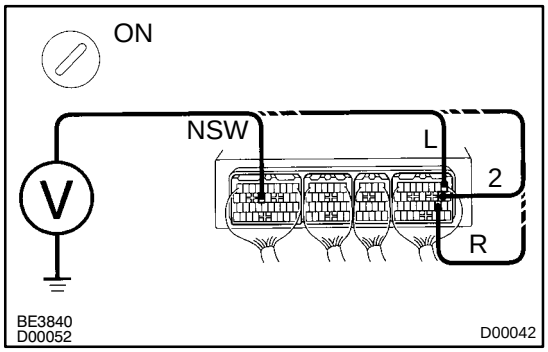
(a) Remove the DLC3 cover.
(b) Connect a LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON and LEXUS hand–held tester main switch ON.

CHECK:

Shift lever into the P, R, N, 2 and L positions, and read the PNP, REVERSE, 2ND and LOW signals on the LEXUS hand–held tester.

OK:

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



When not using LEXUS hand–held tester.

PREPARATION:

Turn the ignition switch ON.

CHECK:

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

OK:

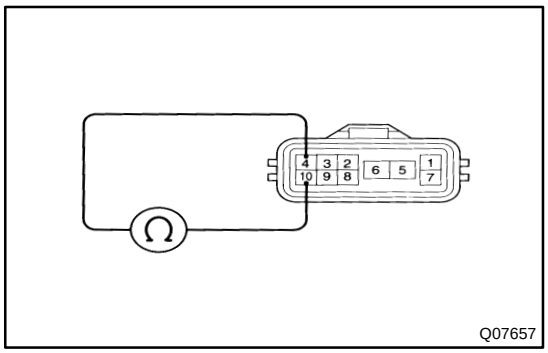
Position	NSW–Body ground	R–Body ground	2–Body ground	L–Body ground
P,N	0 V	0 V	0 V	0 V
R	9 ~ 14 V*	9 ~ 14 V*	0 V	0 V
D	9 ~ 14 V	0 V	0 V	0 V
2	9 ~ 14 V	0 V	9 ~ 14 V	0 V
L	9 ~ 14 V	0 V	0 V	9 ~ 14 V

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

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–164).**

NG

2	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the park/neutral position switch.

CHECK:

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

Shift Position	Terminal No. to continuity	
P	2 – 7	5 – 6
R	2 – 8	–
N	2 – 9	5 – 6
D	2 – 10	–
2	2 – 3	–
L	2 – 4	–

OK:

There is continuity.

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

OK ↓

3	Check harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN–27).

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

OK ↓

Check and replace the ECM.

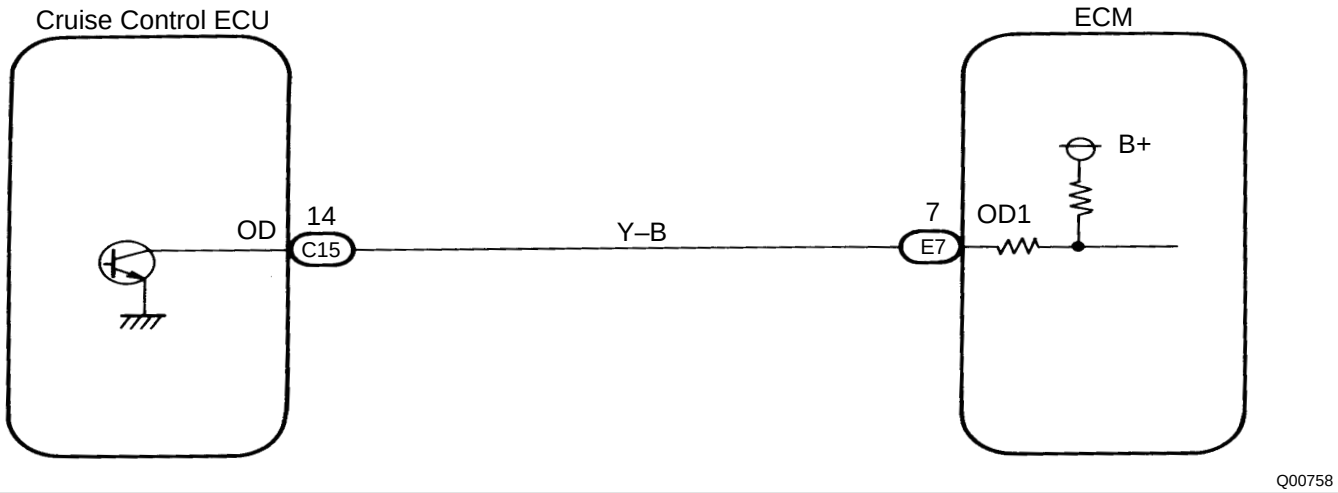
DI0D0–01

O/D Cancel Signal Circuit

CIRCUIT DESCRIPTION

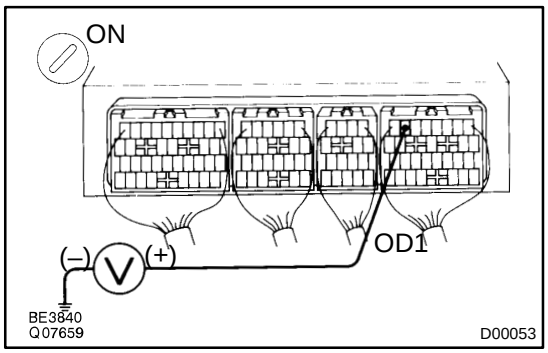
While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some condition.
The cruise control ECU sends O/D cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal OD1 of ECM and body ground.**

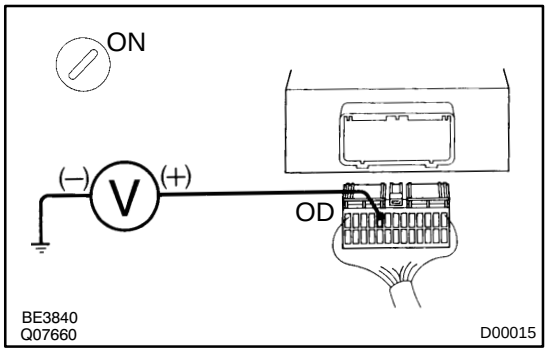


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal OD1 of ECM and body ground.
OK:
Voltage: 10 ~ 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–164).**

NG

2	**Check voltage between terminal OD of cruise control ECU harness side connector and body ground.**



PREPARATION:

(a) Disconnect the cruise control ECU connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal OD of cruise control ECU harness side connector and body ground.

OK:

Voltage: 10 ~ 14 V

OK → **Check and replace the cruise control ECU.**

NG

3	**Check harness and connector between cruise control ECU and ECM.**

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

OK

Check and replace the ECM.

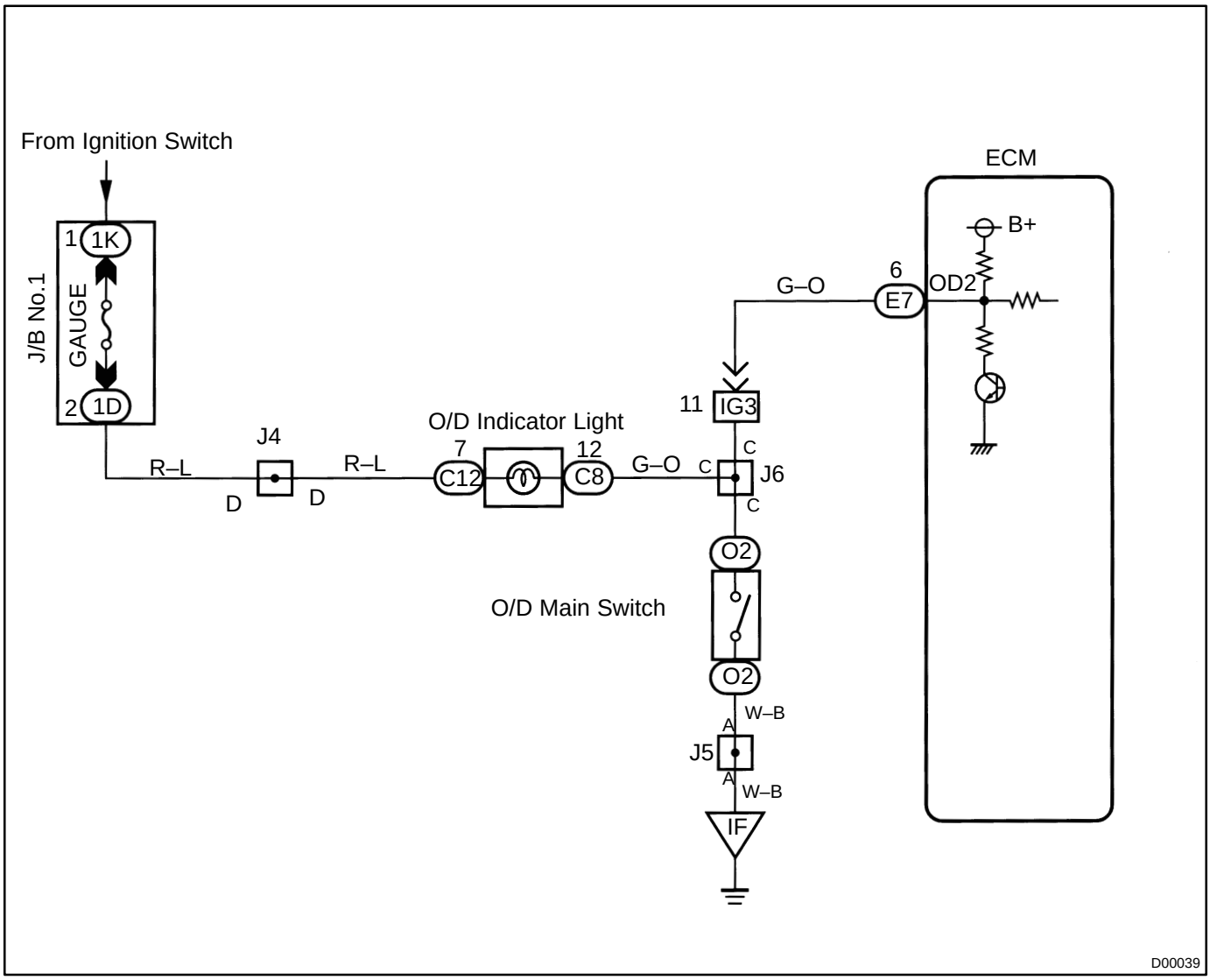
DI0D1–01

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

CIRCUIT DESCRIPTION

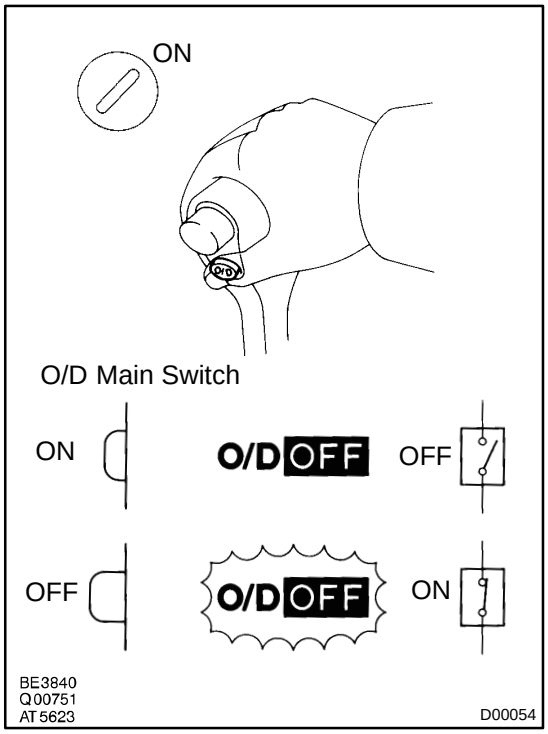
The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. In O/D main switch at OFF position, the O/D OFF indicator light lights up, and the ECM prohibits shifting overdrive.

WIRING DIAGRAM



INSPECTION PROCEDURE
O/D OFF indicator light does not light up

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



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

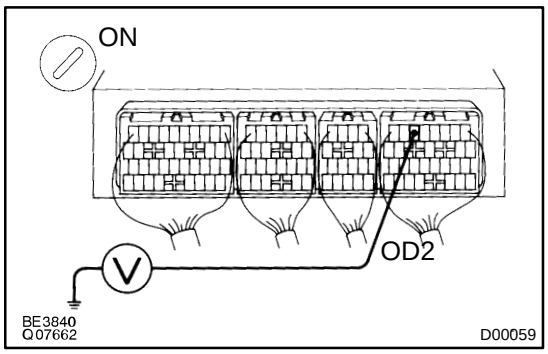
NG → **Go to step 4.**

OK

2	**Check OVRDRIVE CUT SW2 signal.**

When using LEXUS hand–held tester
PREPARATION:
(a) Remove the DLC3 cover.
(b) Connect a LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON and LEXUS hand–held tester main switch ON.
CHECK:
Read the OVRDRIVE CUT SW2 signal on the LEXUS hand–held tester.
OK:

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



When not using LEXUS hand–held tester

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of ECM and body ground.

OK:

O/D main switch	Voltage
OFF	Below 1 V
ON	10 ~ 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–164).**

NG

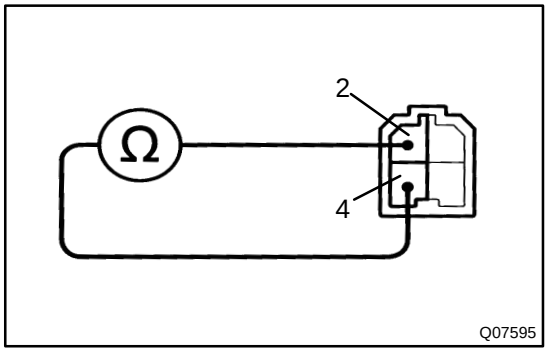
3	Check harness and connector between O/D OFF indicator light and ECM (See page IN–27).

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

OK

Check the O/D main switch.

4	Check O/D main switch.



PREPARATION:

Disconnect the O/D main switch connector.

CHECK:

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

OK:

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

NG → **Replace the O/D main switch.**

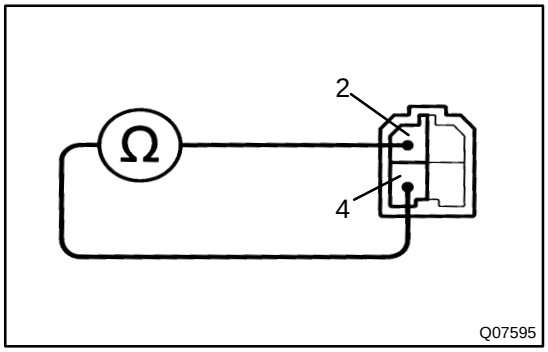
OK

Check and replace the combination meter (See page BE–58).

INSPECTION PROCEDURE

O/D OFF indicator light does not light up

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



PREPARATION:

Disconnect the O/D main switch connector.

CHECK:

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

OK:

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

NG → **Replace the O/D main switch.**

OK

2	**Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and ECM (See page IN–27).**

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

OK

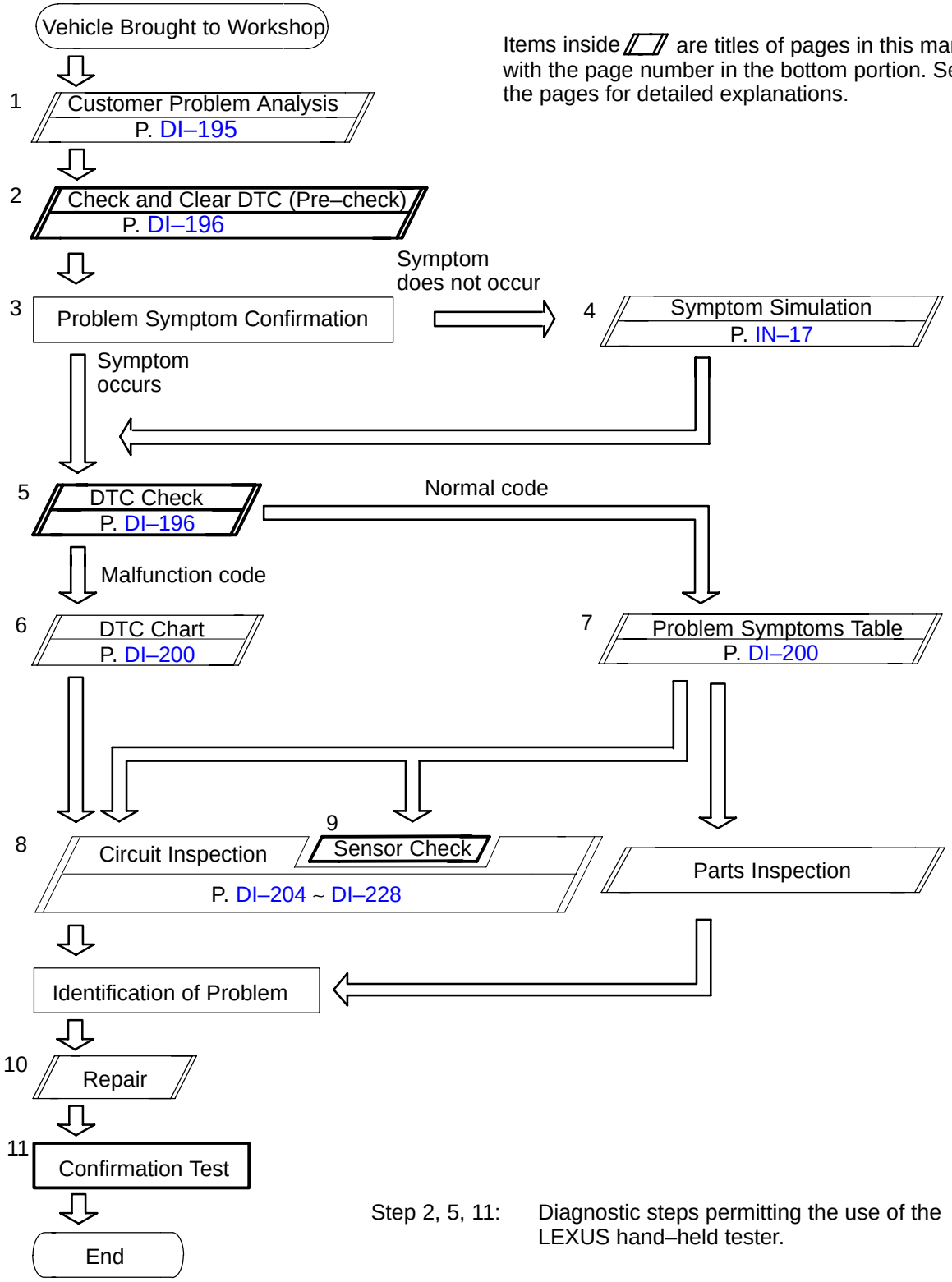
Check and replace the ECM.

ELECTRIC MODULATED SUSPENSION

DI0AB–01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoooting 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, 11: Diagnostic steps permitting the use of the LEXUS hand–held tester.

DI0AC–01

CUSTOMER PROBLEM ANALYSIS CHECK

ELECTRONIC MODULATED SUSPENSION Check Sheet

Inspector's Name :

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

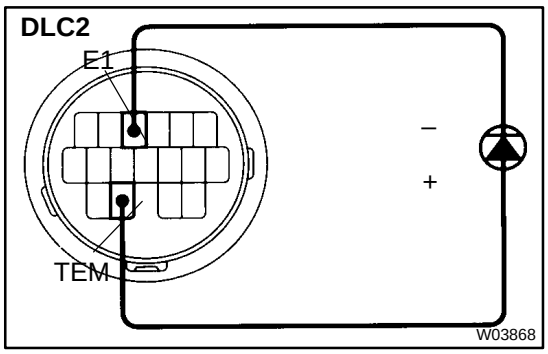
Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Condtions at Time of Problem Occurrence	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/ Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F(°C))
	Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Hill (Up, Down) ☐ Rough Road ☐ Others ( )

Symptoms	☐ Malfunction in damping force control	☐ Anti–roll control does not operate ☐ Anti–squat control does not operate ☐ Anti–dive control does not operate ☐ High speed control does not operate ☐ Bounding control does not operate ☐ Others ( )
	☐ Others	

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

DI0AD–01

PRE–CHECK



1. DIAGNOSIS SYSTEM

(a) TEM OUTPUT CHECK (LED LIGHTENING CHECK)

(1) Connect the LED to terminals TEM and E1 of DLC2.

NOTICE:If connected reversely, the LED does not light.

HINT:Use the LED whose recommended operating current is 10 – 20 mA.

(2) Turn the ignition switch ON, and check that the LED lights for about 2 seconds.

HINT:

If the LED does not light, inspect the TEM circuit (See page DI–224).

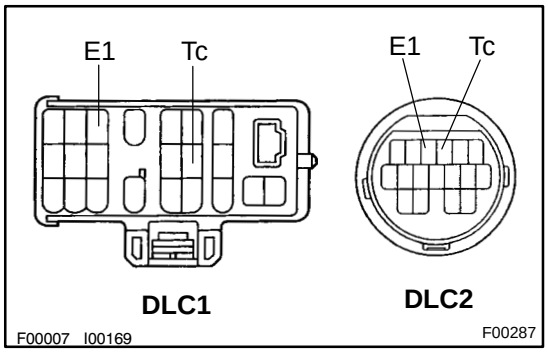
(b) DTC CHECK

(1) Check the battery positive voltage.

Battery positive voltage: 10 – 14 V (When is stopped the engine)

(2) After driving the vehicle, using SST, connect between terminals Tc and E1of DLC2 or DLC1.

SST 09843–18020

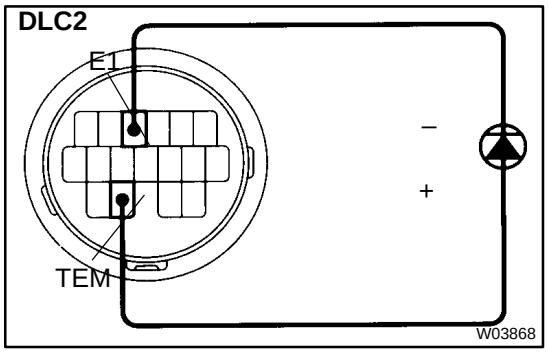


HINT:

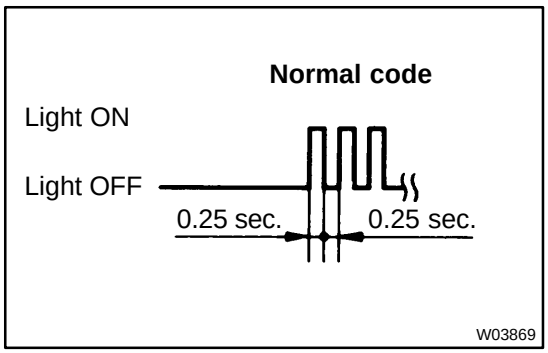
- Do not stop the engine.
- In this condition, the ignition switch is ON.

NOTICE:The wrong connection of the connector may cause malfunction. Use extreme caution when connecting the connector.

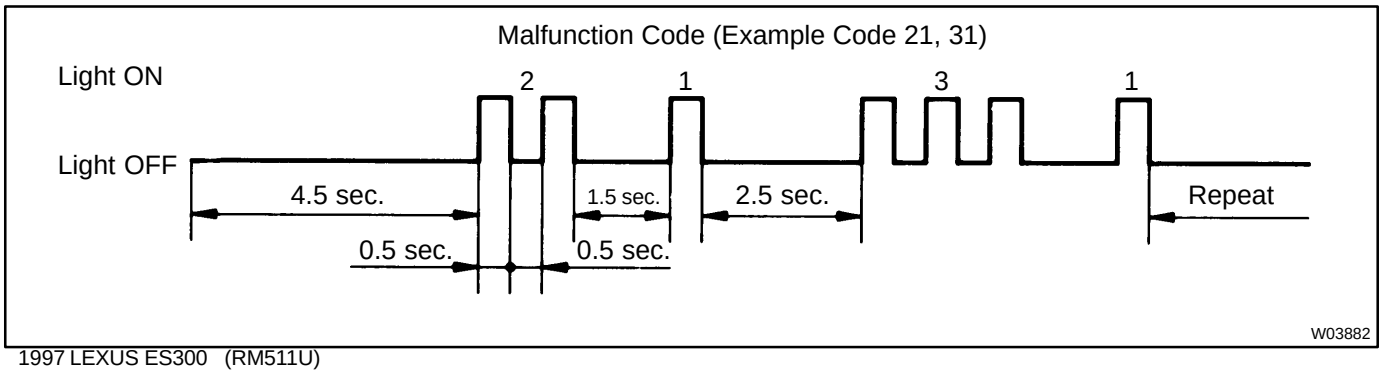
(3) Connect the LED to terminals TEM and E1 of DLC2.



(4) Check the number that the LED blinks.



- When the code is normal, the LED comes on for 0.25 sec. and goes off for 0.25 sec. repeatedly.
- When more than 2 diagnosis codes are detected, the diagnosis codes are displayed in the order form the smallest number.
- If no code appears, inspect the diagnostic circuit (See page DI–226).
- Code are explained in the code table on page DI–200.

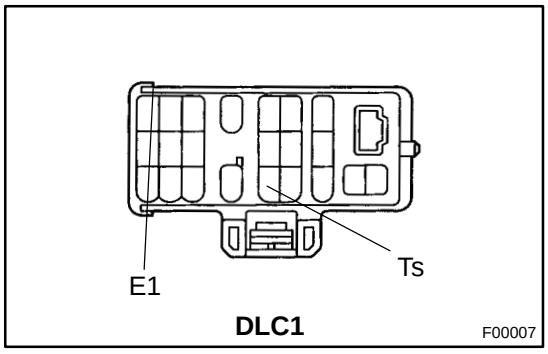


(5) Disconnect the SST from the terminals Tc and E1 of DLC2 or DLC1.

SST 09843–18020

Confirm that the connected LED is off.

(6) When the abnormal code is output, inspect the function, absorber control ECU and input signal.



(c) DAMPING FORCE CONTROLLING CONDITION CHECK

(1) Using SST, connect terminals Ts and E1 of DLC1 with the ignition switch OFF. (TEST mode)

SST 09843–18020

(2) Start the engine.

In this condition, the absorber control actuator position becomes 1 (Soft).

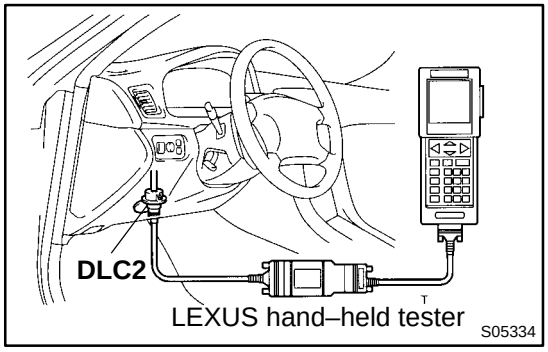
(3) Starting from the above mentioned position, as the brake pedal is depressed, the absorber control actuator position increase (1 → 2 → 3 → ... 15 → 16). At this time, bounce the vehicle and check that the shock absorber is becoming harder.

HINT:

- To hold the shock absorber control actuator at a specific position, adjust it to the position using the above mentioned procedure then increase the vehicle speed to over 5 km/h.
  After that the shock absorber control actuator position does not change until the ignition switch is turned OFF.
- If the absorber control actuator does not operate, inspect the absorber control actuator circuit and absorber control ECU.

(4) Disconnect the SST from the terminals Ts and E1 of DLC1.

SST 09843–18020



(d) FAIL–SAFE FUNCTION

(1) When the short circuit of an shock absorber control actuator is detected, the shock absorber control actuator located on the other side of the detected drive shaft is held at step 8. The shock absorber control actuator remains uninterrogated until the ignition switch is OFF.

(e) DTC CHECK BY USING LEXUS HAND–HELD TESTER

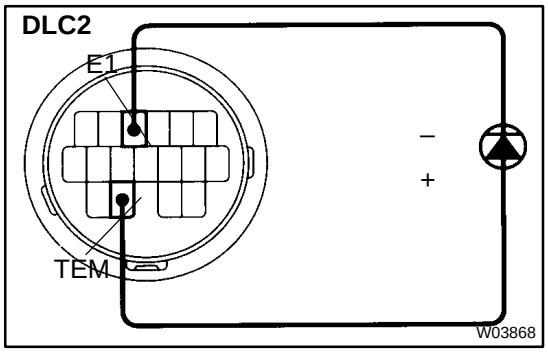
(1) Hook up the LEXUS hand–held tester to the DLC2.

(2) Monitor the ECU data by following the prompts on the tester screen.
Please refer to the LEXUS hand–held tester operator's manual.

LEXUS hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.

(f) DTC CLEARANCE

The diagnosis memory is erased by turning the ignition switch off.



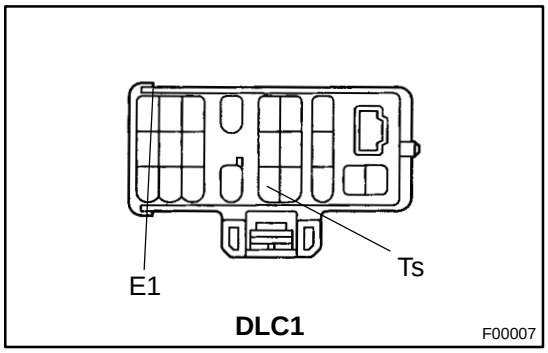
(g) INPUT SIGNAL CHECK (TEST MODE CHECK)

This function check if signals from the steering sensor and stop light switch etc. are being input normally to the ECU.

(1) Check the battery positive voltage.
Battery positive voltage: 10 – 14 V (When stop the engine)
(2) Turn ignition switch off.
(3) Connect the LED to terminals TEM and E1 of DLC2.
(4) Set each of the check items in the table below to the condition in Operation (A).
(5) Using SST, connect between terminals Ts and E1 of DLC1. (TEST mode)

SST 09843–18020

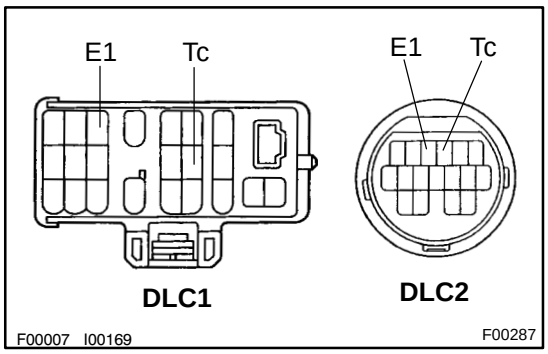
(6) Start the engine.
(7) Each of the check items is set to the condition in Operation (B).



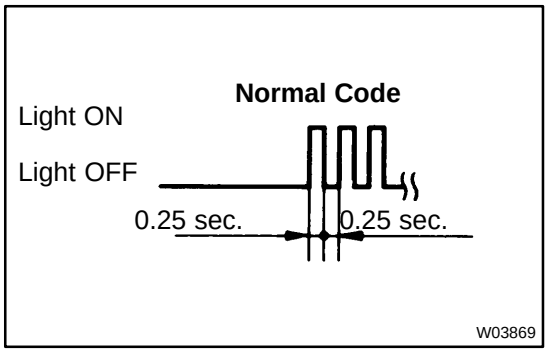
- The LED lights for 1 sec. before it blinks.
- If the operation (B) has not been tone, DTC will indicate.

NOTICE:Do not turn off the ignition switch. Diagnosis code are erased by turning the ignition switch off.

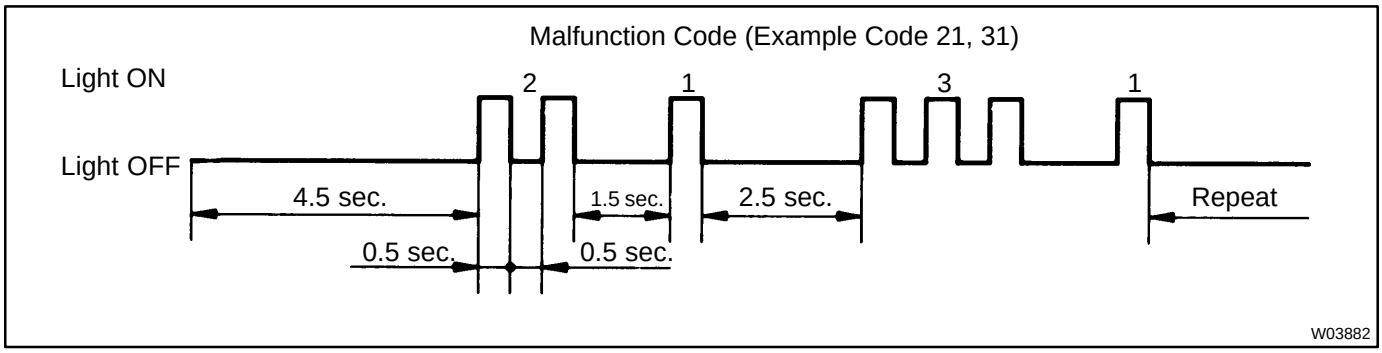
Check Item	Operation (A)	Operation (B)
Steering Sensor Signal	Steering wheel straight ahead	Steering wheel angle 36˚ degrees or larger
Vehicle Speed Sensor Signal	Vehicle speed below 12 mph (20 km/h)	Vehicle speed 12 mph (20 km/h) or higher
Stop Light Switch Signal	OFF (Brake pedal not depressed)	ON (Brake pedal depressed)
Crankshaft Position Sensor Signal	Engine speed below 2,000 rpm or more	Engine speed 2,000 rpm or higher
Absorber Control Switch Signal	–	Slowly move the absorber control switch "COMFORT" ↔ "SPORT" both ways once



(8) Using SST, connect terminals Tc and E1 of DLC2 or DLC1.
SST 09843–18020



(9) Check the number that the LED blinks.
HINT:When the code is normal, the LED come on for 0.25 sec. and goes off for 0.25 sec. repeatedly.



(h) DESERT FROM INPUT SIGNAL CHECK MODE
(1) With the ignition switch off, disconnect the SST from the terminals Ts and E1 of DLC2 or DLC1.
SST 09843–18020

DI0AE–01

DIAGNOSTIC TROUBLE CODE CHART

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

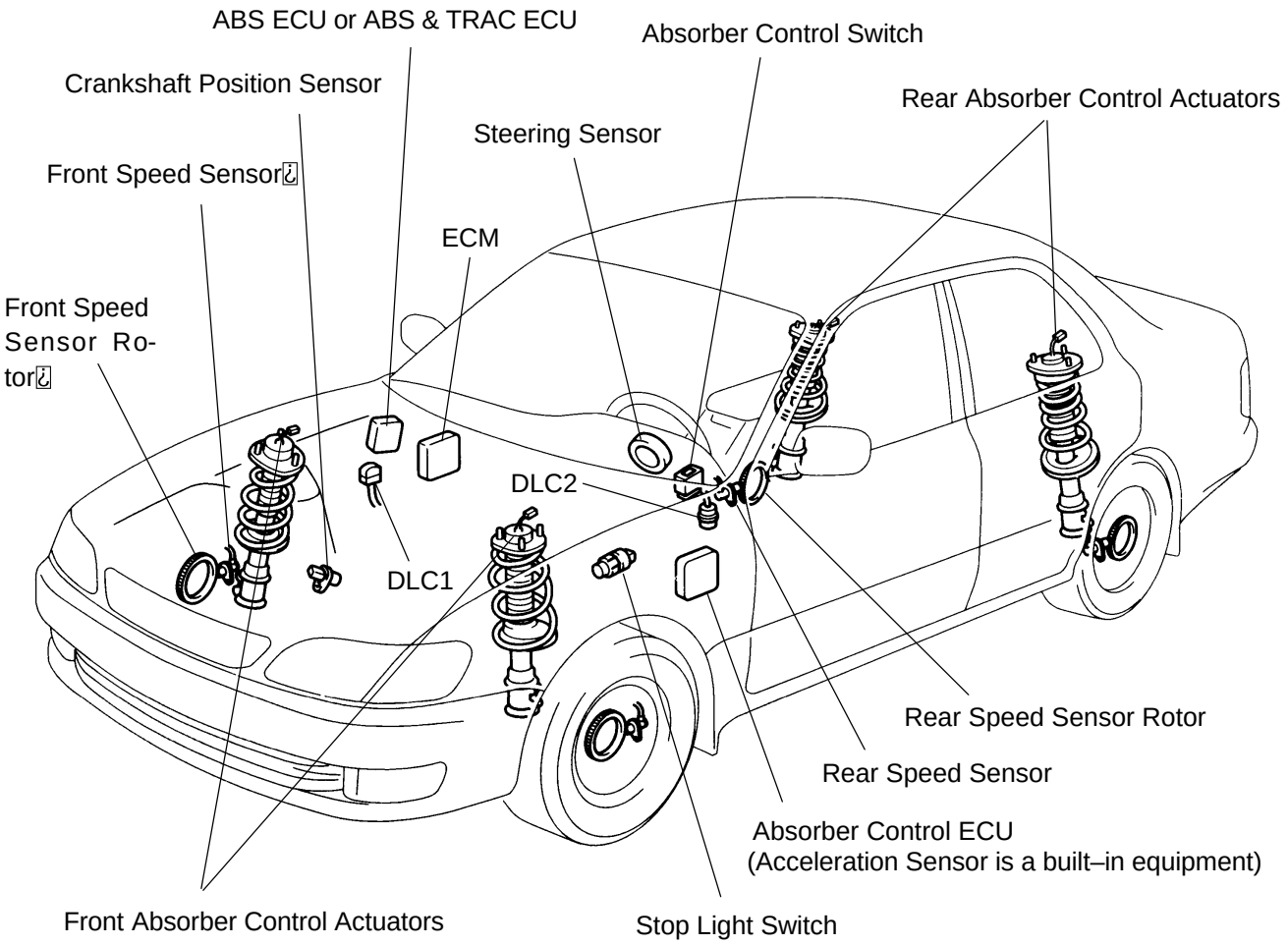
DTC No. (See Page)	Detection Item	Trouble Area
21 DI–204	Open or short in front absorber control actuator circuit	●Left front, right front, left rear and right rear absorber control actuator ●Short circuit in between absorber control actuator and absorber control ECU ●Absorber control ECU
23 DI–204	Open or short in rear absorber control actuator circuit	
31 DI–208	Acceleration sensor signal malfunction	●Absorber control ECU (Acceleration sensor is a built–in equipment)
34 DI–209	Front speed sensor signal malfunction	●Right front and right rear speed sensor ●Open or short circuit in between absorber control ECU and ABS ECU or ABS & TRAC ECU ●Open or short circuit in between ABS ECU or ABS & TRAC ECU and ABS speed sensor ●Error in other system that uses the same speed sensor signal ●ABS ECU or ABS & TRAC ECU ●Absorber control ECU
35 DI–209	Rear speed sensor signal malfunction	
36 DI–211	Steering sensor signal malfunction	●Battery ●Steering sensor ●Open or short circuit in between absorber control ECU and steering sensor ●Absorber control ECU
41 DI–214	Crankshaft position sensor signal malfunction	●Open or short circuit in between absorber control ECU and ECM ●ECM ●Absorber control ECU
42 DI–216	Stop light switch signal does not input	●Stop light switch ●Open or short circuit in between absorber control ECU and stop light switch ●Error in other system that uses the same stop light switch ●Absorber control ECU
52 DI–218	Absorber control switch signal malfunction	●Absorber control switch ●Open or short circuit in between absorber control switch and absorber control ECU ●Absorber control ECU

NOTICE:

- **DTCs 36, 42, and 52 can be detected only in the input signal inspecting mode.**
- **All DTCs are erased when the ignition switch is turned off.**

DI0AF–01

PARTS LOCATION

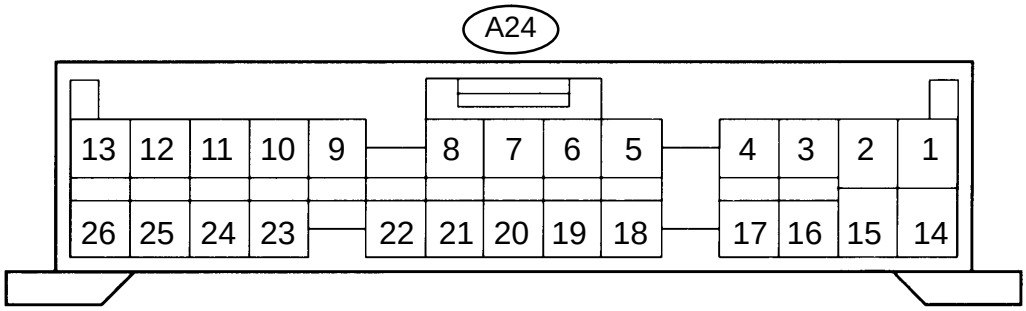


1997 LEXUS ES300 (RM511U)

W04370

DI0AG–01

TERMINALS OF ECM



W03883

Symbols (Terminals No.)	STD Voltage (V)	Condition
GND (A24 – 1) – Body ground	Continuity	Always
+B (A24 – 2) – Body ground	10 – 14	IG switch ON
SW2 (A24 – 3) – Body ground	8 V or more	IG switch ON, Absorber control switch 1
	Below 1.5	IG switch ON, Absorber control switch 2
TEM (A24 – 4) – Body ground	10 – 14	Connect between terminals TEM and E1 of DLC2 for 2 sec. after the ignition
RB– (A24 – 5) – Body ground RB+ (A24 – 6) – Body ground RA– (A24 – 7) – Body ground RA+ (A24 – 8) – Body ground FB– (A24 – 10) – Body ground FB+ (A24 – 11) – Body ground FA– (A24 – 12) – Body ground FA+ (A24 – 13) – Body ground	Continuity	Always
NEO (A24 – 14) – Body ground	1 – 8	Start the engine, run it at idle
SS1 (A24 – 16) – Body ground	1 – 3.5	IG switch ON, Steering wheel is being turned slowly
SS2 (A24 – 17) – Body ground		
RRO (A24 – 18) – Body ground	1.5 – 8	While driving
Ts (A24 – 19) – Body ground	Below 1.5	IG switch ON, Connect between terminals Ts and E1 of DLC1
	10 – 14	IG switch ON, Disconnect terminals Ts and E1 of DLC1
FRO (A24 – 20) – Body ground	1.5 – 8	While driving
SW1 (A24 – 21) – Body ground	Below 1.5	IG switch ON, Absorber control switch 3
	8 V or more	IG switch ON, Absorber control switch 4
Tc (A24 – 22) – Body ground	Below 1.5	IG switch ON, Connect between terminals Tc and E1 of DLC1
	10 – 14	IG switch ON, Disconnect terminals Tc and E1 of DLC1
STP (A24 – 26) – Body ground	10 – 14	IG switch ON, Brake pedal is released
	Below 1.5	IG switch ON, Brake pedal is depressed

DI0AH–01

PROBLEM SYMPTOMS TABLE

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

Symptom	Inspection Circuit	See page
Damping force control do not operate at all	1. Absorber control actuator circuit 2. TEM terminal circuit 3. Tc terminal circuit 4. Ts terminal circuit 5. Shock absorber 6. Absorber control ECU	DI–204 DI–224 DI–226 DI–228 SA–24 SA–50 –
Only anti–roll control does not operate	1. Steering sensor circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–211 DI–209 –
Only anti–squat control does not operate	1. Crankshaft position sensor circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–214 DI–209 –
Only anti–dive control does not operate	1. Stop light switch circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–216 DI–209 –
Only semi–active control does not operate	1. Speed sensor circuit 2. Absorber control ECU (Deceleration sensor is a built–in equipment)	DI–209 –
Only speed sensing control does not operate	1. Speed sensor circuit 2. Absorber control ECU	DI–209 –
Only unsprung damping control does not operate	1. Speed sensor circuit 2. Absorber control ECU	DI–209 –

DI0AI–01

CIRCUIT INSPECTION

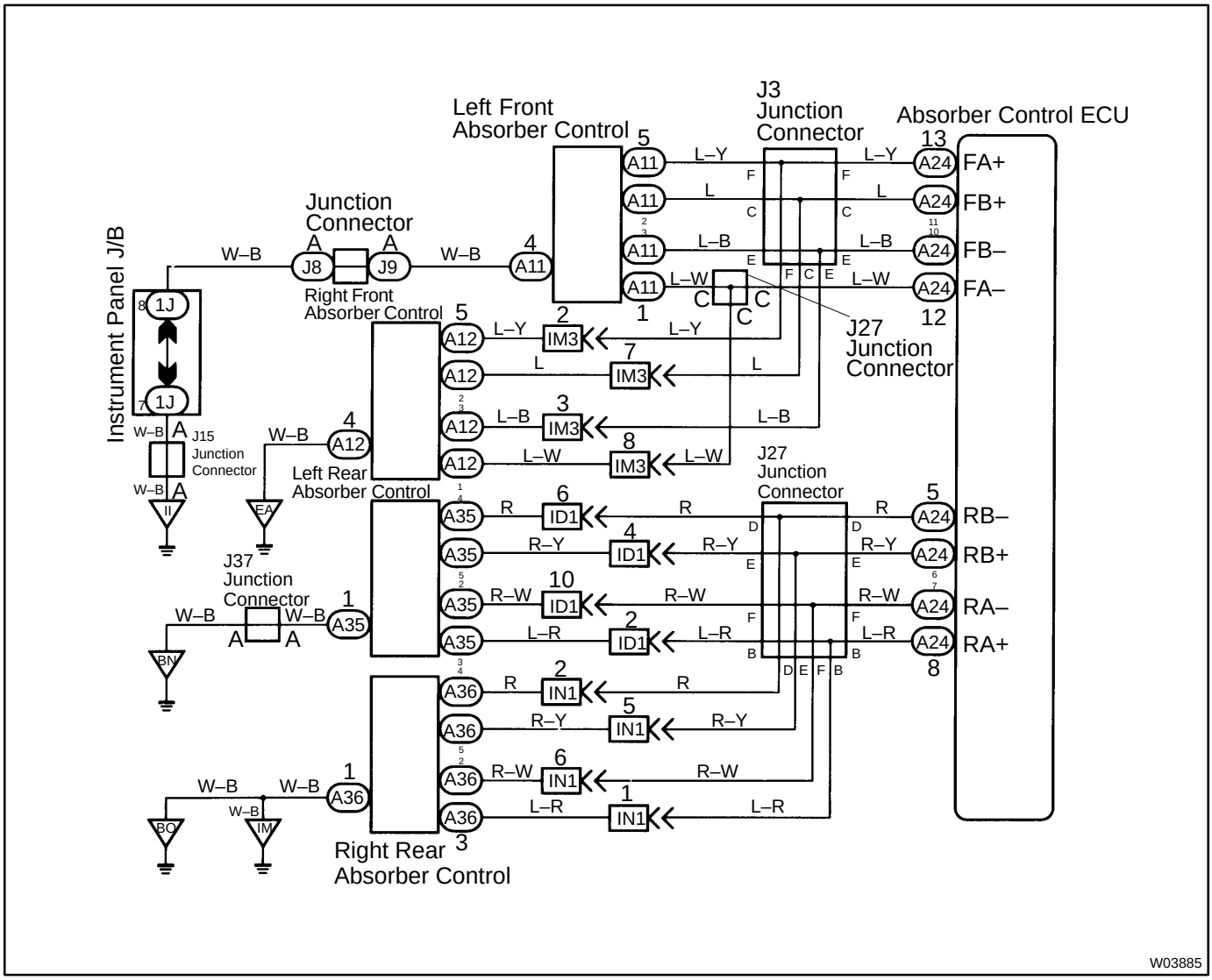
DTC	21, 23	Absorber Control Actuator Circuit

CIRCUIT DESCRIPTION

DTC No.*	DTC Detecting Condition	Trouble Area
21 23	When the absorber control actuator is activated, over current flows through the front or rear driving circuit.	●Left front, right front, left rear and right rear absorber control actuator ●Short circuit in between absorber control actuator and absorber control ECU ●Absorber control ECU

*: Code 21 corresponds to the left front and right front absorber control actuator circuit.
Code 23 corresponds to the left rear and right rear absorber control actuator circuit.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of absorber control actuator.**

CHECK:

Using the same method as used for the clamping force control, check that clamping force of the absorber control actuator changes.

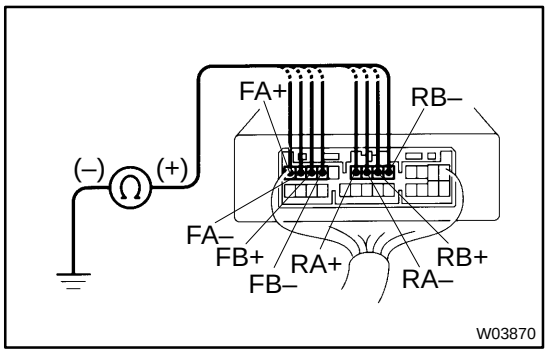
OK:

Bounce the vehicle and check that the shock absorber is becoming harder.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	**Check continuity between terminals RB–, RB+, RA–, RA+, FB–, FB+, FA– and FA+ of absorber control ECU connector and body ground.**



PREPARATION:

Remove the No.1 lower panel (See page BO–82).

CHECK:

Check continuity between terminals RB–, RB+, RA–, RA+, FB–, FB+, FA–, and FA+ of absorber control ECU connector and body ground.

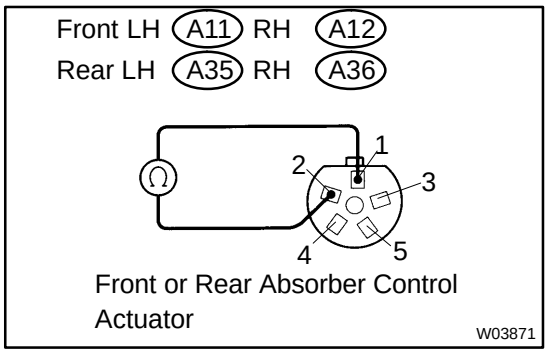
OK:

Continuity

NG → **Check and replace absorber control ECU**

OK

3	Check absorber control actuator.



PREPARATION:

Front absorber control actuator:

(a) Remove the shock absorber cap (See page SA–25).

(b) Remove the absorber control actuator connector.

Rear absorber control actuator:

(a) Remove the rear seat cushion, rear seatback, roof side inner garnish, high mounted stop light and seat belt.

(b) Remove the absorber control actuator connector (See page SA–51).

CHECK:

Measure resistance between each terminal of front or rear absorber control actuator.

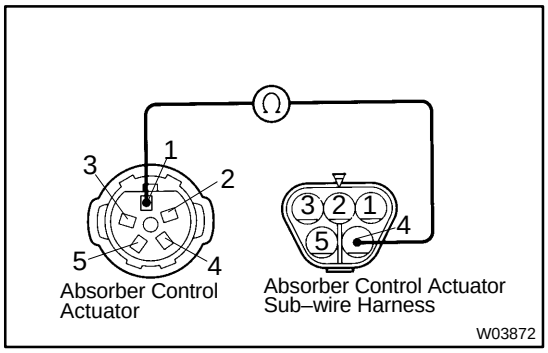
OK:

Front absorber control actuator:

Terminal A11 or A12 – 1 and A11 or A12 – 2	12.4 – 13.6 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 3	12.4 – 13.6 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 4	12.4 – 13.6 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 5	12.4 – 13.6 Ω

Rear absorber control actuator:

Terminal A35 or A36 – 1 and A35 or A36 – 2	12.4 – 13.6 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 3	12.4 – 13.6 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 4	12.4 – 13.6 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 5	12.4 – 13.6 Ω



CHECK:

Front absorber control actuator:

Check continuity between each terminal of absorber control actuator and sub–wire harness.

OK:

Terminals 1 and 4	Continuity
Terminals 2 and 5	Continuity
Terminals 3 and 1	Continuity
Terminals 4 and 2	Continuity
Terminals 5 and 3	Continuity

NG → **Replace absorber control actuator or absorber control actuator sub–wire harness.**

OK

4	**Check harness and connectors between absorber control ECU and absorber control actuator, absorber control actuator and body ground (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).*

*: However, when DTC 21 or 23 is displayed, check and replace absorber control ECU.

DI0AJ–01

DTC	31	Acceleration Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
31	Acceleration sensor signal malfunction.	●Absorber control ECU (Acceleration sensor is a built–in the equipment)

INSPECTION PROCEDURE

As the deceleration sensor is a built–in the equipment for absorber control ECU, replace them as a unit.

DI0AK–01

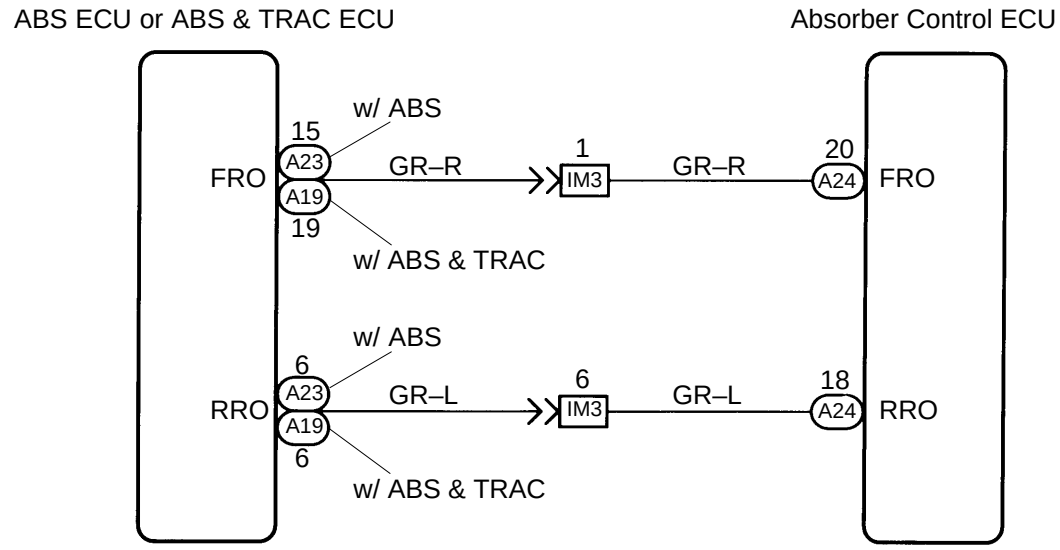
DTC	34, 35	Speed Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.*	DTC Detecting Condition	Trouble Area
34 35	Vehicle speed is 12 mph (20 km/h) or higher signal is not input.	●Right front and right rear speed sensor ●Open or short circuit in between absorber control ECU and ABS ECU or ABS & TRAC ECU ●Open or short circuit in between ABS ECU or ABS & TRAC ECU and ABS speed sensor ●Error in other system that uses the same speed sensor signal ●ABS ECU or ABS & TRAC ECU ●Absorber control ECU

*: Code 34 corresponds to right front speed sensor circuit.
Code 35 corresponds to right rear speed sensor circuit.

WIRING DIAGRAM

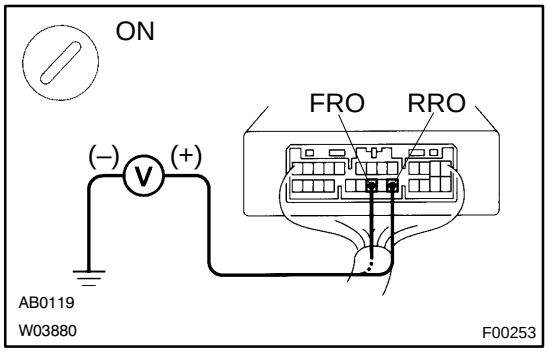


INSPECTION PROCEDURE

HINT:

- When DTC ”34” is displayed, check the right front speed sensor circuit.
- When DTC ”35” is displayed, check the right rear speed sensor circuit.

1	**Check voltage between terminals RRO and FRO of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Start the engine.

CHECK:

Measure voltage between terminals RRO and FRO of absorber control ECU connector and body ground while driving.

OK:

Voltage: 1.5 – 8 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	**Check speed sensor (See page DI–232 or DI–273).**

NG → **Repair or replace harness, connector, speed sensor or rotor.**

OK

3	**Check harness and connectors between absorber control ECU and ABS ECU or ABS & TRAC ECU (See page IN–27).**

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

OK

Check and replace absorber control ECU, ABS ECU or ABS & TRAC ECU.

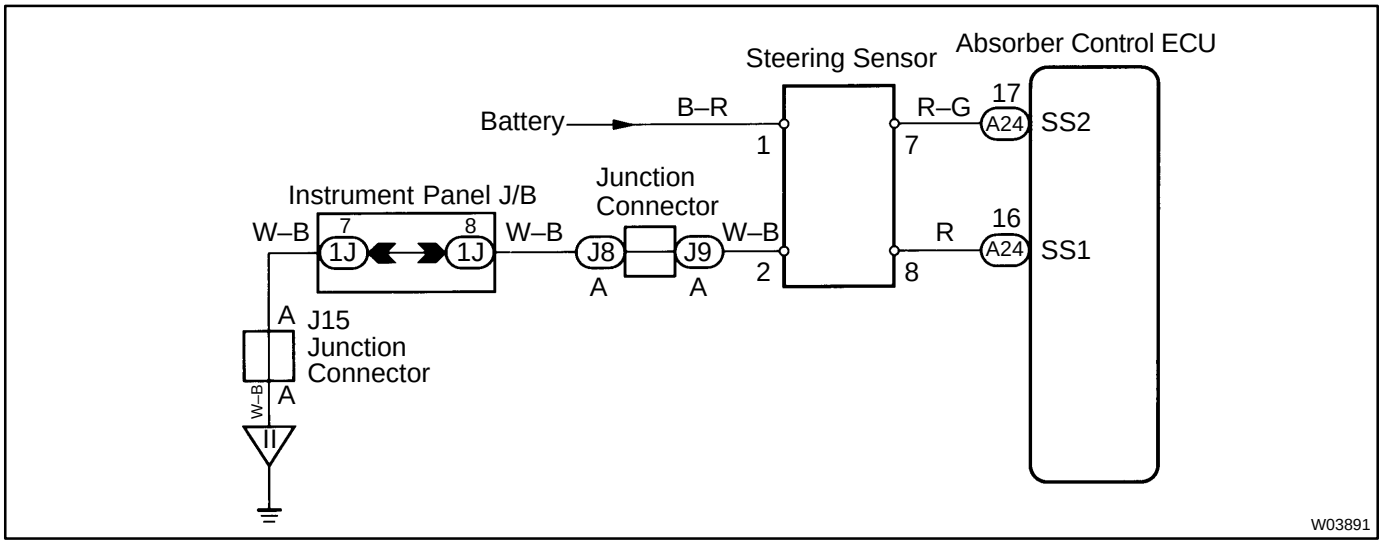
DI0AL–01

DTC	36	Steering Sensor Circuit

CIRCUIT DESCRIPTION

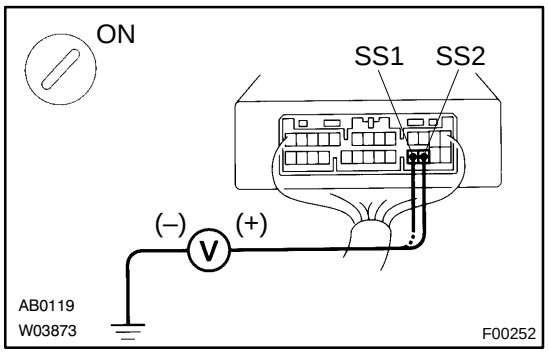
DTC No.	DTC Detecting Condition	Trouble Area
36	Steering angle is 36˚ or larger signal is not input.	●Battery ●Steering sensor ●Open or short circuit in between absorber control ECU and steering sensor ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals SS1 and SS2 of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals SS1 and SS2 of absorber control ECU connector and body ground when steering wheel is turned slowly.

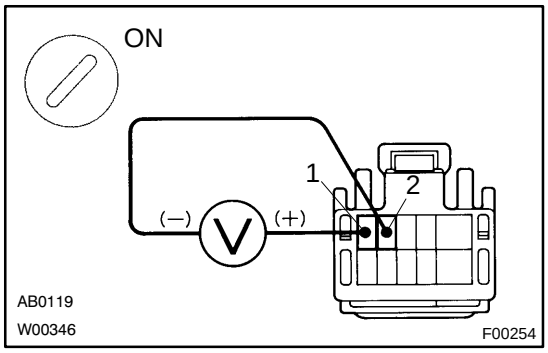
OK:

Changes between 1 V and approx. 3.5 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	Check voltage between terminals 1 and 2 of steering sensor connector.



PREPARATION:

(a) Remove the steering wheel lower No.2 and No.3 covers, steering wheel pad, steering wheel column upper and lower covers (See page SR–11).

(b) Disconnect the steering sensor connector.

(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals 1 and 2 of steering sensor connector.

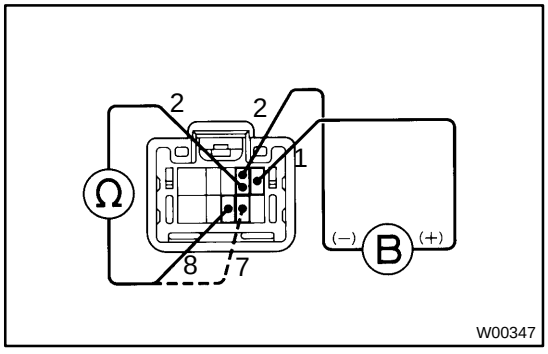
OK:

Voltage: 10 – 14 V

NG	Check and repair harness and connectors between battery and steering sensor.

OK

3	Check steering sensor.



PREPARATION:

Apply battery positive voltage between terminals 1 and 2.

CHECK:

Measure the resistance between the terminal 2 and terminals 7 and 8 of steering sensor connector when the rotating part of steering sensor is turned slowly.

OK:

Changes between 0 Ω and ∞ Ω

NG	Replace steering sensor.

OK

4	Check harness and connectors between absorber control ECU and steering sensor (See page IN–27).

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

OK ↓

Check and replace absorber control ECU.

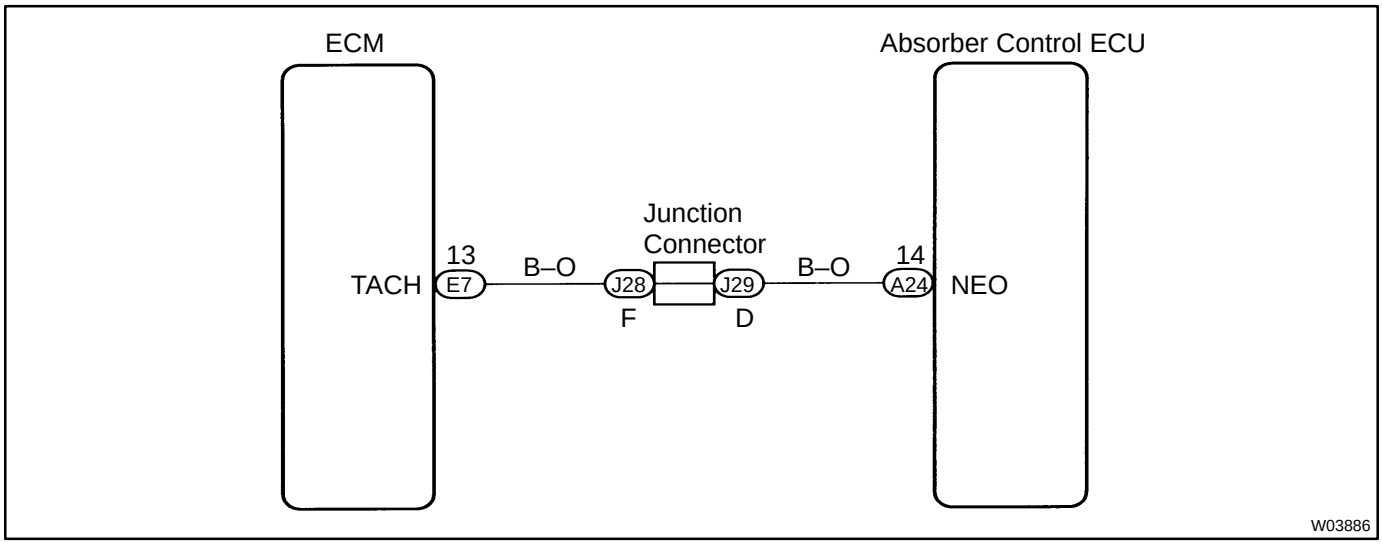
DI0AM–01

DTC	41	Crankshaft Position Sensor Circuit

CIRCUIT DESCRIPTION

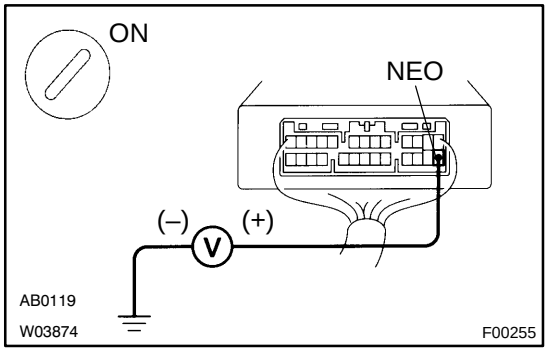
DTC No.	DTC Detecting Condition	Trouble Area
41	Engine speed 2,000 rpm or higher signal does not input.	●Open or short circuit in between absorber control ECU and ECM ●ECM ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal NEO of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Start the engine, run it at idle.

CHECK:

Measure voltage between terminal NEO of absorber control ECU connector and body ground.

OK:

Voltage: 1 – 8 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	Check crankshaft position sensor (See page DI–66).

OK → Go to step 4.

NG

3	Check harness and connectors between absorber control ECU and ECM (See page IN–27).

NG → Repair or replace harness or connector.

OK

Check and replace absorber control ECU.

4	Does malfunction disappear when a known good absorber control ECU is installed?

YES → Check and replace absorber control ECU.

NO

Check and replace ECM.

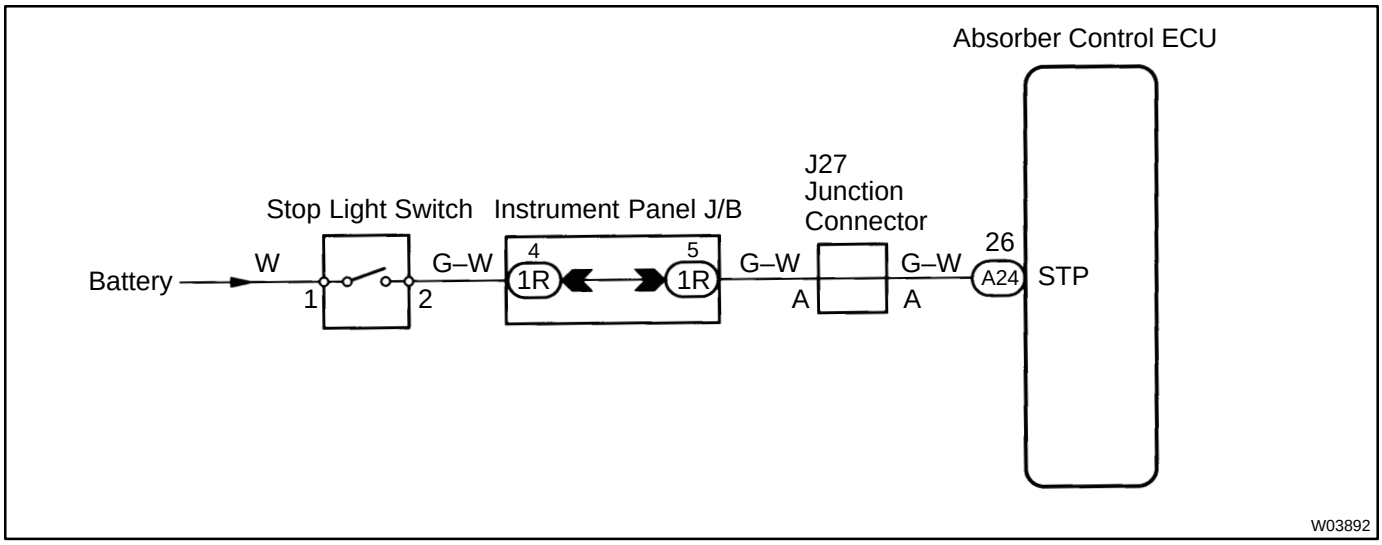
DI0AN–01

DTC	42	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
42	Stop light switch signal does not change.	●Stop light switch ●Open or short circuit in between absorber control ECU and stop light switch ●Error in other system that uses the same stop light switch ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of stop light.

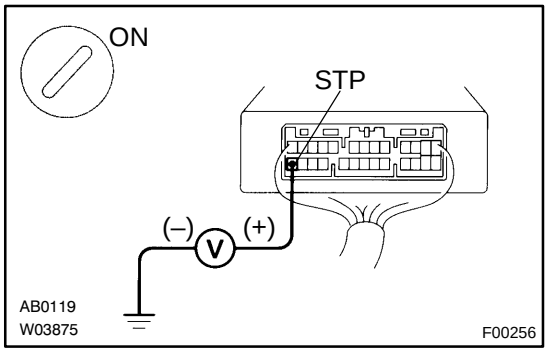
CHECK:

Check that stop light comes on when brake pedal is depressed and goes off when brake pedal is released.

NG → **Check stop light circuit (See page BE–51).**

OK

2	Check voltage between terminal STP of absorber control ECU connector and body ground.



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal STP of absorber control ECU connector and body ground when brake pedal is released and depressed.

OK:

Released	10 – 14 V
Depressed	Below 1.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

3	Check harness and connectors between absorber control ECU and stop light switch (See page IN–27).

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

OK

Check and replace absorber control ECU.

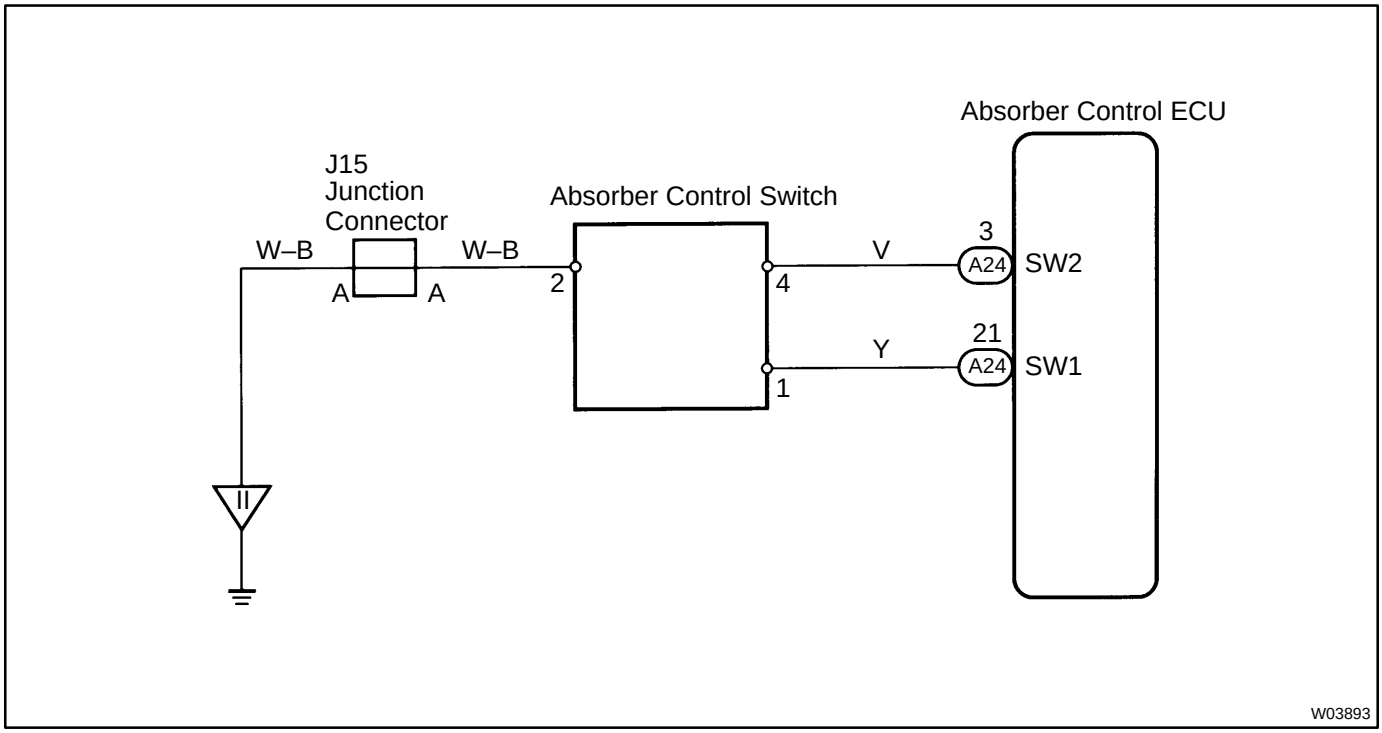
DI0AO–01

DTC	52	Absorber Control Switch Circuit

CIRCUIT DESCRIPTION

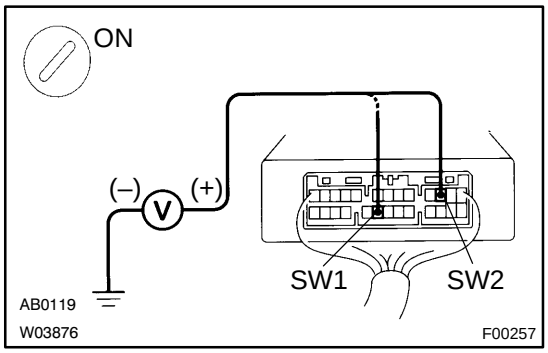
DTC No.	DTC Detecting Condition	Trouble Area
52	SW1 and SW2 of absorber control switch signal do not change.	●Absorber control switch ●Open or short circuit in between absorber control switch and absorber control ECU ●Absorber control ECU

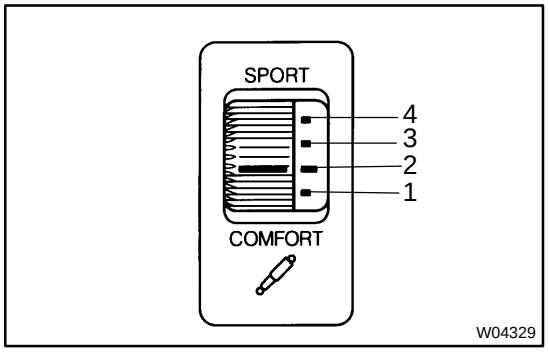
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals SW1 and SW2 of absorber control ECU connector and body ground.**





PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Using SST, connect between terminals Ts and E1 of DLC1.
SST 09843–18020

(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals SW1 and SW2 of absorber control ECU connector and body ground when move slowly moving the absorber control switch "COMFROT" ↔ "SPORT" both ways one.

OK:

SW1:

Absorber control switch 1	8 V or more
Absorber control switch 2	Below 1.5 V

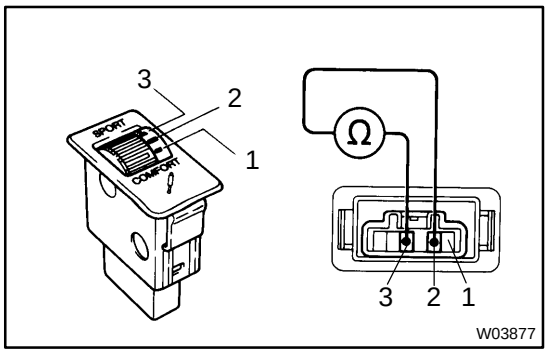
SW2:

Absorber control switch 3	8 V or more
Absorber control switch 4	Below 1.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	Check absorber control switch.



PREPARATION:

(a) Remove the upper control panel (See page BO–82).

(b) Disconnect the absorber control switch connector.

CHECK:

Check continuity between each terminal of absorber control switch when each switch position.

OK:

Absorber control switch 3:

Terminals 2 and 3	Continuity

Absorber control switch 2:

Terminals 1 and 2	Continuity
Terminals 2 and 3	Continuity

Absorber control switch 1:

Terminals 1 and 2	Continuity

NG → **Replace absorber control switch.**

OK ↓

3	Check harness and connectors between absorber control ECU and absorber control switch and body ground (See page IN–27).

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

OK ↓

Check and replace absorber control ECU.

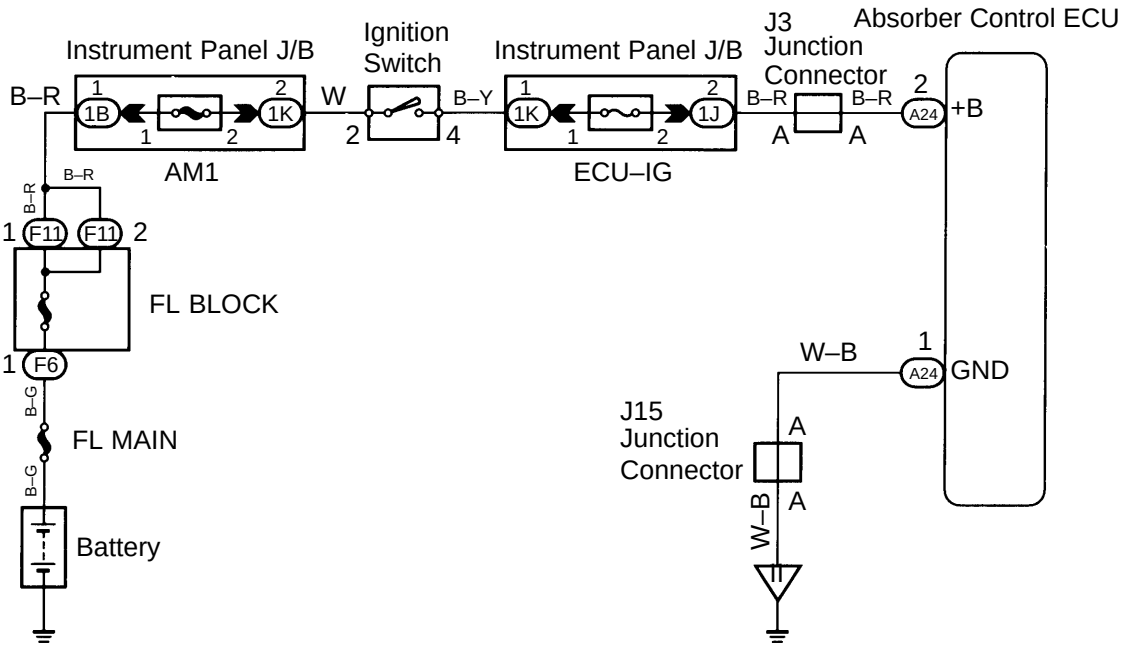
DI0AP–01

Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for the absorber control ECU, hence the absorber control actuator.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

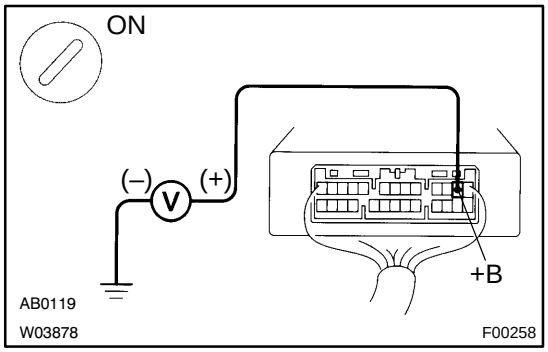
OK:

Voltage: 10 – 14 V

NG → **Charge or replace battery.**

OK

2	Check voltage between terminal +B of absorber control ECU connector and body ground.



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal +B of absorber control ECU and body ground.

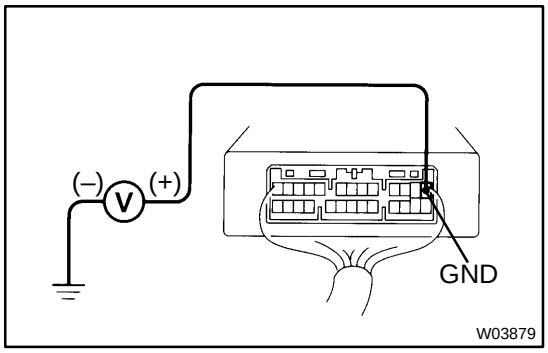
OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

3	Check continuity between terminal GND of absorber control ECU connector and body ground.



CHECK:

Measure continuity between terminal GND of absorber control ECU connector and body ground.

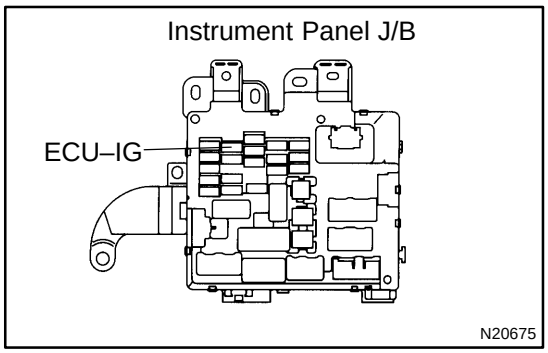
OK:

Continuity

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

4	**Check ECU–IG fuse.**



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

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

OK

Check for open in harness and connector between absorber control ECU and battery (See page IN–27).

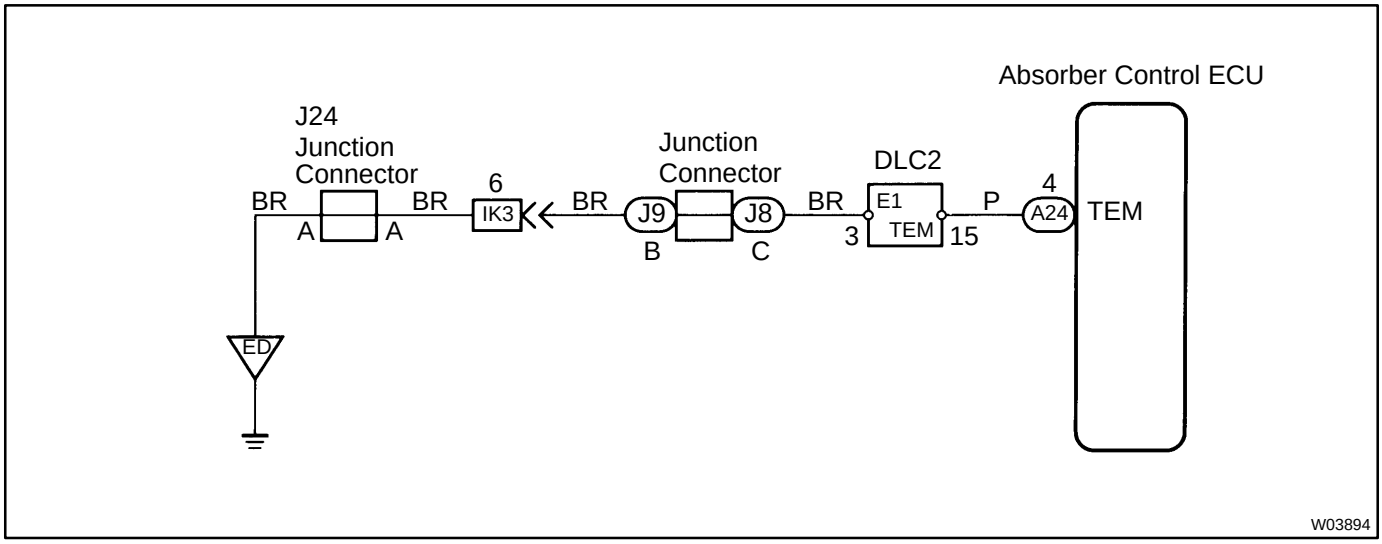
DI0AQ–01

TEM Terminal Circuit

CIRCUIT DESCRIPTION

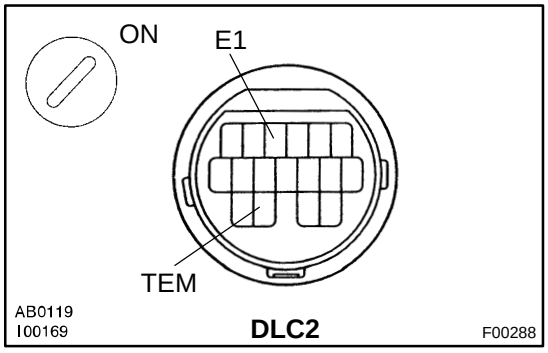
By connecting LED to the between terminals TEM and E1 of DLC2, a TEM output check can be performed (See page DI–196).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals TEM and E1 of DLC2.**



CHECK:

Measure the voltage between terminals TEM and E1 of DLC2 for 2 sec. after the ignition switch is ON.

OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	**Check for open in harness and connectors between terminals E1 of DLC2 and body ground (See page IN–27).**

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

OK

3	**Check harness and connectors between absorber control ECU and DLC2 (See page IN–27).**

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

OK

Check replace absorber control ECU.

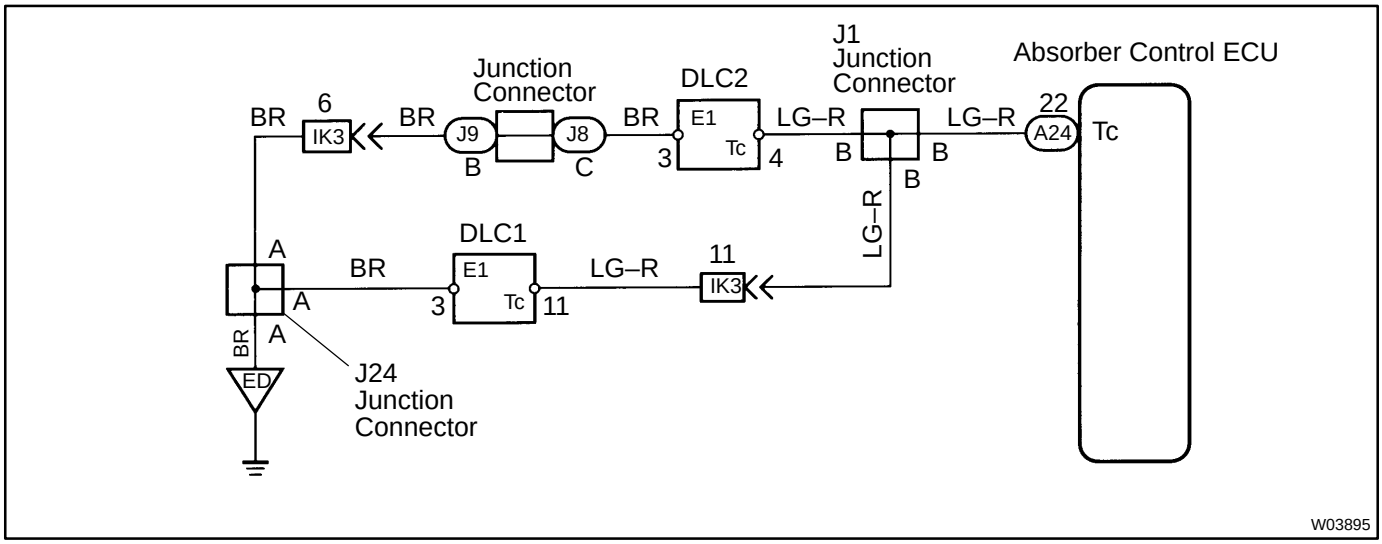
DI0AR–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

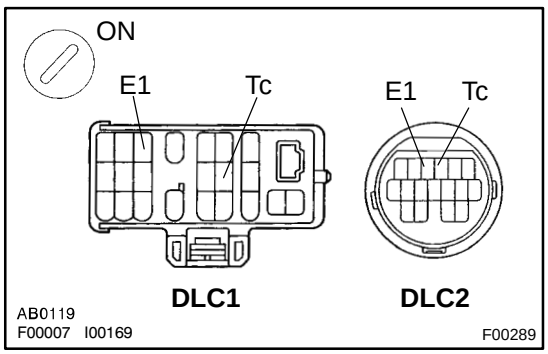
By connecting terminal Tc and E1 of DLC1 or DLC2, the DTC mode can be performed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E1 of DLC1 or DLC2.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals Tc and E1 of DLC2 or DLC1.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	**Check for open in harness and connectors between terminals E1 of DLC1, DLC2 and body ground (See page IN–27).**

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

OK

3	**Check harness and connectors between absorber control ECU and DLC1 absorber control ECU and DLC2 (See page IN–27).**

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

OK

Check and replace absorber control ECU.

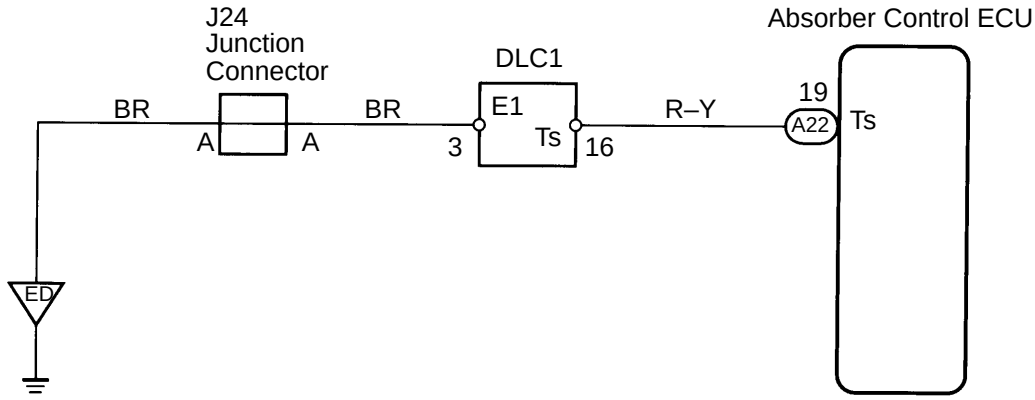
DI0AS–01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

By connecting terminal Ts and E1 of DLC1, an input signal check can be performed.

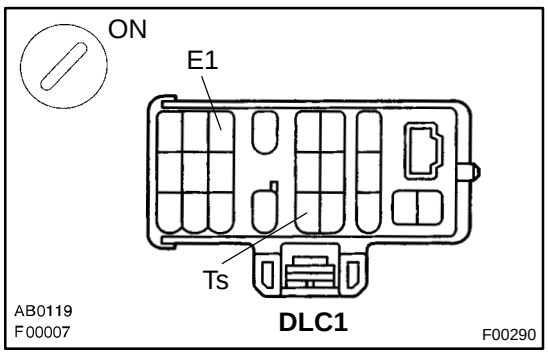
WIRING DIAGRAM



W03888

INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E1 of DLC1.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals Ts and E1 of DLC1.

OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–203).**

NG

2	**Check for open in harness and connectors between terminals E1 of DLC1 and body ground (See page IN–27).**

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

OK

3	**Check harness and connectors between absorber control ECU and DLC1 (See page IN–27).**

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

OK

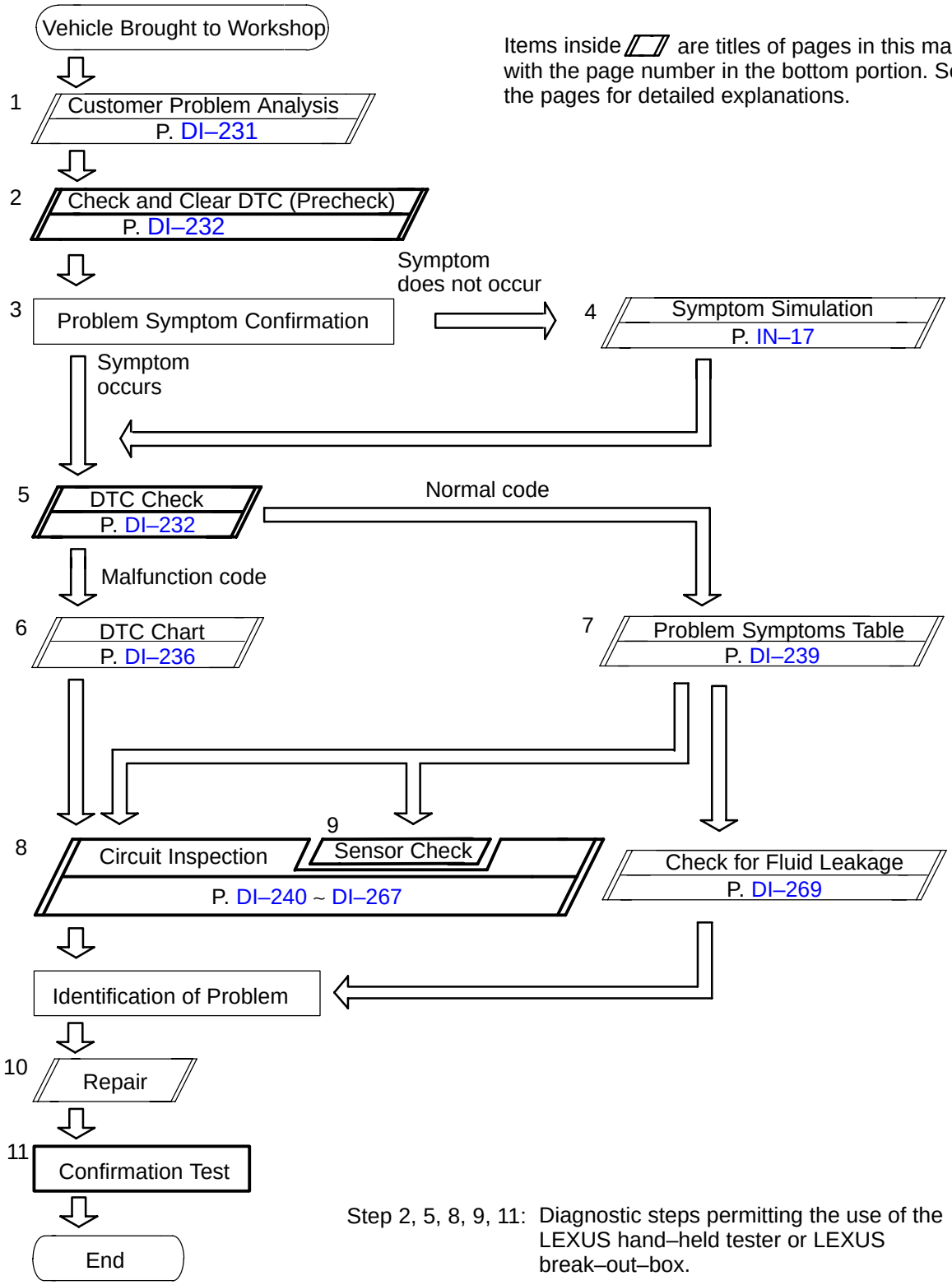
Check and replace absorber control ECU.

ANTI–LOCK BRAKE SYSTEM

DI0BB–01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoooting 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 LEXUS hand–held tester or LEXUS break–out–box.

DI0BC–01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

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

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

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

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

DI0BD–01

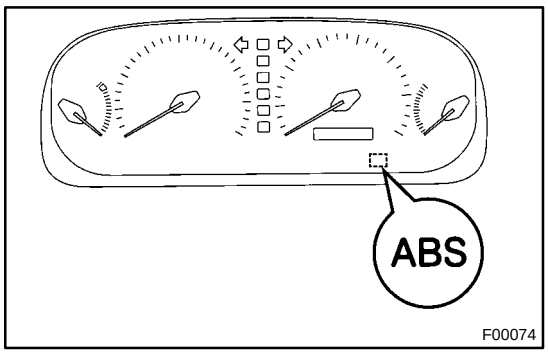
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) INDICATOR CHECK

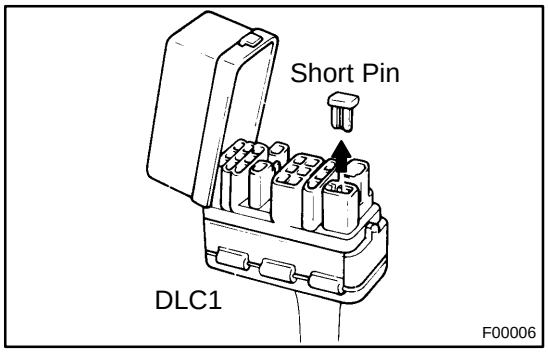
When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.

HINT: If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page DI–262).



(b) DTC CHECK

(1) Disconnect the short pin from DLC1.



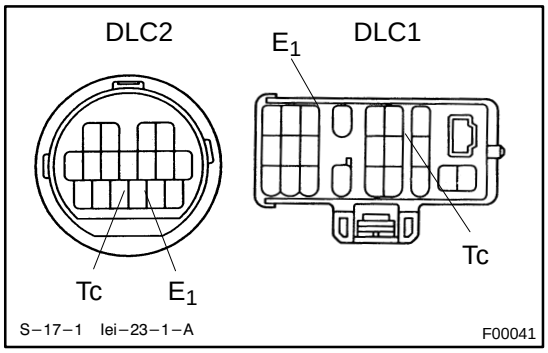
(2) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.

SST 09843 – 18020

(3) Turn the ignition switch ON.

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

HINT: If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–265 or DI–262).

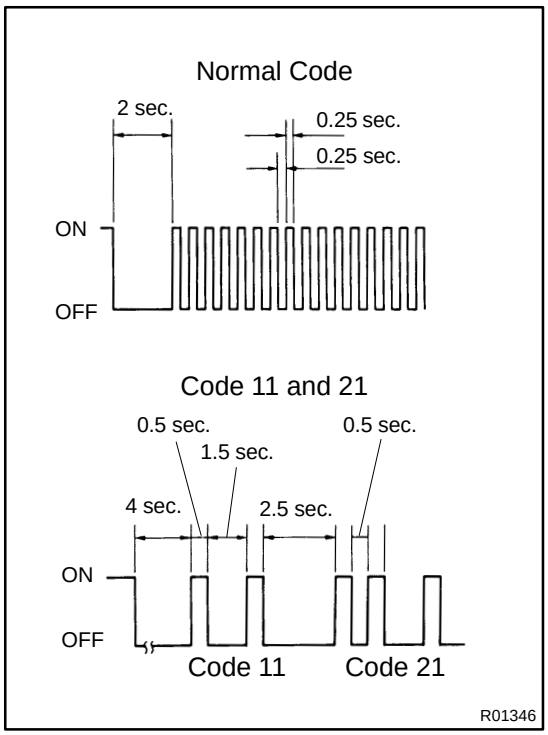


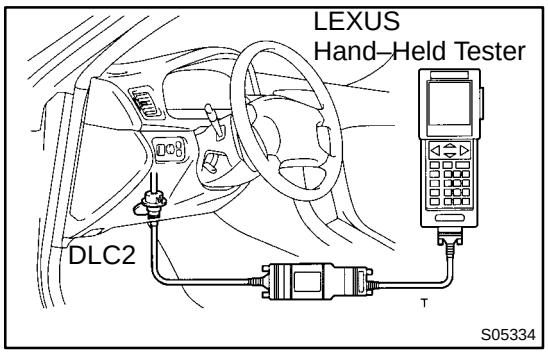
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(5) Code are explained in the code table on page DI–231.

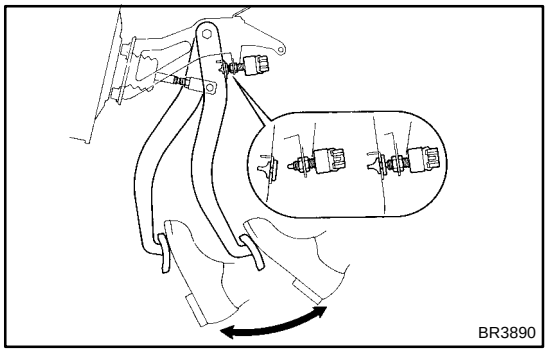
(6) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

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

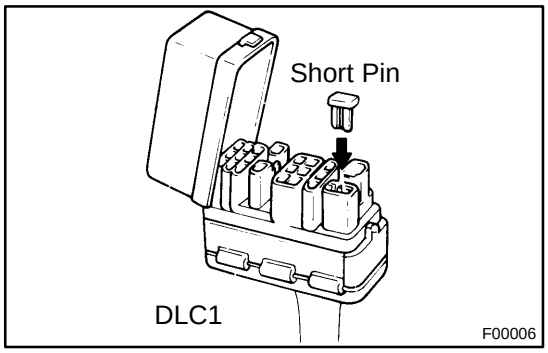




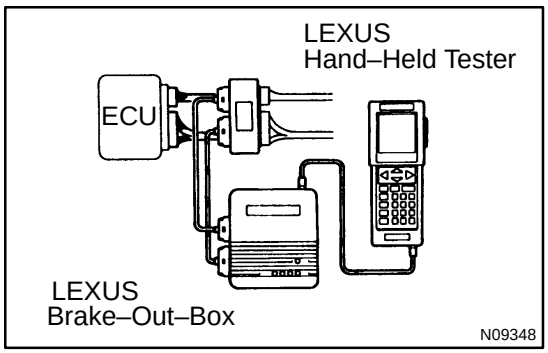
(c) DTC CHECK USING LEXUS HAND–HELD TESTER
(1) Hook up the LEXUS hand–held tester to the DLC2.
(2) Read the DTC by following the prompts on the tester screen.
Please refer to the LEXUS hand–held tester operator's manual for further details.



(d) DTC CLEARANCE
(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1 and remove the short pin from DLC1.
SST 09843 – 18020
(2) IG switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.

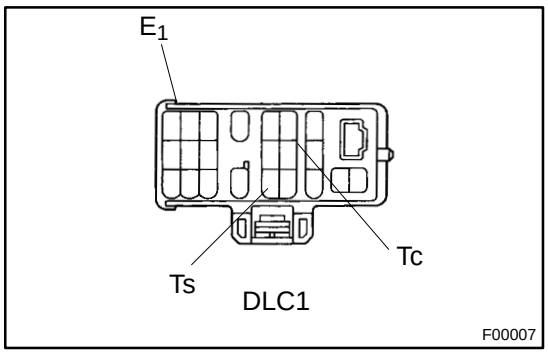


(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC2 or DLC1.
SST 09843 – 18020
(6) Connect the short pin to DLC1.



(e) ECU TERMINAL VALUES MEASUREMENT USING LEXUS BREAK –OUT–BOX AND LEXUS HAND–HELD TESTER
(1) Hook up the LEXUS hand–held tester and LEXUS break–out–box to the vehicle.
(2) Read the ECU input/output values by following the prompts on the tester screen.

HINT:LEXUS 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 LEXUS hand–held tester/LEXUS break–out–box operator's manual for further details.



2. SPEED SENSOR SIGNAL

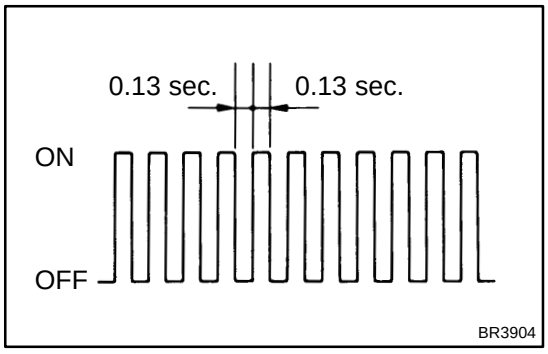
(a) SPEED SENSOR SIGNAL CHECK

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of DLC1.

SST 09843 – 18020

(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–262).

(5) Drive vehicle straight forward.

HINT:Drive vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

(7) Using SST, connect terminals Tc and E_1 of DLC1.

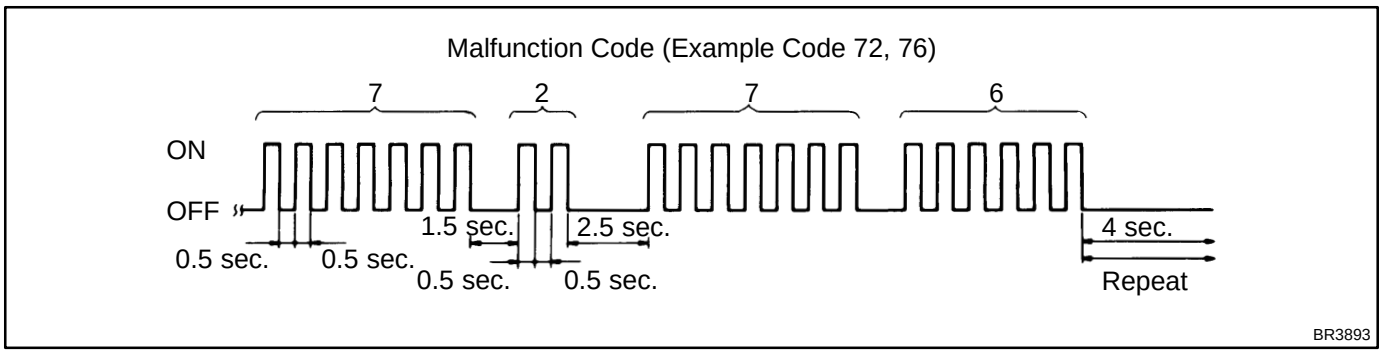
SST 09843 – 18020

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

HINT:See the list of DTC shown on the next page.

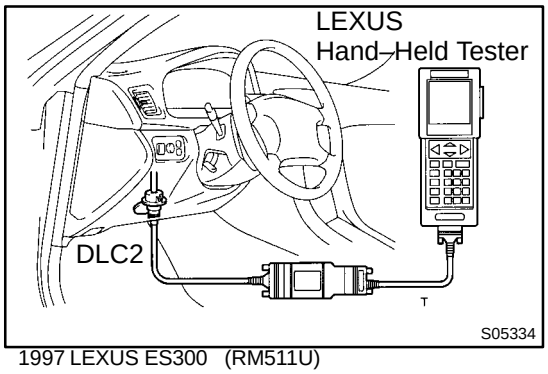
If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).

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



(9) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of DLC1, and turn ignition switch OFF.

SST 09843 – 18020



(b) DTC CHECK USING LEXUS HAND–HELD TESTER

(1) Do step 1. ~ 6. on the previous page.

(2) Hook up the LEXUS hand–held tester to the DLC2.

(3) Read the DTC by following the prompts on the tester screen.

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

(c) DTC OF SPEED SENSOR CHECK FUNCTION

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

DI0BE–01

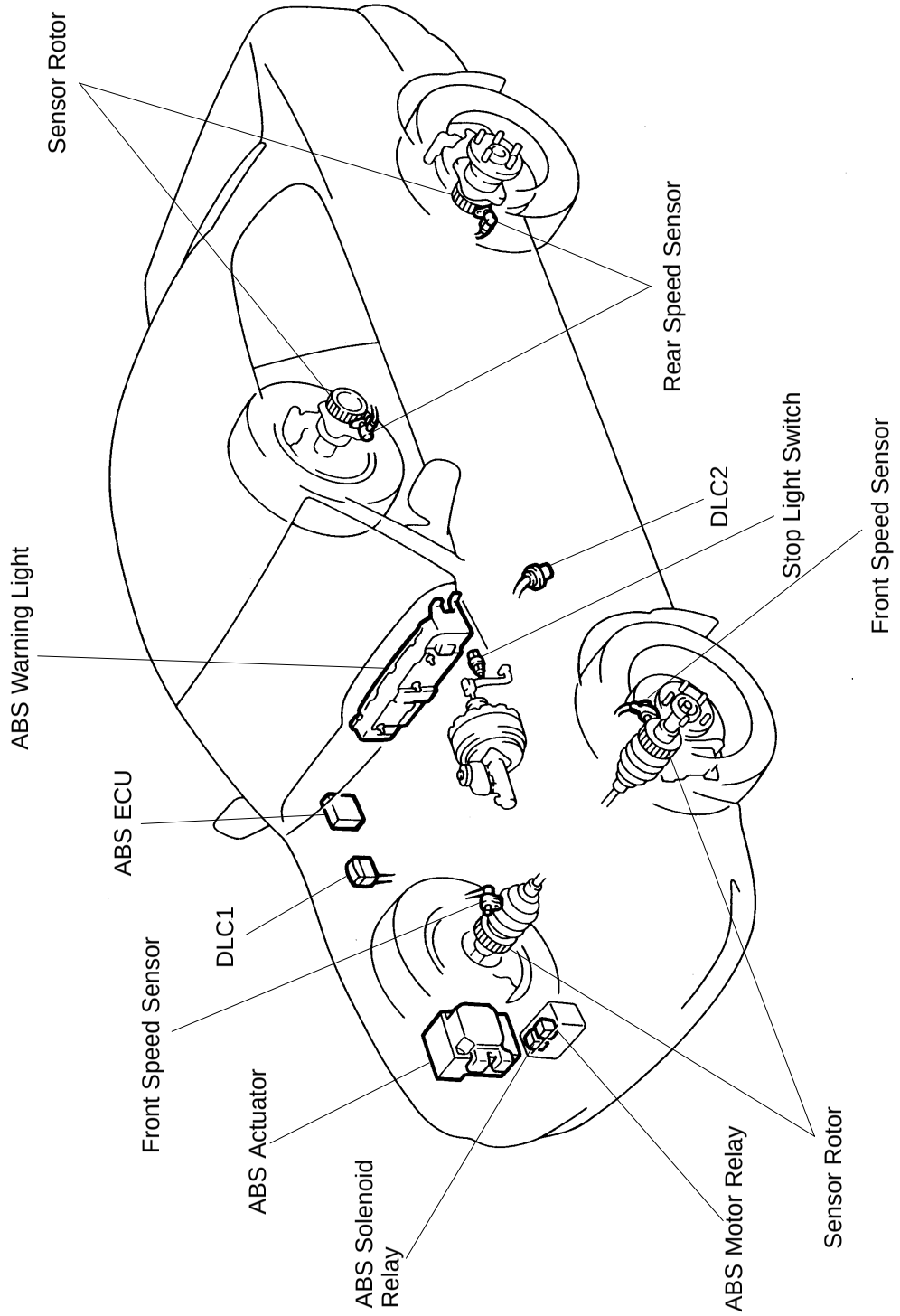
DIAGNOSTIC TROUBLE CODE CHART

HINT:Using SST 09843 –18020, connect the terminals Tc and E_1, and remove the short pin.
If a malfunction code is displayed during the DTC check, check the circuit listed that 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 No. (See Page)	Detection Item	Trouble Area
11 (DI–240)	Open circuit in ABS solenoid relay circuit	●ABS solenoid relay ●ABS solenoid relay circuit
12 (DI–240)	Short circuit in ABS solenoid relay circuit	
13 (DI–243)	Open circuit in ABS motor relay circuit	●ABS motor relay ●ABS motor relay circuit
14 (DI–243)	Short circuit in ABS motor relay circuit	
21 (DI–246)	Open or short circuit in 2–position solenoid circuit for right front wheel	●ABS actuator ●SFRR or SFRH circuit
22 (DI–246)	Open or short circuit in 2–position solenoid circuit for left front wheel	●ABS actuator ●SFLR or SFLH circuit
23 (DI–246)	Open or short circuit in 2–position solenoid circuit for right rear wheel	●ABS actuator ●SRRR or SRRH circuit
24 (DI–246)	Open or short circuit in 2–position solenoid circuit for left rear wheel	●ABS actuator ●SRLR or SRLH circuit
31 (DI–248)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor
32 (DI–248)	Left front wheel speed sensor signal malfunction	
33 (DI–248)	Right rear wheel speed sensor signal malfunction	
34 (DI–248)	Left rear wheel speed sensor signal malfunction	
33, 34 (DI–253)	Rear speed sensor rotor faulty	●Rear axle hub ●Right rear, left rear speed sensor ●Rear speed sensor circuit
41 (DI–254)	Power source voltage down	●Battery ●IC regulator ●Power source circuit
49 (DI–257)	Open circuit in stop light switch circuit	●Stop light switch ●Stop light switch circuit
51 (DI–259)	Pump motor is locked	●ABS pump motor
Always ON (DI–260)	Malfunction in ECU	●ECU ●Battery

DI0BF–01

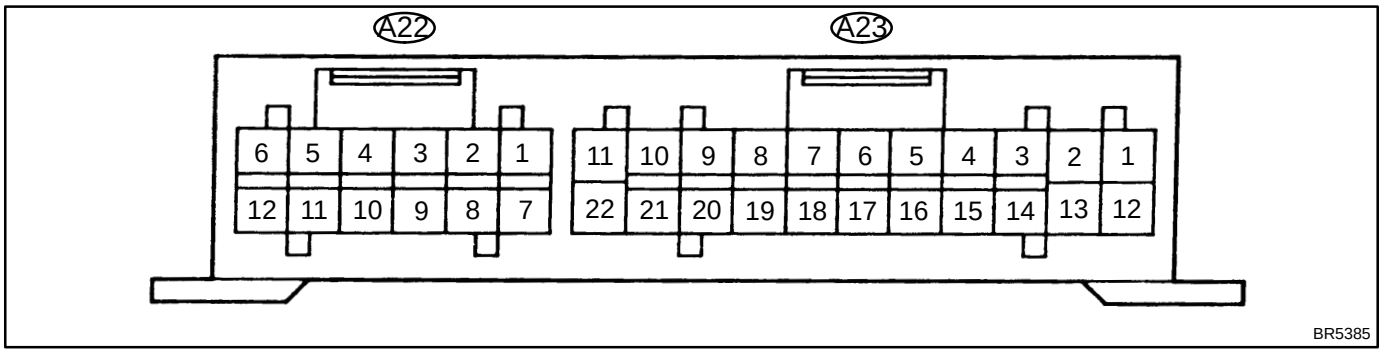
PARTS LOCATION



F00077

DI0BG–01

TERMINALS OF ECM



Symbols (Terminals No.)	STD Voltage (V)	Condition
IG1(A22 – 2) – GND (A23 – 2, 13)	10 – 14	IG switch ON
R+ (A23 – 8) – SR (A23 – 18)	9 – 14	IG switch ON, ABS warning light OFF
R+ (A23 – 8) – MR (A23 – 7)	Below 1.0	IG switch ON
SFRR (A23 – 1) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SFRH (A23 – 4) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SFLR (A23 – 11) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SFLH (A23 – 10) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SRRR (A23 – 22) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SRRH (A23 – 21) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SRLR (A23 – 12) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
SRLH (A23 – 5) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
AST (A23 – 16) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
WA (A22 – 4) – GND (A23 – 2, 13)	Below 2.0	IG switch ON, ABS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
STP (A22 – 12) – GND (A23 – 2, 13)	Below 1.5	Stop light switch OFF
	8 – 14	Stop light switch ON
D/G (A22 – 11) – GND (A23 – 2, 13)	10 – 14	IG switch ON, ABS warning light OFF
Tc (A22 – 9) – GND (A23 – 2, 13)	8 – 14	IG switch ON
Ts (A22 – 8) – GND (A23 – 2, 13)	8 – 14	IG switch ON
FR+ (A23 – 3) – FR– (A23 – 14)	AC generation	IG switch ON Slowly turn right front wheel
FL+ (A23 – 19) – FL– (A23 – 20)	AC generation	IG switch ON Slowly turn left front wheel
RR+ (A22 – 1) – RR– (A22 – 7)	AC generation	IG switch ON Slowly turn right rear wheel
RL+ (A22 – 3) – RL– (A22 – 10)	AC generation	IG switch ON Slowly turn left rear wheel
MT (A23 – 9) – GND (A23 – 2, 13)	Below 1.5	IG switch ON

DI0BH–01

PROBLEM SYMPTOMS TABLE

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

Symptoms	Inspection Circuit	See page
ABS does not operate.	Only when 1. ~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. IG power source circuit. 3. Speed sensor circuit. 4. Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–269).	 DI–232 DI–254 DI–248 BR–46
ABS does not operate efficiently.	Only when 1. ~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit. 3. Stop light switch circuit. 4. Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–269).	 DI–232 DI–248 DI–257 BR–46
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS ECU.	DI–262 DI–260
DTC check cannot be done.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit. 2. Tc terminal circuit.	 DI–262 DI–265
Speed sensor signal check cannot be done.	1. Ts terminal circuit. 2. ABS ECU.	DI–267 DI–260

DI0BI–01

CIRCUIT INSPECTION

DTC	11, 12	ABS Solenoid Relay Circuit

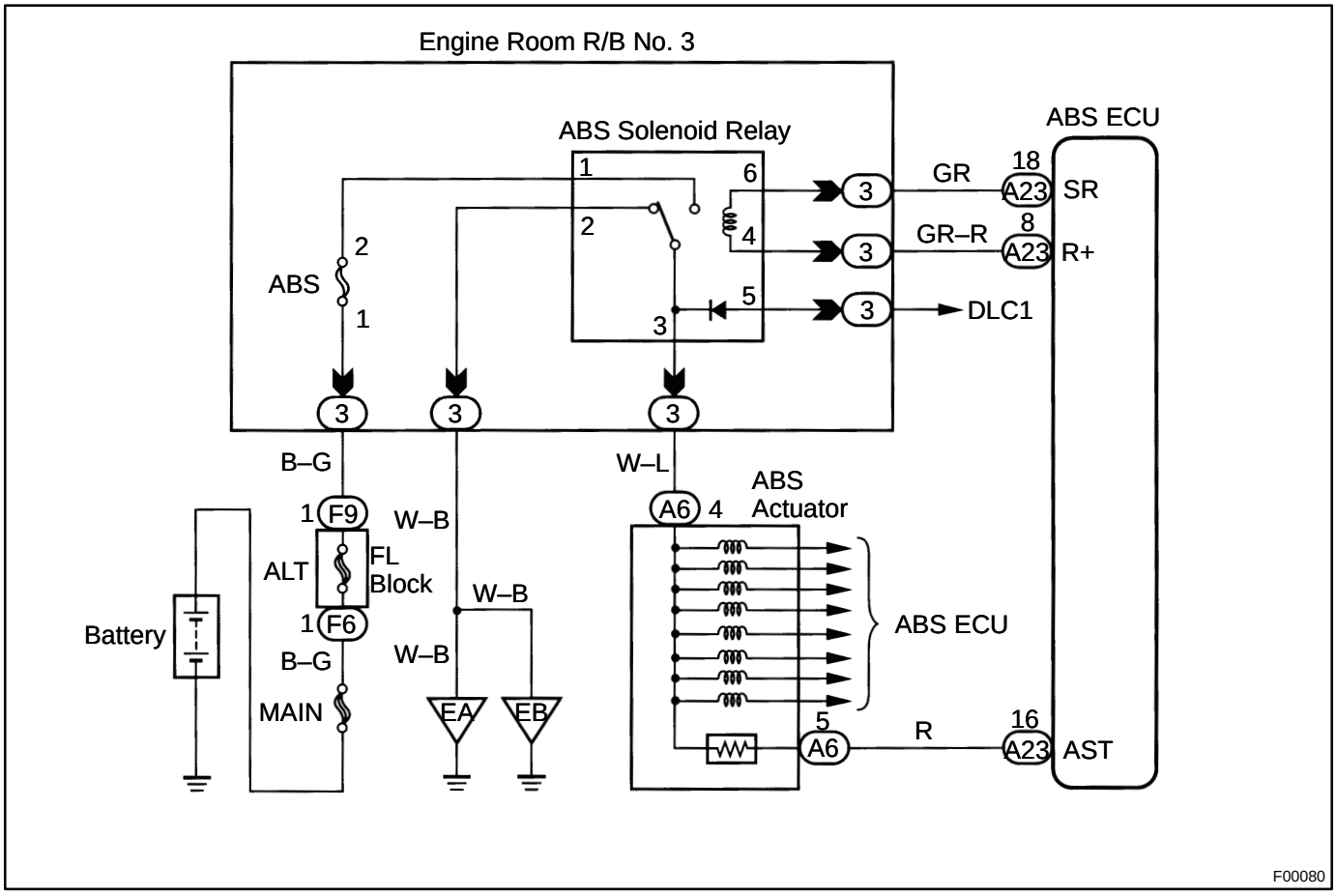
CIRCUIT DESCRIPTION

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
11	Condition (1) or (2) continue for 0.2 sec. or more: (1) ABS ECU terminal IG1 voltage is 9.5 V to 18.0 V, and when solenoid relay is ON, ABS ECU terminal AST voltage is less than 4 V. (2) With solenoid relay is ON driving, ABS ECU terminal IG1 voltage becomes 9.5 V or less, and ABS ECU terminal AST voltage is less than 4 V.	●ABS solenoid relay ●ABS solenoid relay circuit
12	Immediately after turning ignition switch ON, and when solenoid relay is OFF, ABS ECU terminal AST voltage is 4 V or more continues for 0.2 sec. or more.	

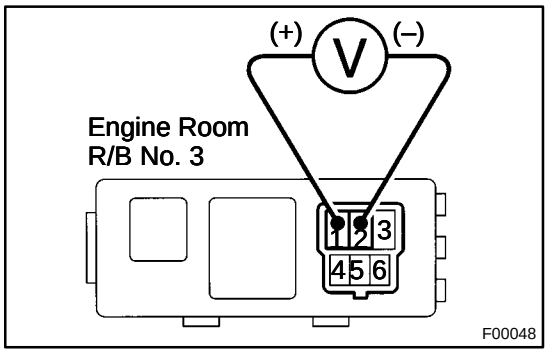
Fail safe function: If trouble in the ABS solenoid relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS solenoid relay).**



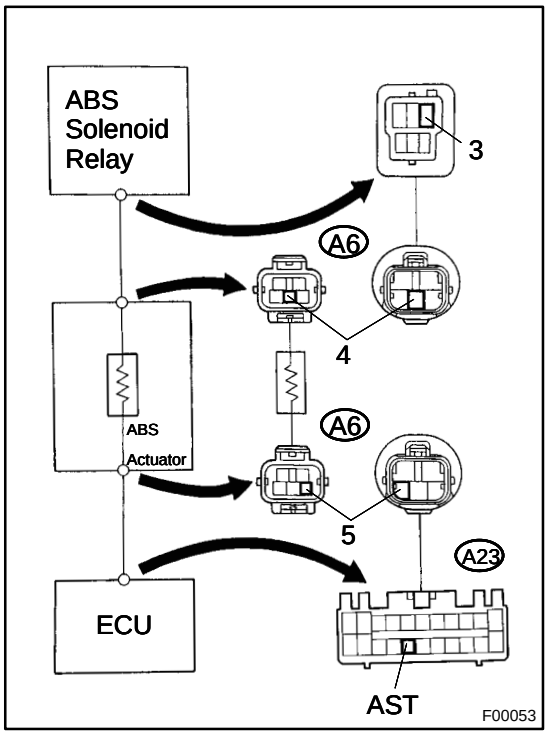
PREPARATION:
Remove ABS solenoid relay from Engine Room R/B No. 3.
CHECK:
Measure the voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS solenoid relay).
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 3 of ABS solenoid relay and terminal AST of ABS ECU.**



CHECK:
Check continuity between terminal 3 of ABS solenoid relay and terminal AST of ABS ECU.
OK:

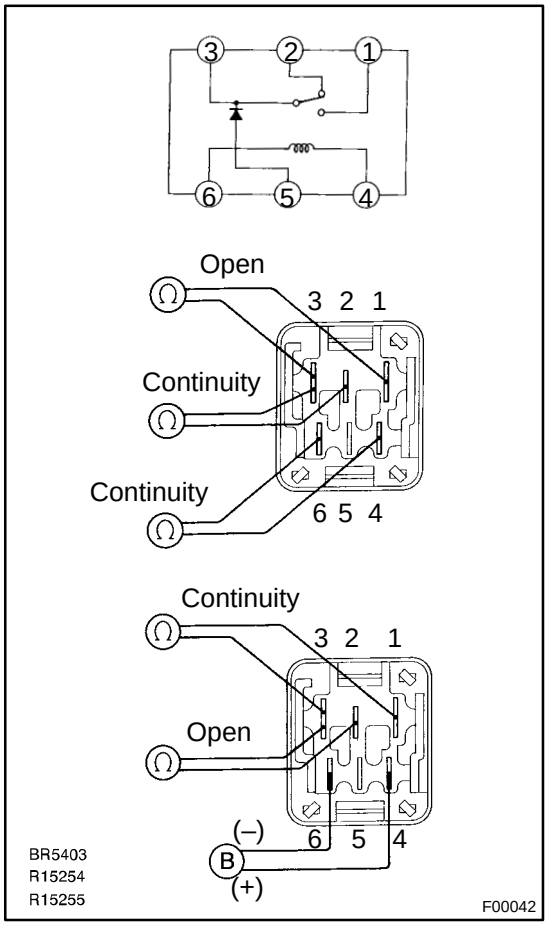
Continuity

HINT:There is a resistance of 4 ~ 6 Ω between terminals A6 – 4 and A6 – 5 of ABS actuator.

NG	**Repair or replace harness or ABS actuator.**

OK

3	Check ABS solenoid relay.



PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 3.

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 positive 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 for open and short in harness and connector between ABS solenoid relay and ABS ECU (See page IN–27).

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 connector are normal, the ECU may be defective.

DI0BJ–01

DTC	13, 14	ABS Motor Relay Circuit

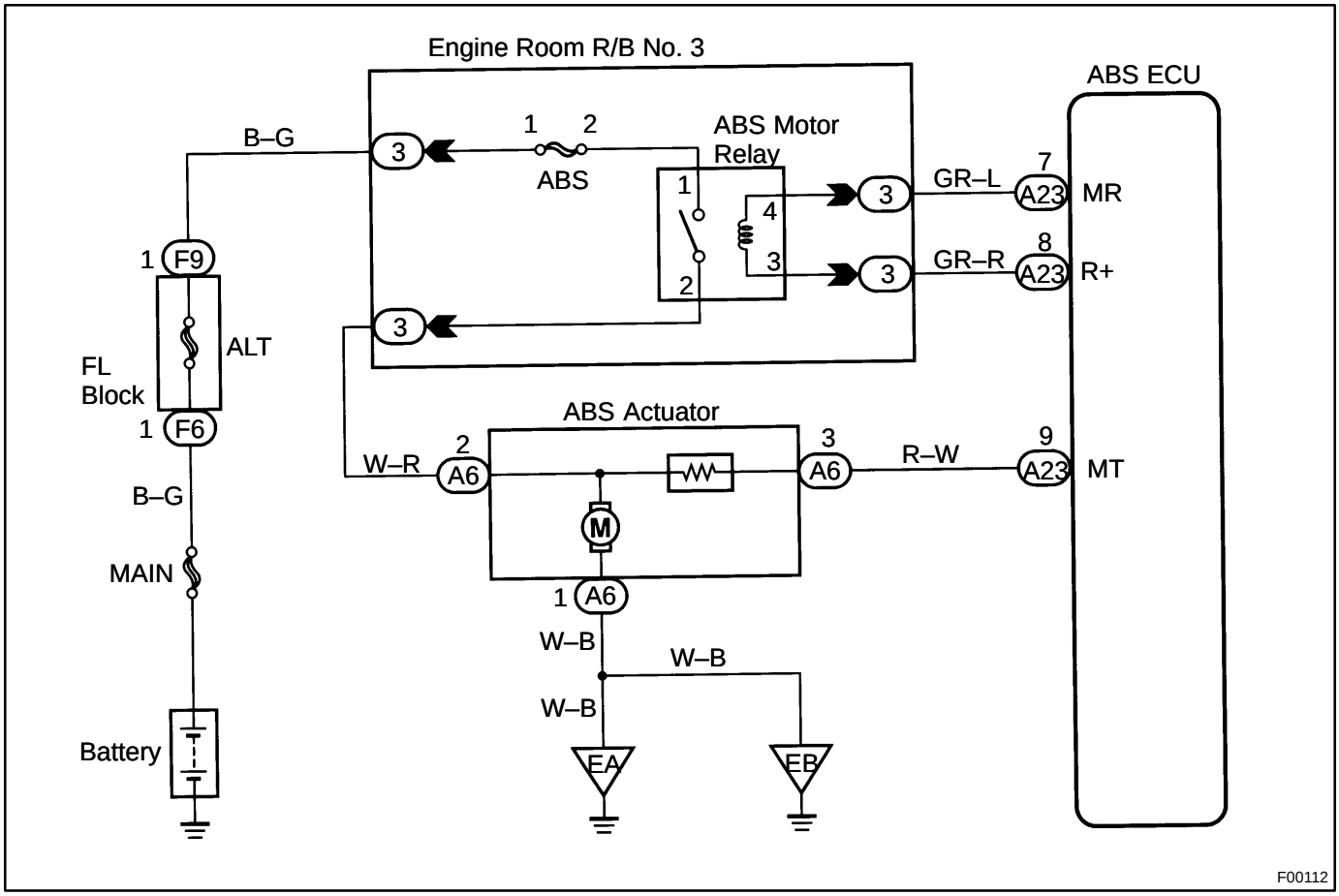
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
13	Condition (1) or (2) continued for 0.2 sec. or more: (1) ABS ECU terminal IG1 voltage is 9.5 V to 18.0 V, and when motor relay is ON in the midst of initial check or in operation of ABS control, ABS ECU terminal MT voltage is less than 4 V. (2) Motor relay is ON driving in the midst of initial check or in operation of ABS control, ABS ECU terminal IG1 voltage becomes 9.5 V or less and ABS ECU terminal MT voltage is less than 4 V.	●ABS motor relay ●ABS motor relay circuit
14	When motor relay is OFF, ABS ECU terminal MT voltage is 4 V or more continues for 0.2 sec. or more.	

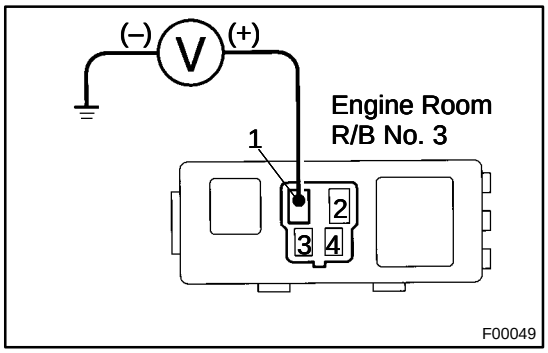
Fail safe function: If trouble occurs in the ABS motor relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of Engine Room R/B No. 3 (for ABS motor relay) and body ground.**



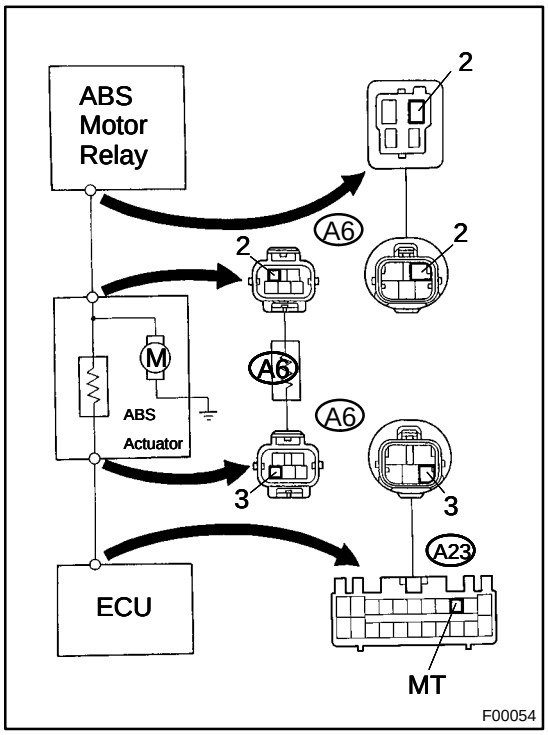
PREPARATION:
Remove ABS motor relay from Engine Room R/B No. 3.
CHECK:
Measure voltage between terminal 1 of Engine Room R/B No. 3 (for ABS motor relay) and body ground.
OK:

Voltage: 10 – 14 V

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

OK ↓

2	**Check continuity between terminal 2 of ABS motor relay and terminal MT of ABS ECU.**



CHECK:
Check continuity between terminal 2 of ABS motor relay and terminal MT of ABS ECU.
OK:

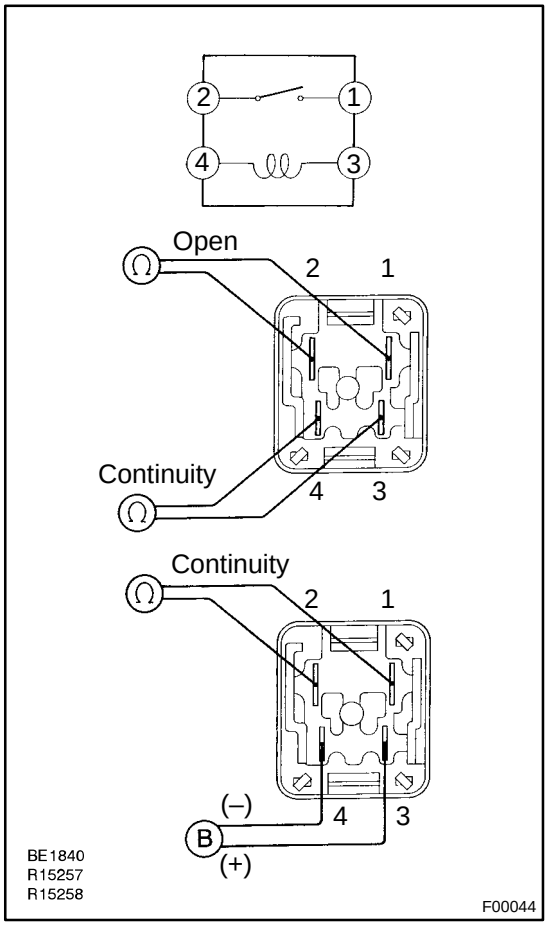
Continuity

HINT:There is a resistance of 4 ~ 6 Ω between terminals A6 – 2 and A6 – 3 of ABS actuator.

NG → **Repair or replace harness or ABS actuator.**

OK ↓

3	Check ABS motor relay.



PREPARATION:
Remove ABS motor relay from Engine Room R/B No. 3.

CHECK:
Check continuity between each terminal of ABS motor relay.
OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals of ABS motor relay.
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK ↓

4	Check for open and short in harness and connector between ABS motor relay and ABS ECU (See page IN–27).

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.

DI0BK–01

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

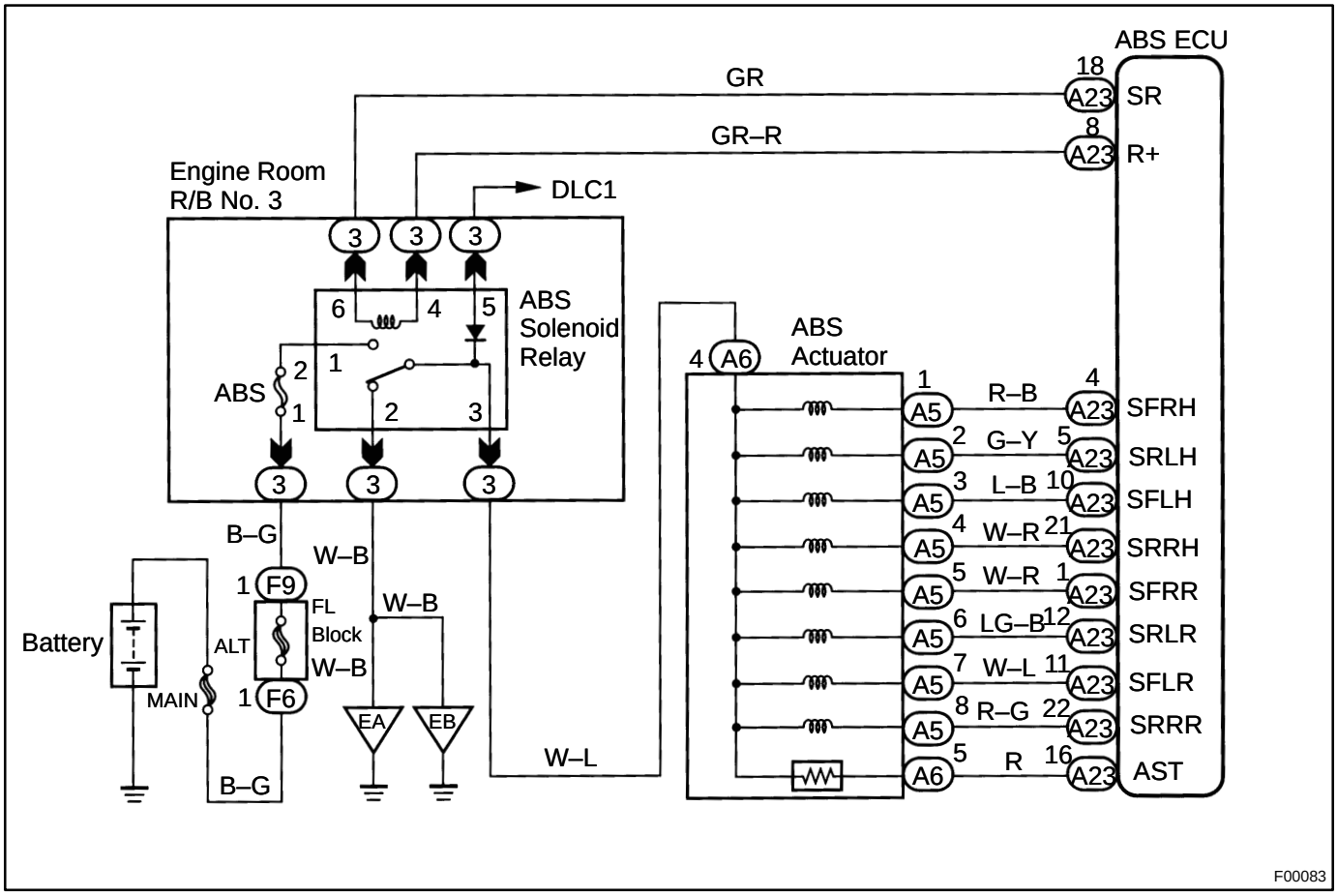
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
21	Actuator solenoid SFRR or SFRH is open or short circuit continues for 0.05 sec. or more.	●ABS actuator ●SFRR or SFRH circuit
22	Actuator solenoid SFLR or SFLH is open or short circuit continues for 0.05 sec. or more.	●ABS actuator ●SFLR or SFLH circuit
23	Actuator solenoid SRRR or SRRH is open or short circuit continues for 0.05 sec. or more.	●ABS actuator ●SRRR or SRRH circuit
24	Actuator solenoid SRLR or SRLH is open or short circuit continues for 0.05 sec. or more.	●ABS actuator ●SRLR or SRLH circuit

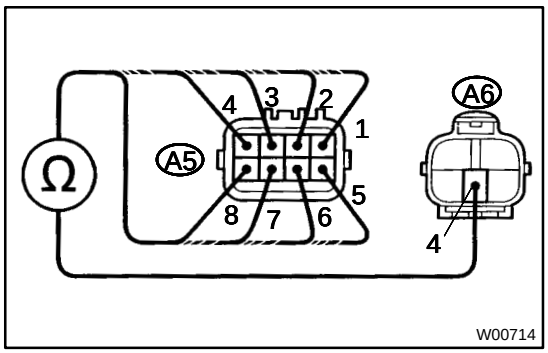
Fail safe function: If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ABS actuator solenoid.**



PREPARATION:
Disconnect the 2 connectors from ABS actuator.
CHECK:
Check continuity between terminals A6 – 4 and A5 – 1, 2, 3, 4, 5, 6, 7, 8 of ABS actuator connector.
OK:

Continuity

HINT:Resistance of each solenoid coil is 1.2 Ω.

NG → **Replace ABS actuator.**

OK

2	**Check for open and short in harness and connector between ABS ECU and actuator (See page IN–27).**

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

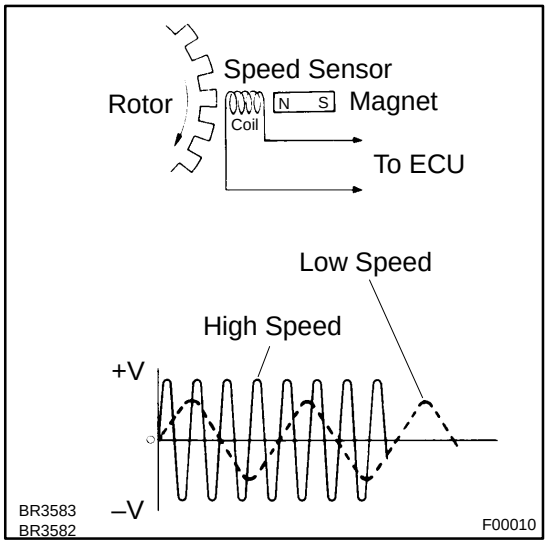
OK

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.

DI0BL–01

DTC	31, 32, 33, 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



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

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

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from (1) through (4): (1) Vehicle speed is at 10 km/h (6 mph) or more and the speed sensor signal circuit is open or short circuit continues for 15 sec. or more. (2) Momentary interruption of the speed sensor signal occurs 7 times or more. (3) Vehicle speed is at 20 km/h (12mph) or more and interference on the speed sensor signal continues for 5 sec. or more. (4) Open circuit condition 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 ●Speed sensor rotor

HINT:

DTC No. 31 is for the right front speed sensor.

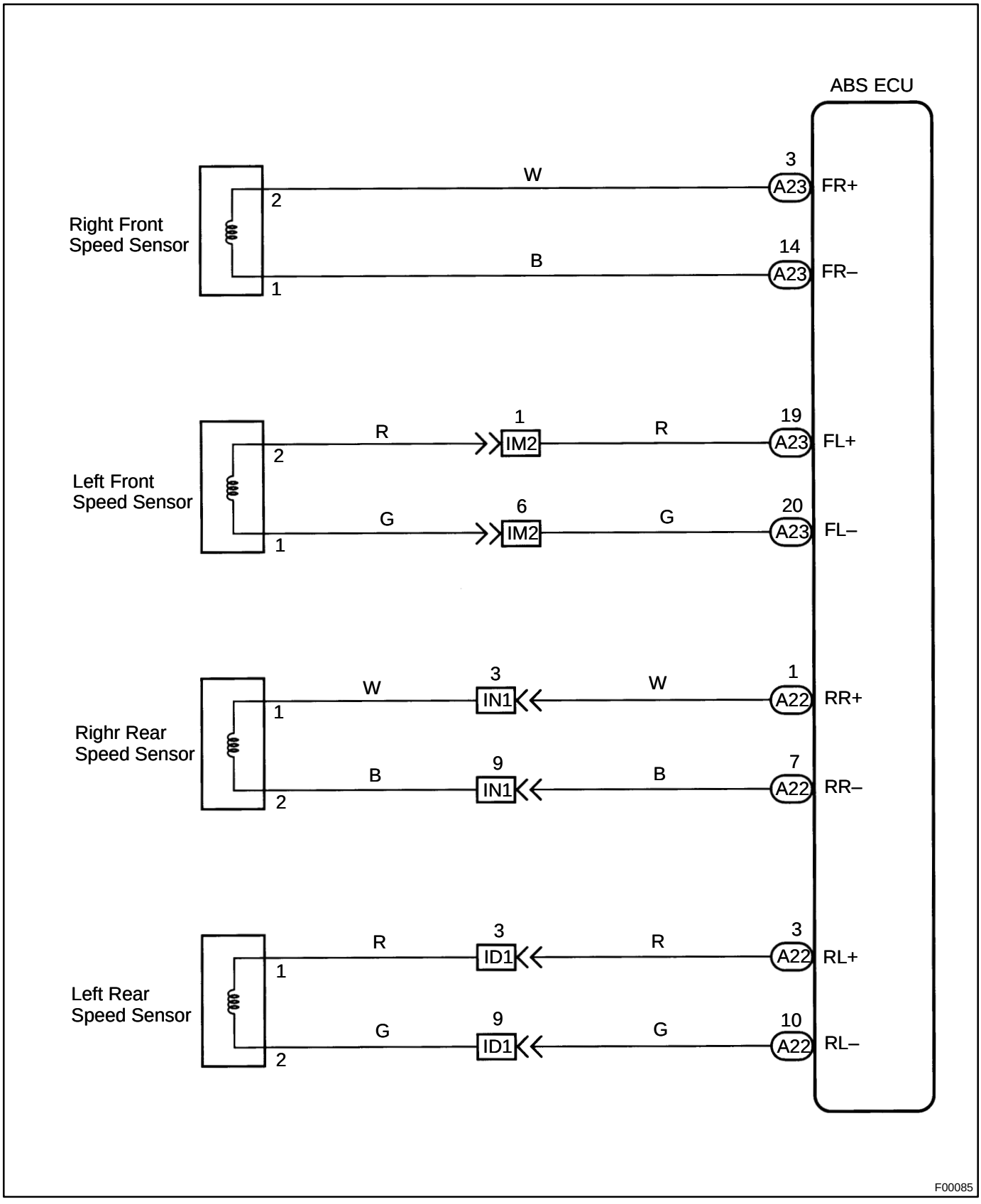
DTC No. 32 is for the left front speed sensor.

DTC No. 33 is for the right rear speed sensor.

DTC No. 34 is for the left rear speed sensor.

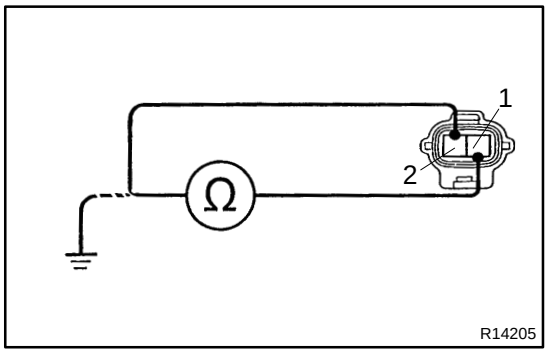
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front

PREPARATION:

(a) Remove front fender liner.

(b) Disconnect speed sensor connector.

CHECK:

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

OK:

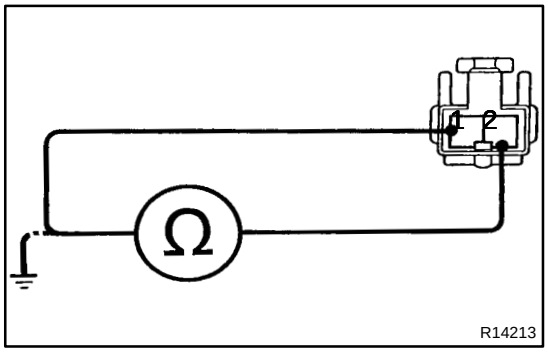
Resistance: 0.6 – 2.5 kΩ

CHECK:

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

OK:

Resistance: 1 MΩ or higher



Rear

PREPARATION:

(a) Remove the seat cushion and seat back.

(b) Disconnect speed sensor connector.

CHECK:

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

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

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

OK:

Resistance: 1 MΩ or higher

NG → **Replace speed sensor.**

NOTICE:Check the speed sensor signal last (See page DI–232).

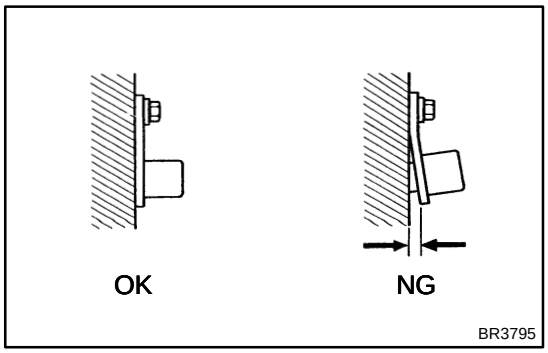
OK

2	**Check for open and short in harness and connector between each speed sensor and ECU (See page IN–27).**

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

OK

3	**Check sensor installation.**



CHECK:
Check the speed sensor installation.
OK:

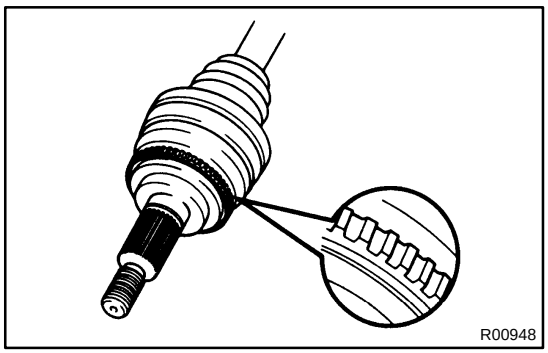
The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:Check the speed sensor signal last (See page DI–232).

OK

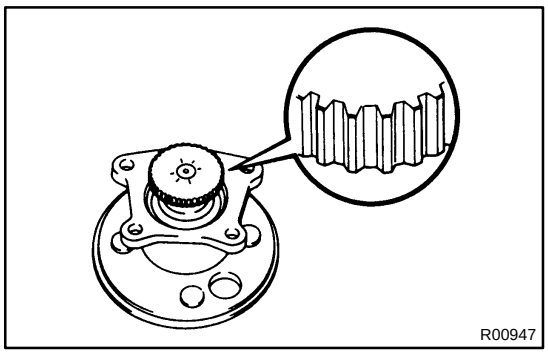
4	**Check sensor rotor and sensor tip.**



Front
PREPARATION:
Remove front drive shaft (See page SA–16).
CHECK:
Check sensor rotor serrations.
OK:

No scratches or missing teeth or foreign objects.
PREPARATION:
Remove the front speed sensor (See page BR–59).
CHECK:
Check the sensor tip.
OK:

No scratches or foreign objects on the sensor tip.



Rear

PREPARATION:

Remove the axle hub (See page SA–46).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–62).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

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

NOTICE:Check the speed sensor signal last (See page DI–232).

OK

Check and replace ABS ECU.

DI0BM–01

DTC	33, 34	Rear Speed Sensor Rotor Faulty

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
33, 34	The condition that both rear side wheels' speed is lower than front wheels' speed at 20 km/h (12 mph) or more for 20 sec. or more when IG switch turns ON and OFF is repeated in a sequence more than 8 times.	●Rear axle hub ●Right rear, left rear speed sensor ●Rear speed sensor circuit

INSPECTION PROCEDURE

1	Check rear axle hub (See page SA–45).

NG → Replace rear axle hub.

OK

2	Check rear speed sensor (See page DI–248).

NG → Replace rear speed sensor.

OK

3	Check for open or short in harness and connector between rear speed sensor and ECU (See page IN–27).

NG → Repair or replace harness and connector.

OK

Check and replace ABS ECU.

DI0BN–01

DTC	41	IG Power Source Circuit

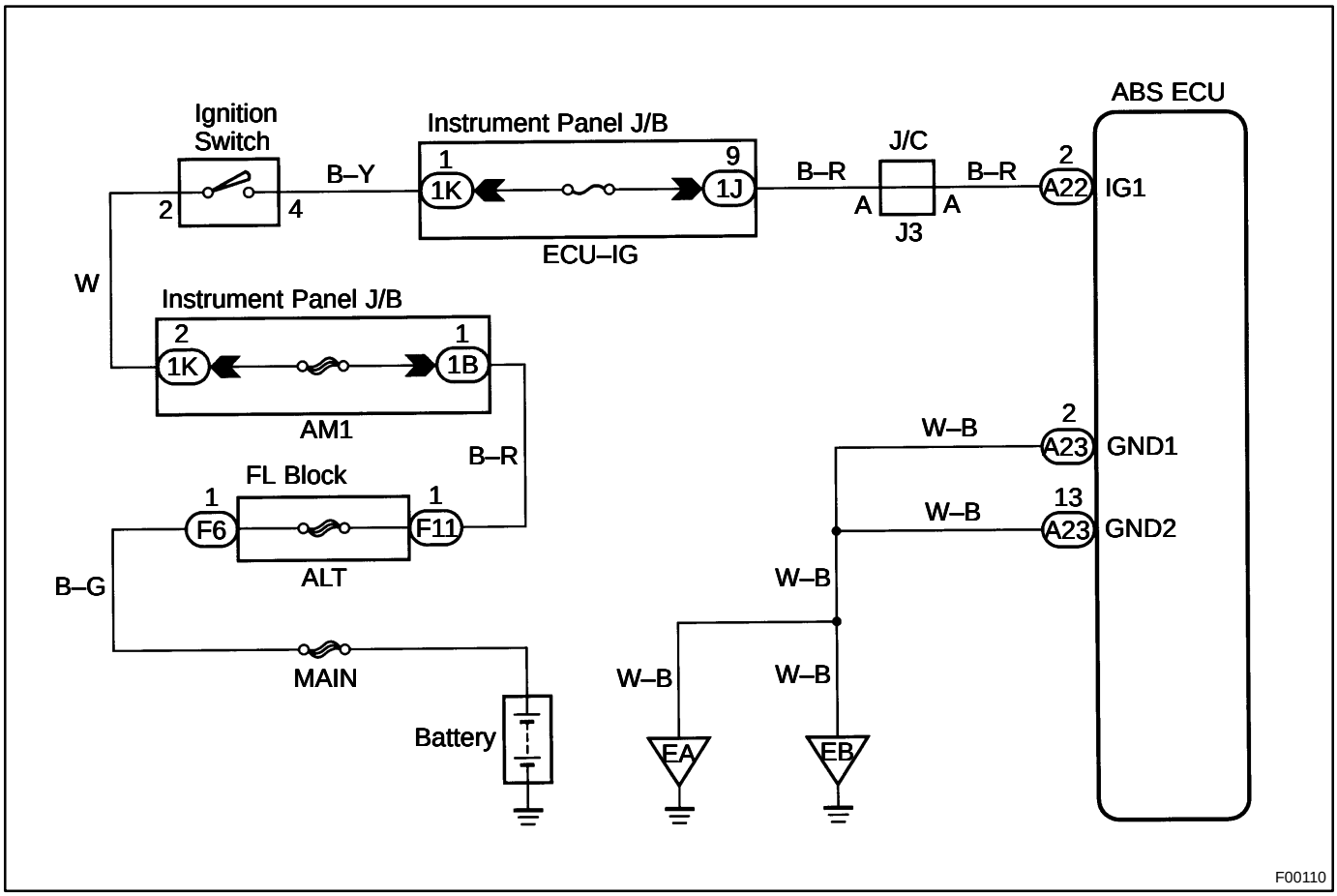
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
41	Condition (1) or (2) is detected: (1) Vehicle speed is at 3 km/h (1.9 mph) or more and ECU terminal IG1 voltage is 9.5 V or less continues for 10 sec. or more. (2) While ABS solenoid or motor relay is ON, ABS ECU terminal IG1 voltage becomes 9.5 V or less and when ABS ECU terminal AST or MT voltage is less than 4 V continues for 0.2 sec. or more.	●Battery ●IC regulator ●Power source circuit

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

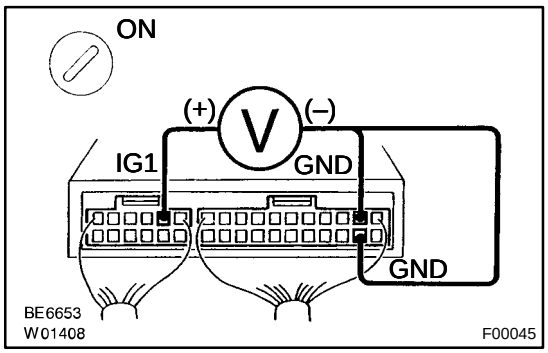
OK:

Voltage: 10 – 14 V

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

OK

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



PREPARATION:

Remove ABS ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of ABS ECU connector.

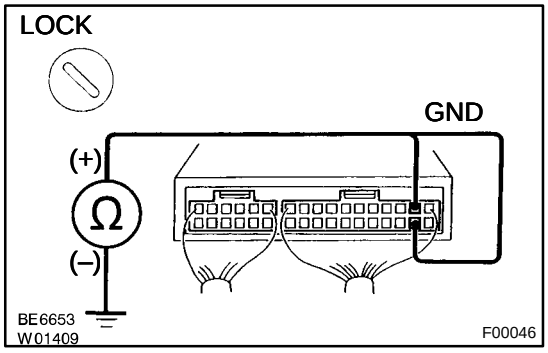
OK:

Voltage: 10 – 14 V

NG → **Check and replace ABS ECU.**

OK

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



CHECK:

Measure resistance between terminal GND of ABS ECU connector and body ground.

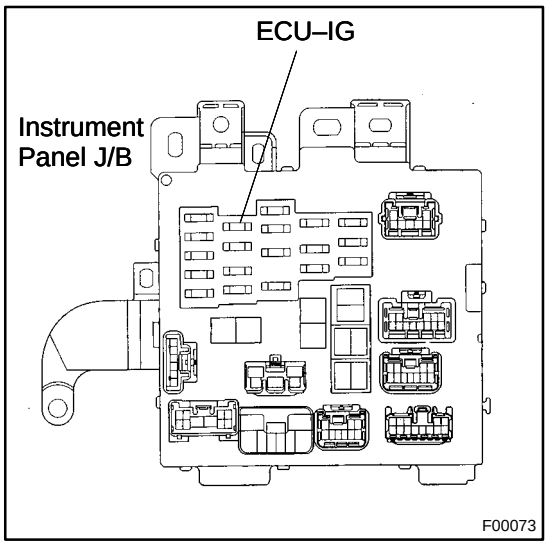
OK:

Resistance: 1 Ω or less

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

OK

4	Check ECU–IG fuse.



PREPARATION:
Remove ECU–IG fuse from Instrument Panel J/B.
CHECK:
Check continuity of ECU–IG fuse.
OK:

Continuity

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

OK →

Check for open in harness and connector between ABS ECU and battery (See page IN–27).

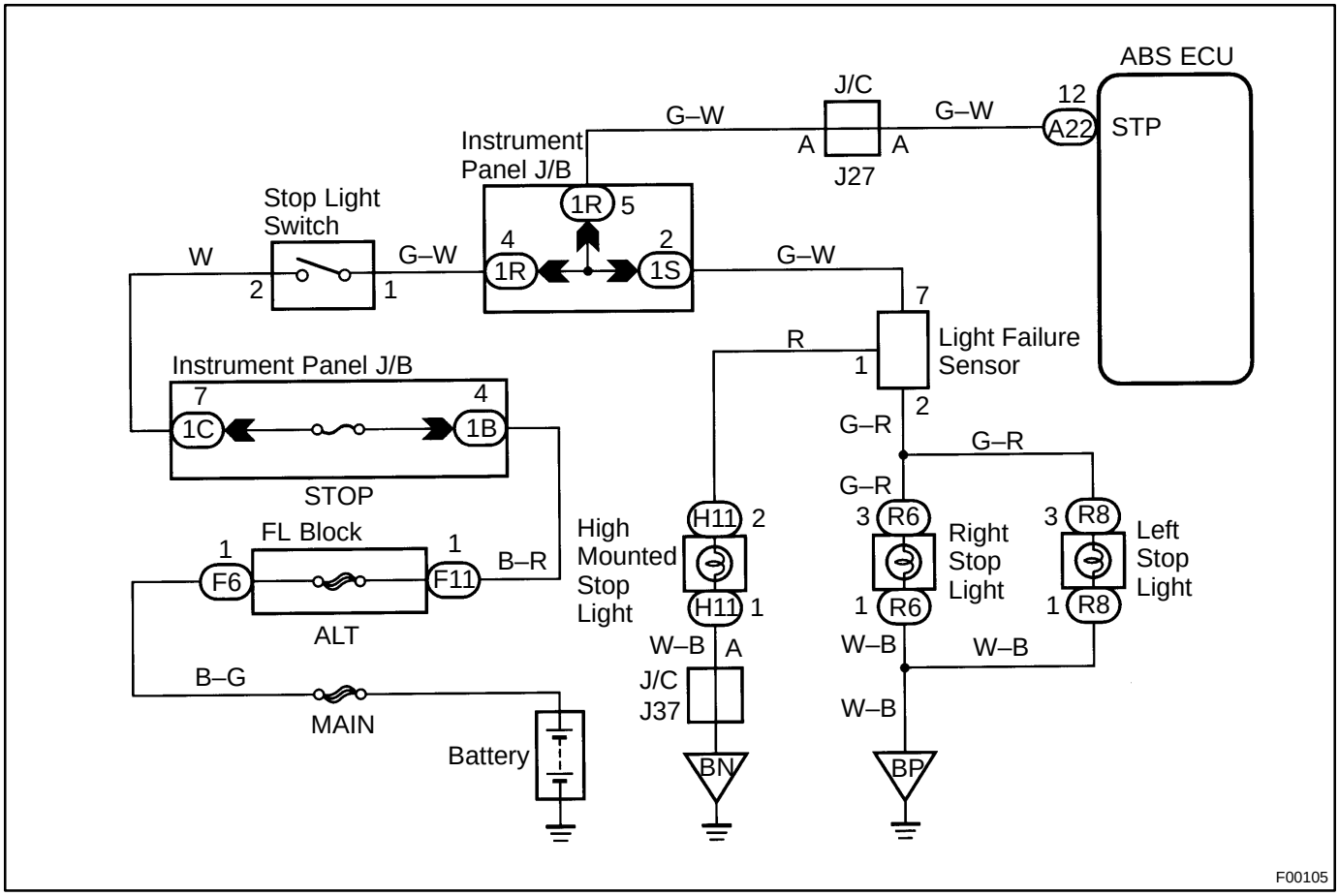
DI0BO–01

DTC	49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
49	ABS ECU terminal IG1 voltage is 9.5 V to 18.0 V and ABS is in non–operation, the open circuit of the stop light switch circuit continues for 0.3 sec. or more.	●Stop light switch ●Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of stop light.**

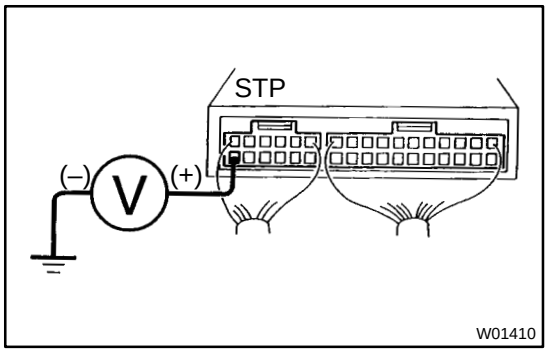
CHECK:

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

NG	**Repair stop light circuit (See page BE–50).**

OK

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



PREPARATION:
Remove ABS ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of ABS ECU and body ground when brake pedal is depressed.
OK:

Voltage: 8 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–239).**

NG

3	**Check for open in harness and connector between ABS ECU and stop light Switch (See page IN–27).**

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

OK

Check and replace ABS ECU.

DI0BP–01

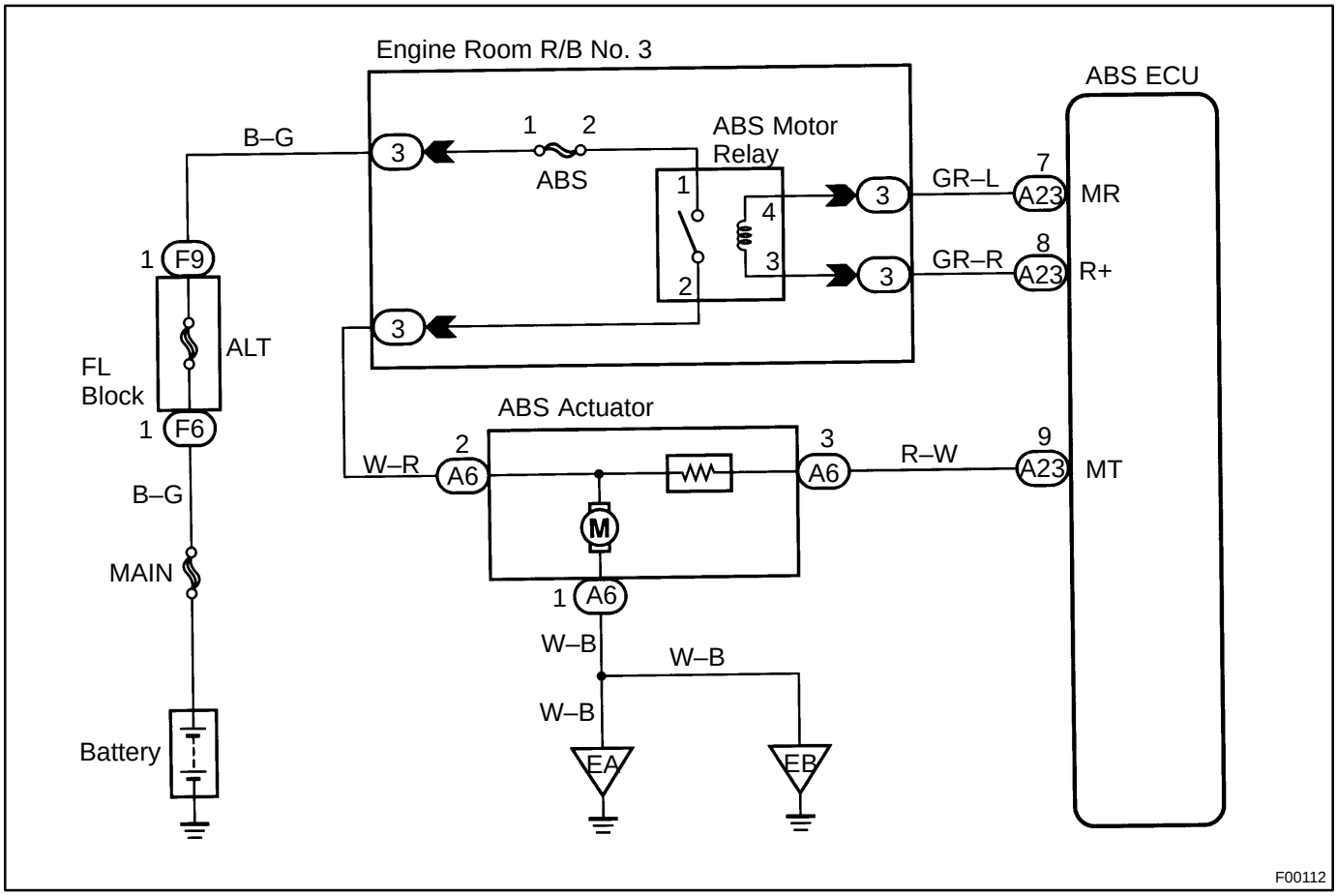
DTC	51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
51	ABS actuator pump motor is not operating normally.	●ABS pump motor

Fail safe function: If trouble occurs in the ABS pump motor, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



DI0BQ–01

DTC	Always ON	ABS ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	ABS ECU internal malfunction is detected.	●ECU ●Battery

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

INSPECTION PROCEDURE

1	**Is DTC output?**

Check DTC on page DI–232.

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

NO

2	**Is normal code displayed?**

YES → **Check ABS solenoid relay. Check for short in harness and connector between ABS solenoid relay and DLC1 (See page IN–27).**

NO

3	**Is ABS warning light go off?**

YES → **Check for open or short in harness and connector between ECU–IG fuse and ABS ECU (See page IN–27).**

NO

4	**Check battery positive voltage.**

PREPARATION:
Start the engine.
CHECK:
Check the battery positive 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 ABS ECU.
(c) Turn the ignition switch ON.
CHECK:
Check the ABS warning light goes off.

OK → **Check and replace ABS ECU.**

NG

Check for short in harness and connector between ABS warning light, DLC1, DLC2, and ABS ECU (See page IN–27).

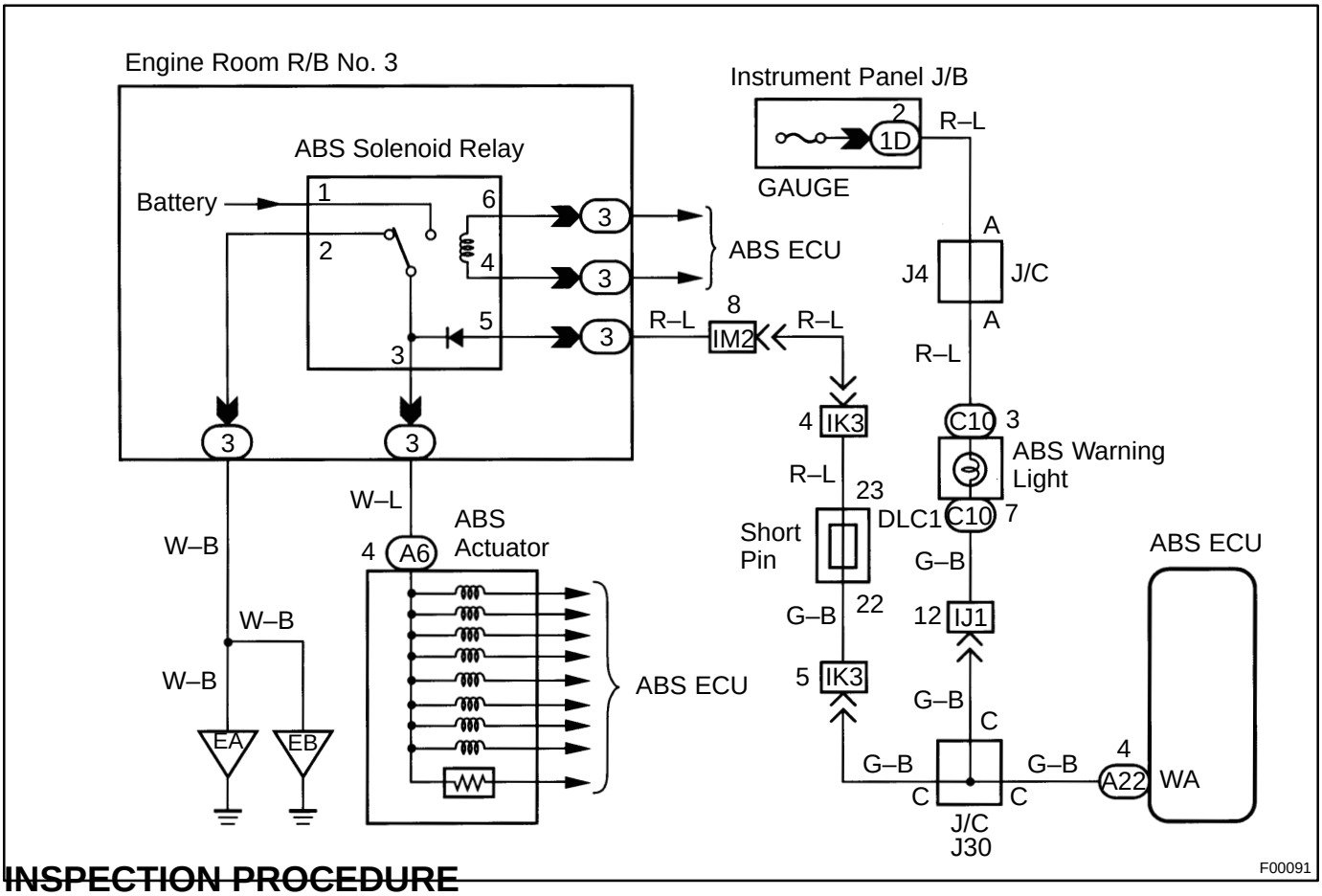
DI0BR–01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
After removing the short pin of the DLC1, connect terminals Tc and E_1 of the DLC1 or DLC2 make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

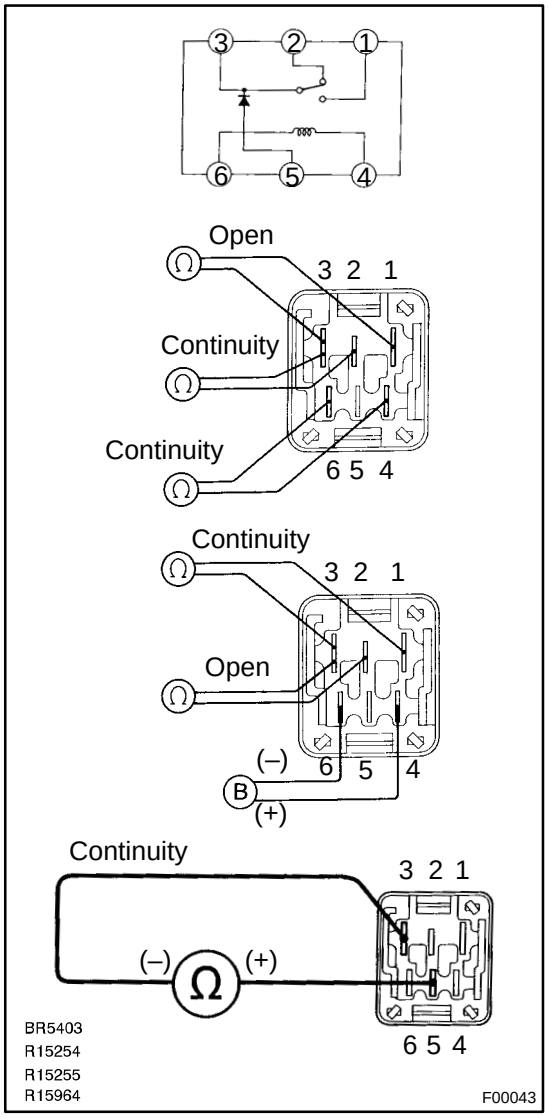
1	**Check ABS warning light.**

See Combination Meter Troubleshooting on page BE–58.

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

OK

2	Check ABS solenoid relay.



PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 3.

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 positive 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

CHECK:

Connect the ~ test lead to terminal 5 and the ⊖ lead to terminal 3. Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the ⊖ test lead to terminal 5 and the ~ lead to terminal 3. Recheck continuity between terminals.

NG → **Replace ABS solenoid relay.**

OK →

Check for open in harness and connector between DLC1, ABS solenoid relay and body ground (See page IN–27).

3	**Is DTC output?**

Check DTC on page DI–232.

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

NO

4	**Does ABS warning light go off if short pin is removed?**

NO → **Check for short in harness and connector between ABS warning light, DLC1 and ABS ECU (See page IN–27).**

YES

5	**Check ABS solenoid relay (See step 2).**

NG → **Replace ABS solenoid relay.**

OK

Check for short in harness and connector between DLC1 and ABS solenoid relay (See page IN–27).

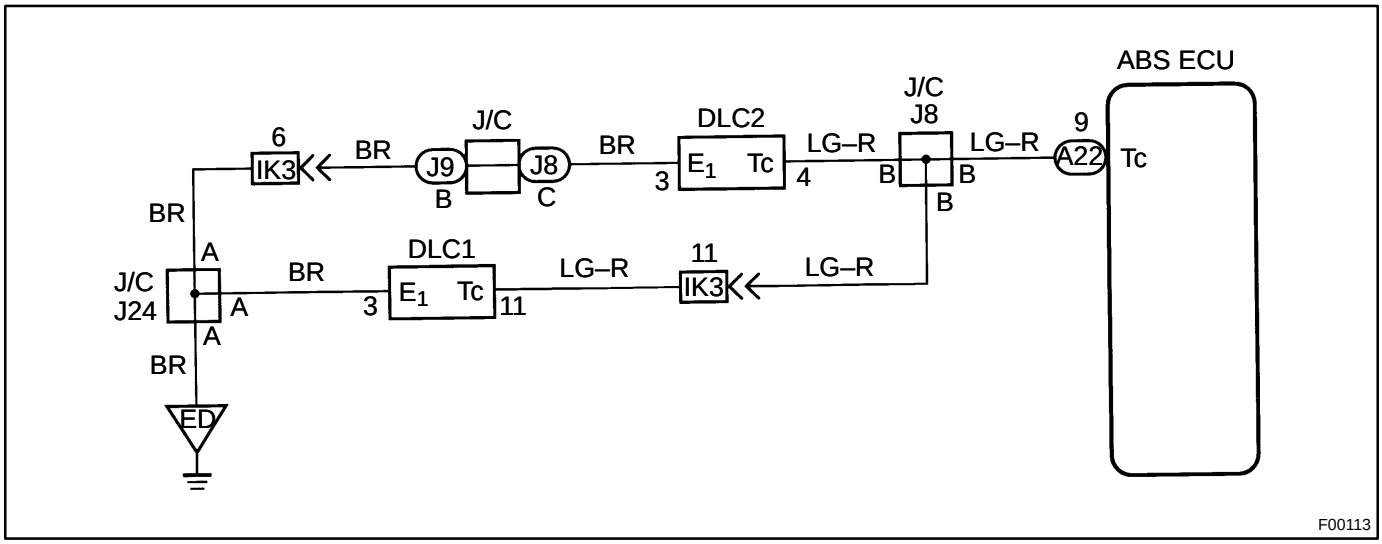
DI0BS–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

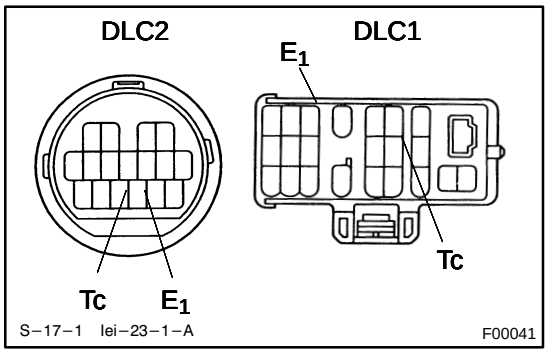
Connecting between terminals Tc and E_1 of the DLC1 or the DLC2 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2 or DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E_1 of DLC2 or DLC1.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short in harness and connector between ABS ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–27).**

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

OK

Check and replace ABS ECU.

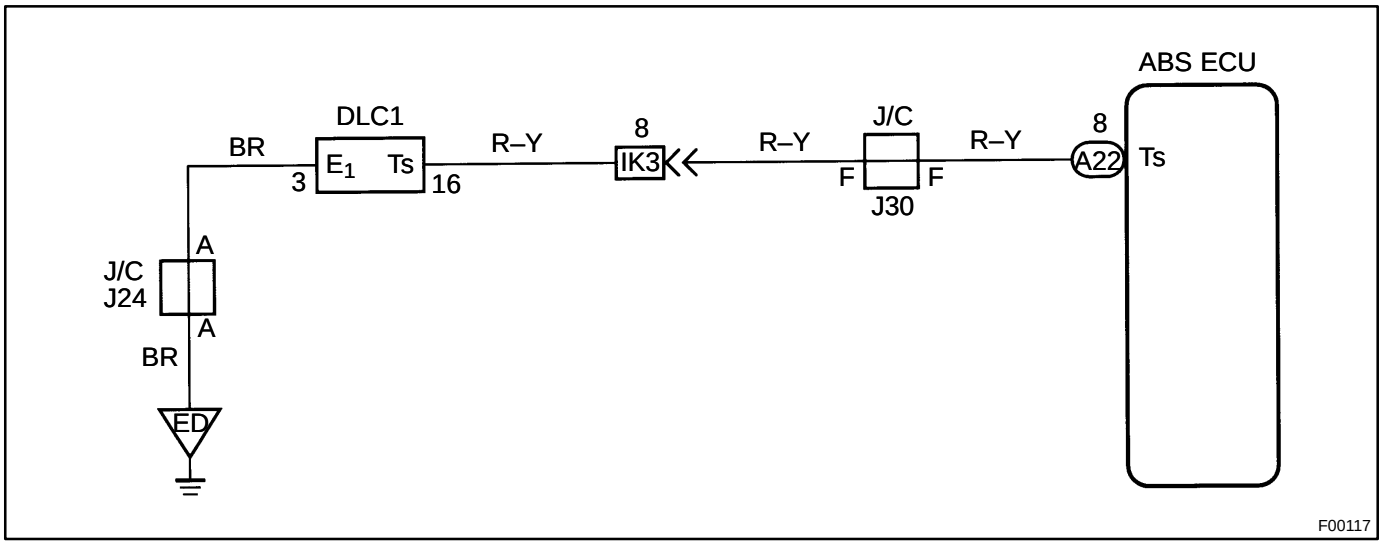
DI0BT–01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

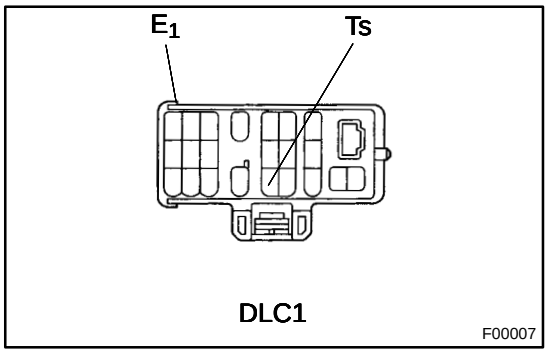
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals Ts and E_1 of DLC1.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–27).**

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

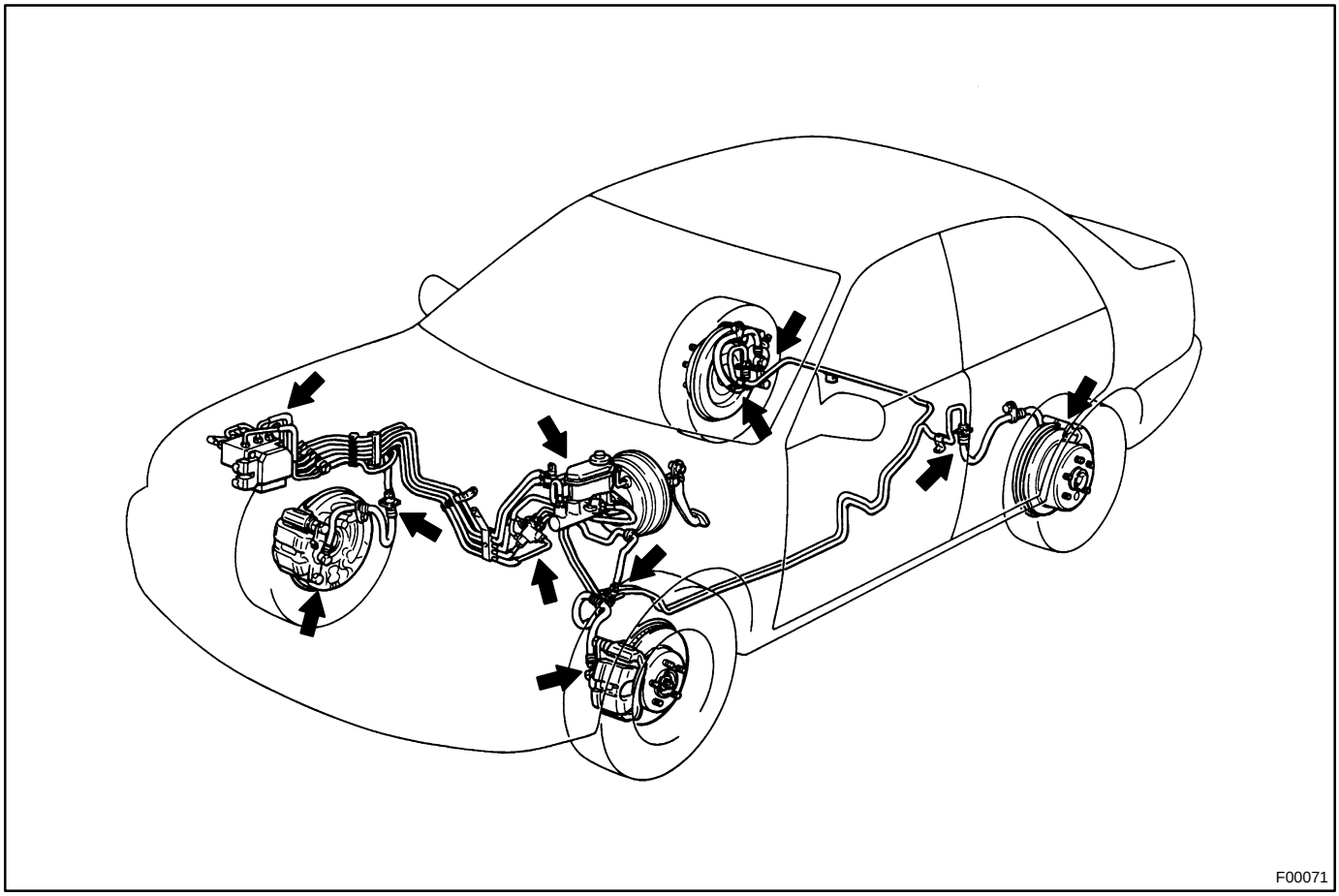
OK

Check and replace ABS ECU.

DI0BU–01

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



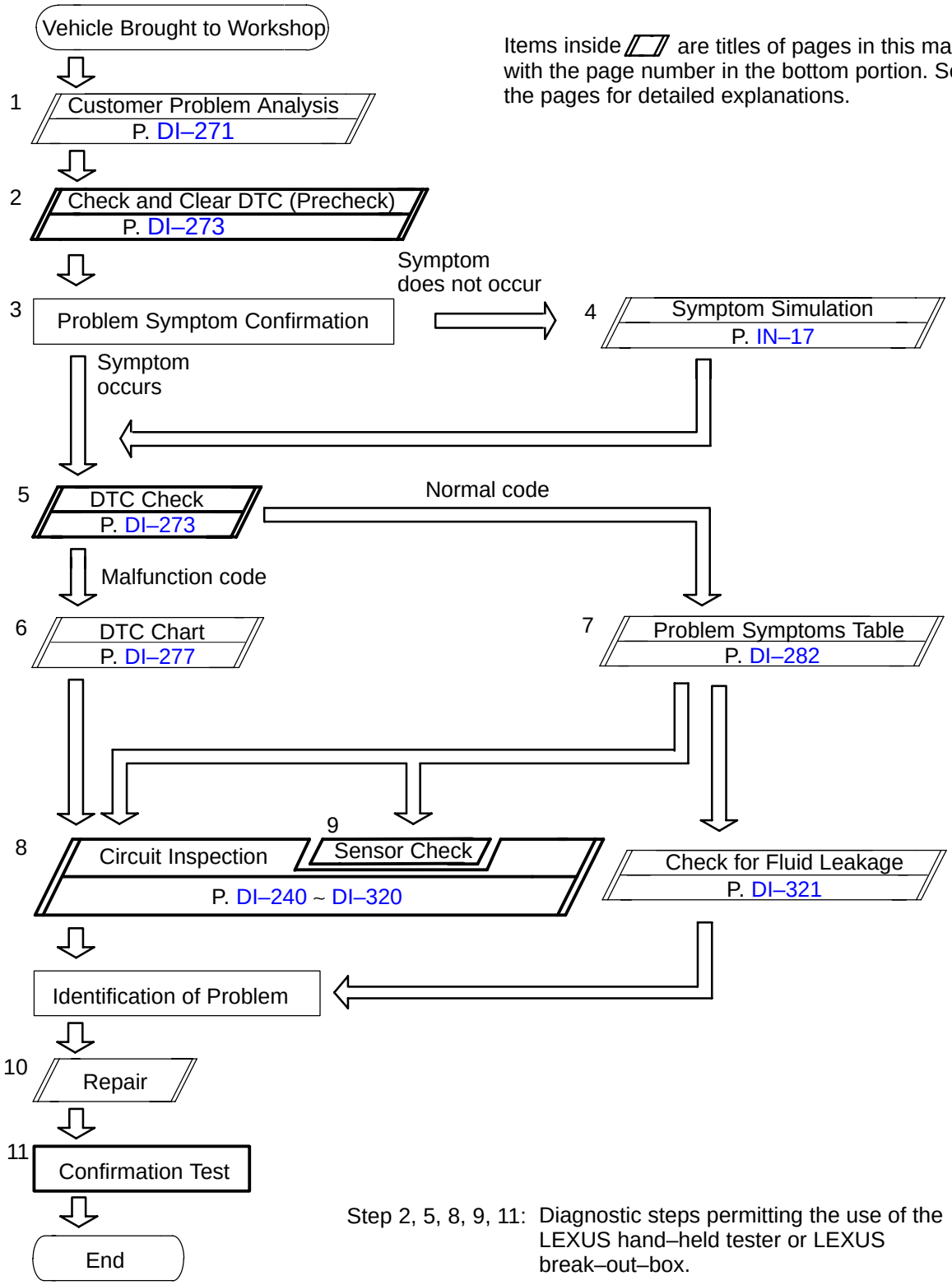
F00071

ABS & TRACTION CONTROL SYSTEM

DI0BV–01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoooting 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 LEXUS hand–held tester or LEXUS break–out–box.

DI0BW–01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

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

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

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

Check Item	**TRAC OFF Indicator Light**	☐ Normal ☐ Does not Light Up

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

TRAC 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	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Blinks ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Lamp	☐ Normal ☐ Malfunction Code (Code)

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

DI0BX–01

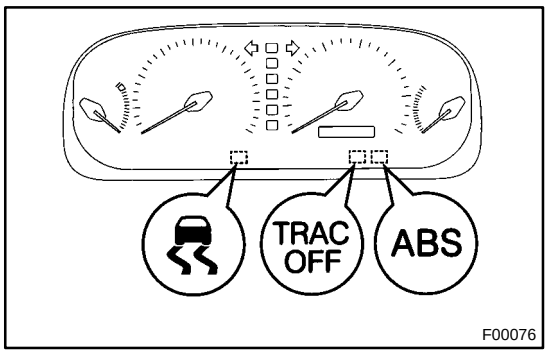
PRE–CHECK

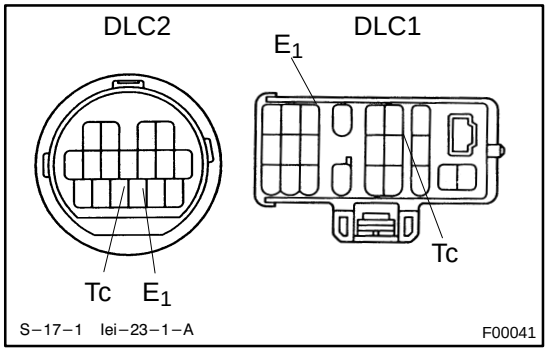
1. DIAGNOSIS SYSTEM

(a) INDICATOR CHECK

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

HINT:If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, TRAC OFF indicator light circuit, SLIP indicator light circuit
(See page DI–310, DI–317, DI–320).





(b) DTC CHECK

(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.

SST 09843 – 18020

(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and TRAC OFF indicator light on the combination meter.

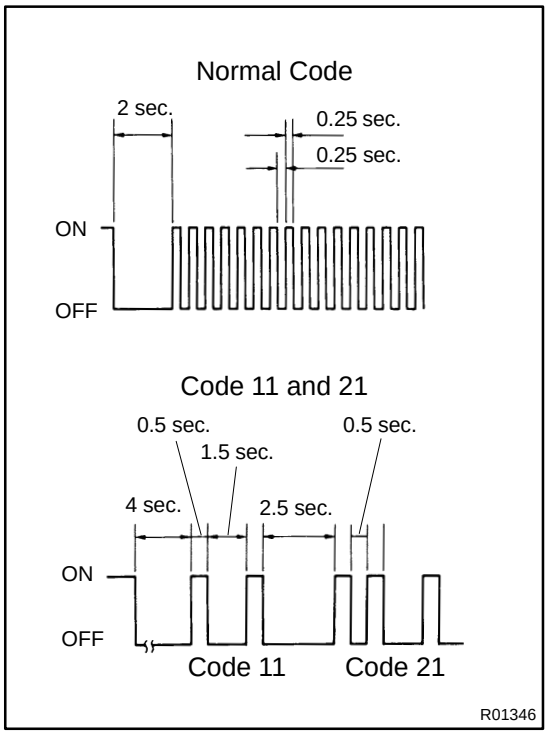
HINT:If no code appears, inspect the diagnostic circuit or ABS warning light circuit, TRAC OFF indicator light circuit
(See page DI–313 or DI–310, DI–317).

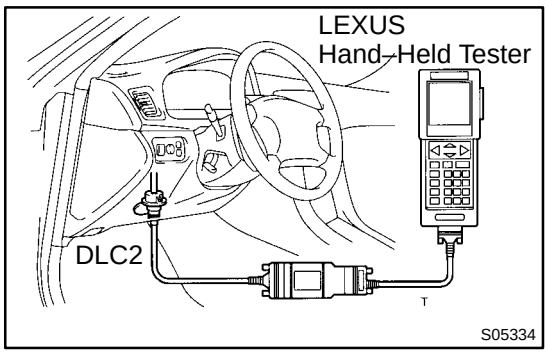
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Code are explained in the code table on page DI–277.

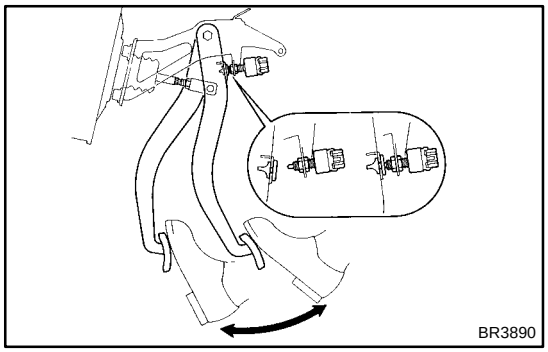
(5) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

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

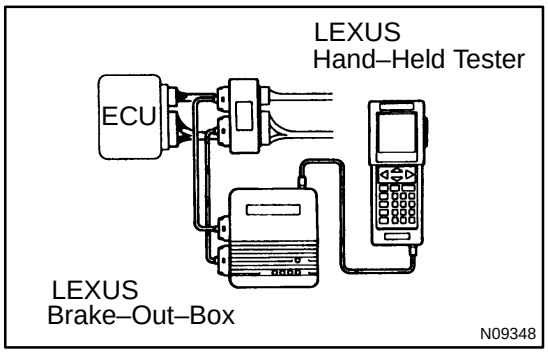




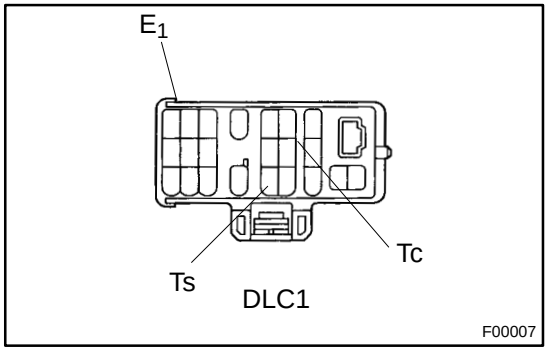
(c) DTC CHECK USING LEXUS HAND–HELD TESTER
(1) Hook up the LEXUS hand–held tester to the DLC2.
(2) Read the DTC by following the prompts on the tester screen.
Please refer to the LEXUS hand–held tester operator's manual for further details.



(d) DTC CLEARANCE
(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.
SST 09843 – 18020
(2) IG 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 DLC2 or DLC1.
SST 09843 – 18020

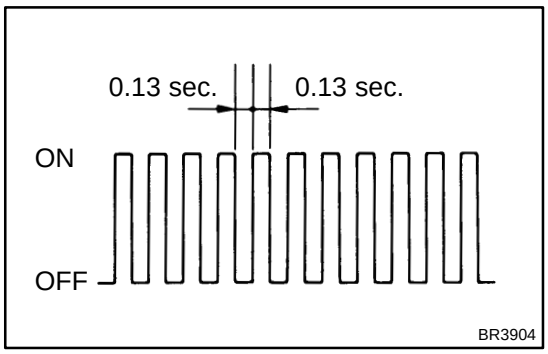


(e) ECU TERMINAL VALUES MEASUREMENT USING LEXUS BREAK –OUT–BOX AND LEXUS HAND–HELD TESTER
(1) Hook up the LEXUS hand–held tester and LEXUS break–out–box to the vehicle.
(2) Read the ECU input/output values by following the prompts on the tester screen.
HINT:LEXUS hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
Please refer to the LEXUS hand–held tester/LEXUS break–out–box operator's manual for further details.



2. SPEED SENSOR SIGNAL

(a) SPEED SENSOR SIGNAL CHECK
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and E_1 of DLC1.
SST 09843 – 18020
(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–310).

(5) Drive vehicle straight forward.

HINT:Drive vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

(7) Using SST, connect terminals Tc and E_1 of DLC1.

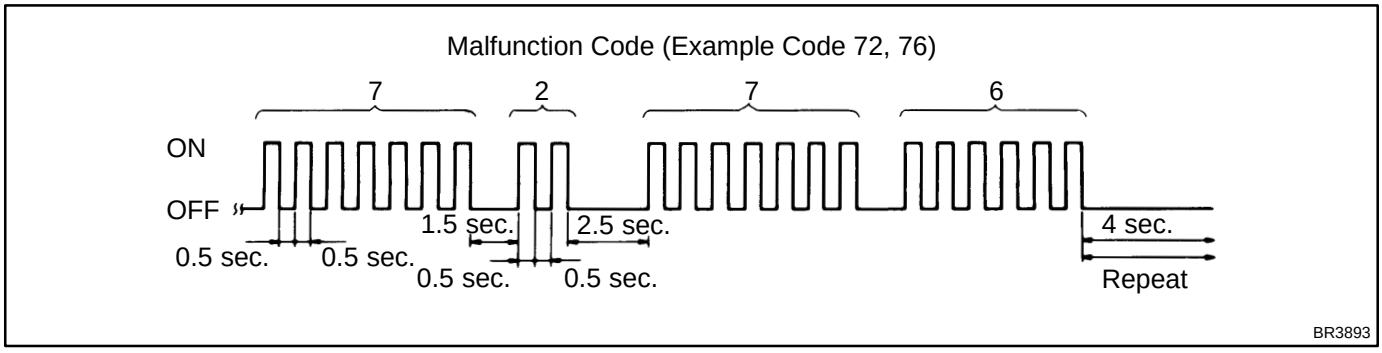
SST 09843 – 18020

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

HINT:See the list of DTC shown on the next page.

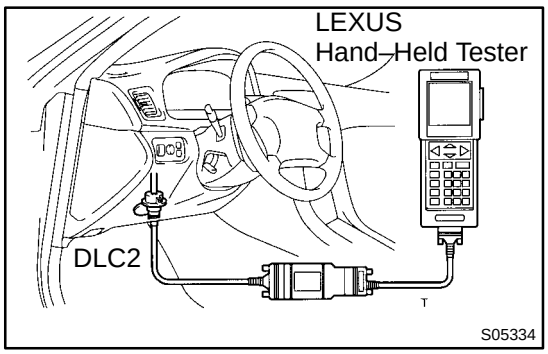
If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).

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



(9) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of DLC1, and turn ignition switch OFF.

SST 09843 – 18020



(b) DTC CHECK USING LEXUS HAND–HELD TESTER

(1) Do step 1. ~ 6. on the previous page.

(2) Hook up the LEXUS hand–held tester to the DLC2.

(3) Read the DTC by following the prompts on the tester screen.

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

(c) DTC OF SPEED SENSOR CHECK FUNCTION

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

DI0BY–01

DIAGNOSTIC TROUBLE CODE CHART

HINT:Using SST 09843 –18020, connect the terminals Tc and E_1.

If a malfunction code is displayed during the DTC check, check the circuit listed that 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.

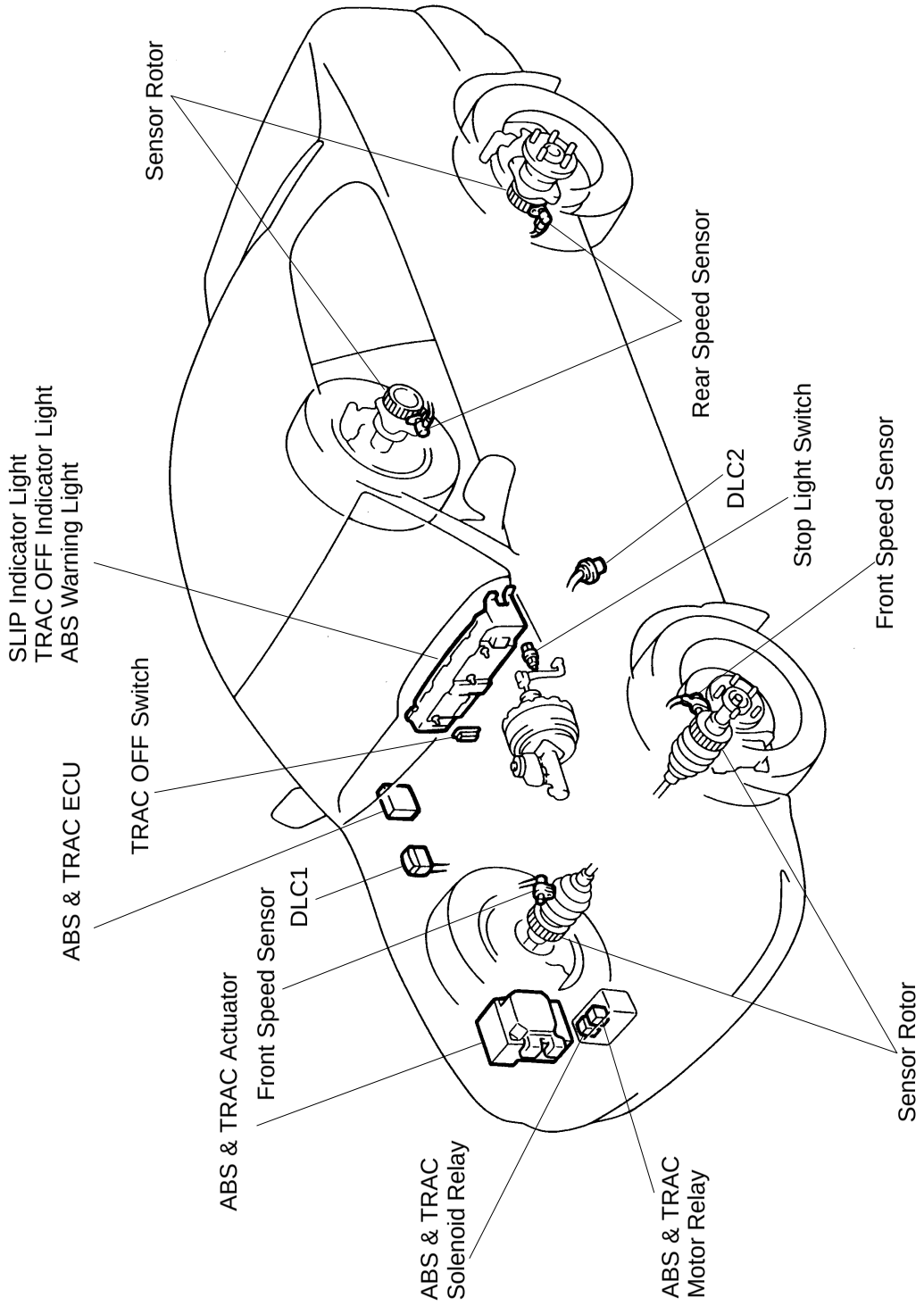
DTC No. (See Page)	Detection Item	Trouble Area
11 (DI–240)	Open circuit in ABS & TRAC solenoid relay circuit	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ECU
12 (DI–240)	Short circuit in ABS & TRAC solenoid relay circuit	
13 (DI–286)	Open circuit in ABS & TRAC motor relay circuit	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ECU
14 (DI–286)	Short circuit in ABS & TRAC motor relay circuit	
21 (DI–289)	Open or short circuit in right front solenoid circuit	●ABS & TRAC actuator ●SFRR or SFRH circuit ●ECU
22 (DI–289)	Open or short circuit in left front solenoid circuit	●ABS & TRAC actuator ●SFLR or SFLH circuit ●ECU
23 (DI–289)	Open or short circuit in right rear solenoid circuit	●ABS & TRAC actuator ●SRRR or SRRH circuit ●ECU
24 (DI–289)	Open or short circuit in left rear solenoid circuit	●ABS & TRAC actuator ●SRLR or SRLH circuit ●ECU
25 (DI–289)	Open or short circuit in SMC1 circuit	●ABS & TRAC actuator ●SMC1 circuit ●ECU
26 (DI–289)	Open or short circuit in SMC2 circuit	●ABS & TRAC actuator ●SMC2 circuit ●ECU
27 (DI–289)	Open or short circuit in SRC1 circuit	●ABS & TRAC actuator ●SRC1 circuit ●ECU
28 (DI–289)	Open or short circuit in SRC2 circuit	●ABS & TRAC actuator ●SRC2 circuit ●ECU
31 (DI–292)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor ●ECU
32 (DI–292)	Left front wheel speed sensor signal malfunction	
33 (DI–292)	Right rear wheel speed sensor signal malfunction	
34 (DI–292)	Left rear wheel speed sensor signal malfunction	
41 (DI–297)	Low battery positive voltage or abnormally high battery positive voltage	●Battery ●IC regulator ●Power source circuit ●ECU
43* (DI–300)	Malfunction in ABS control system	●ABS control system

44* (DI–301)	Open or short circuit in NE signal circuit	●NEO circuit ●ECM ●ECU
49 (DI–303)	Open circuit in stop light switch circuit	●Stop light switch ●Stop light switch circuit ●ECU
51 (DI–305)	Pump motor is locked	●ABS pump motor
53* (DI–306)	Malfunction in ECM communication circuit	●TRC+ or TRC – circuit ●EFI+ or EFI– circuit ●ECM ●ECU
61* (DI–307)	Malfunction in engine control system	●Engine control system
Always ON (DI–308)	Malfunction in ECU	●ECU

***: TRAC OFF indicator light blinking**

DI0BZ–01

PARTS LOCATION



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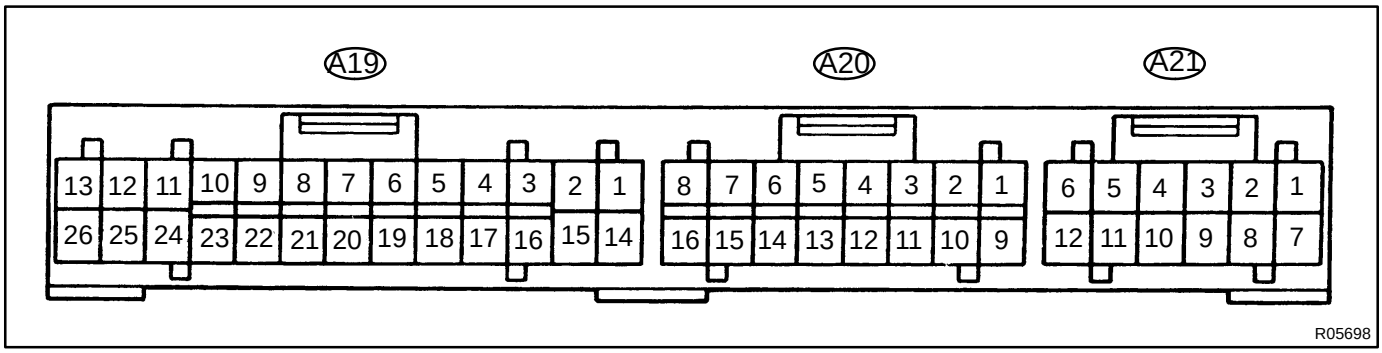
DI0C0–01

TERMINALS OF ECM



Symbols (Terminals No.)	STD Voltage (V)	Condition
IG1(A20 – 8) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON
R+ (A19 – 1) – SR (A19 – 11)	9 – 14	IG switch ON, ABS warning light OFF
R+ (A19 – 1) – MR (A19 – 24)	Below 1.0	IG switch ON
SFRR (A19 – 26) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SFRH (A19 – 13) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SFLR (A21 – 1) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SFLH (A21 – 2) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SRRR (A21 – 7) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SRRH (A21 – 8) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SRLR (A19 – 12) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
SRLH (A19 – 25) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
AST (A19 – 10) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light OFF
WA (A20 – 4) – GND (A19 – 15, A21 – 9, 10)	Below 2.0	IG switch ON, ABS warning light ON
	10 – 14	IG switch ON, ABS warning light OFF
STP (A20 – 16) – GND (A19 – 15, A21 – 9, 10)	Below 1.5	Stop light switch OFF
	8 – 14	Stop light switch ON
D/G (A19 – 22) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, ABS warning light ON
Tc (A19 – 9) – GND (A19 – 15, A21 – 9, 10)	8 – 14	IG switch ON
Ts (A19 – 23) – GND (A19 – 15, A21 – 9, 10)	8 – 14	IG switch ON
FR+ (A19 – 17) – FR– (A19 – 18)	AC generation	IG switch ON Slowly turn right front wheel
FL+ (A19 – 5) – FL– (A19 – 4)	AC generation	IG switch ON Slowly turn left front wheel
RR+ (A20 – 9) – RR– (A20 – 10)	AC generation	IG switch ON Slowly turn right rear wheel
RL+ (A20 – 2) – RL– (A20 – 1)	AC generation	IG switch ON Slowly turn left rear wheel
MT (A19 – 14) – GND (A19 – 15, A21 – 9, 10)	Below 1.5	IG switch ON
SRC1 (A21 – 5) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, TRAC OFF indicator light OFF
SRC2 (A21 – 6) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, TRAC OFF indicator light OFF
SMC1 (A21 – 12) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, TRAC OFF indicator light OFF
SMC2 (A21 – 6) – GND (A19 – 15, A21 – 9, 10)	10 – 14	IG switch ON, TRAC OFF indicator light OFF
NEO (A20 – 15) – GND (A19 – 15, A21 – 9, 10)	Pulse generation	Idling
EFI+ (A20 – 6) – GND (A19 – 15, A21 – 9, 10)	Pulse generation	IG switch ON
EFI– (A20 – 14) – GND (A19 – 15, A21 – 9, 10)	Pulse generation	IG switch ON

TRC+ (A20 – 13) – GND (A19 – 15, A21 – 9, 10)	Pulse generation	TRAC control active
TRC– (A20 – 5) – GND (A19 – 15, A21 – 9, 10)	Pulse generation	TRAC control active
IND (A20 – 3) – GND (A19 – 15, A21 – 9, 10)	Below 2.0	IG switch ON, SLIP indicator light ON
	10 – 14	IG switch ON, SLIP indicator light OFF
WT (A20 – 12) – GND (A19 – 15, A21 – 9, 10)	Below 2.0	IG switch ON, TRAC OFF indicator light ON
	10 – 14	IG switch ON, TRAC OFF indicator light OFF
CSW (A20 – 11) – GND (A19 – 15, A21 – 9, 10)	Below 2.0	IG switch ON, TRAC cut switch pushed in
	8 – 14	IG switch ON, TRAC cut switch released

DI0C1–01

PROBLEM SYMPTOMS TABLE

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

Symptoms	Inspection Circuit	See page
ABS does not operate.	Only when 1. ~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. IG power source circuit. 3. Speed sensor circuit. 4. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–321).	 DI–273 DI–297 DI–292 BR–52
ABS does not operate efficiently.	Only when 1. ~ 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit. 3. Stop light switch circuit. 4. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–321).	 DI–273 DI–292 DI–303 BR–52
ABS warning light abnormal.	1. ABS warning light circuit. 2. ABS & TRAC ECU.	DI–310 DI–308
DTC check cannot be done.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. ABS warning light circuit. 2. TRAC OFF indicator light circuit. 3. Tc terminal circuit.	 DI–310 DI–317 DI–313
Speed sensor signal check cannot be done.	1. Ts terminal circuit. 2. ABS & TRAC ECU.	DI–315 DI–308
TRAC does not operate.	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the ABS & TRAC 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–273 DI–297 DI–321 DI–292
SLIP indicator light abnormal.	SLIP indicator light circuit.	DI–320
TRAC OFF indicator light abnormal.	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. TRAC OFF indicator light circuit. 2. TRAC cut switch circuit.	 DI–317 DI–317

DI0C2–01

CIRCUIT INSPECTION

DTC	11, 12	ABS & TRAC Solenoid Relay Circuit

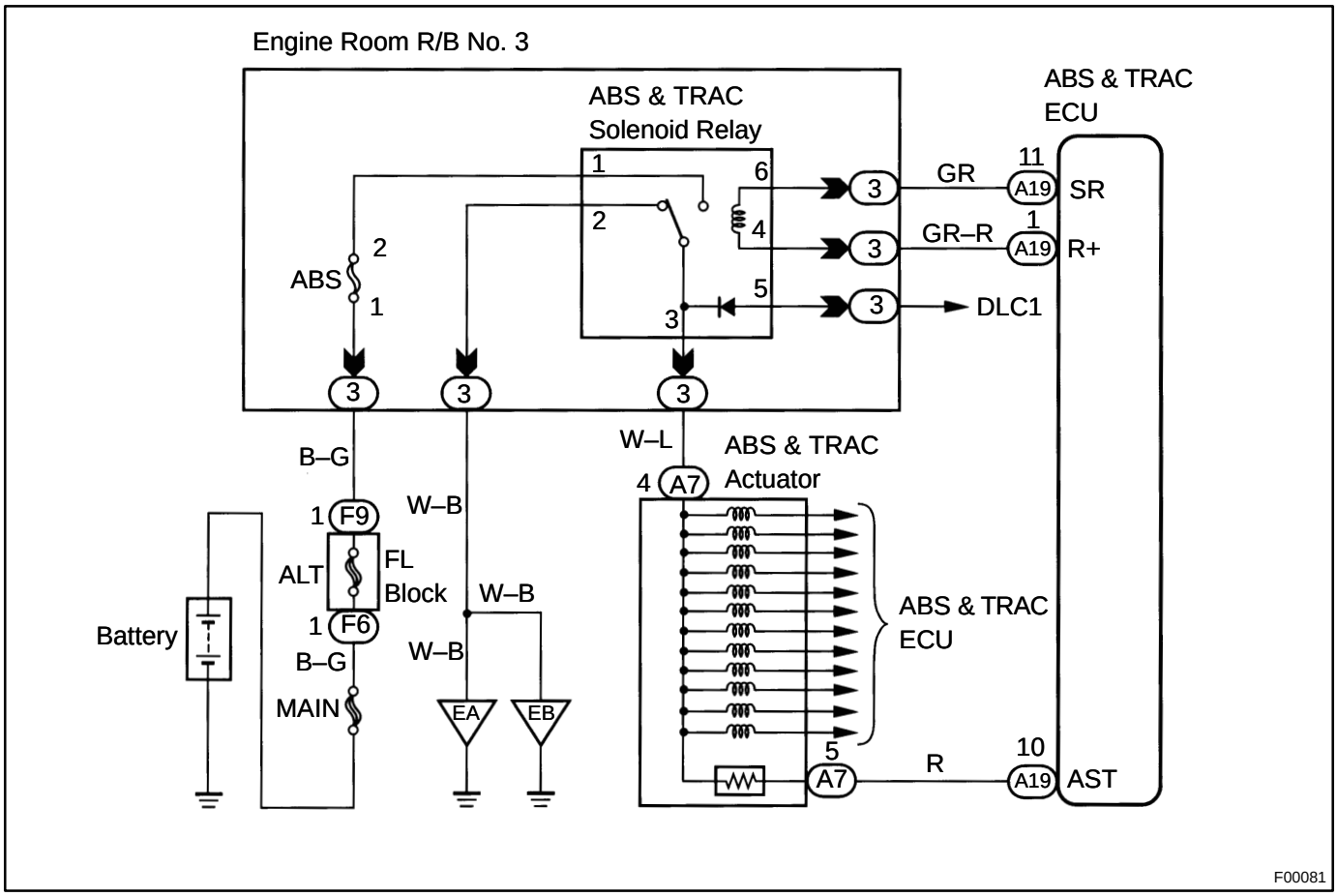
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
11	Condition (1) to (3) are detected: (1) Malfunction of solenoid relay monitor. (2) Battery voltage will not exceed more than 17.0 V within 2.16 sec. (3) Battery voltage will not become less than 9.5 V within 2.16 sec., or after the solenoid relay is ON and AST voltage of ECU terminal does not become 8.0 V or more.	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ECU
12	Solenoid relay is OFF in the midst of premain routine, and AST voltage of ECU terminal is 8.0 V or more continues for 2.04 sec. or more.	

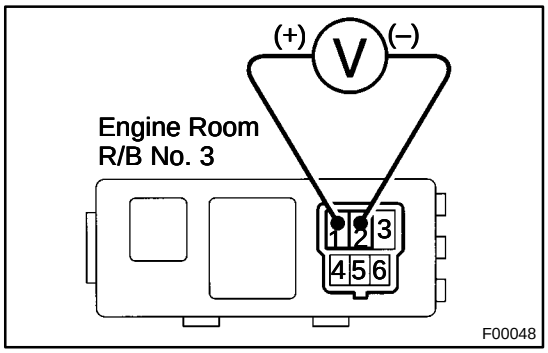
Fail safe function: If trouble in the ABS & TRAC solenoid relay circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS & TRAC solenoid relay).**



PREPARATION:
Remove ABS & TRAC solenoid relay from Engine Room R/B No. 3.

CHECK:
Measure the voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS & TRAC solenoid relay).

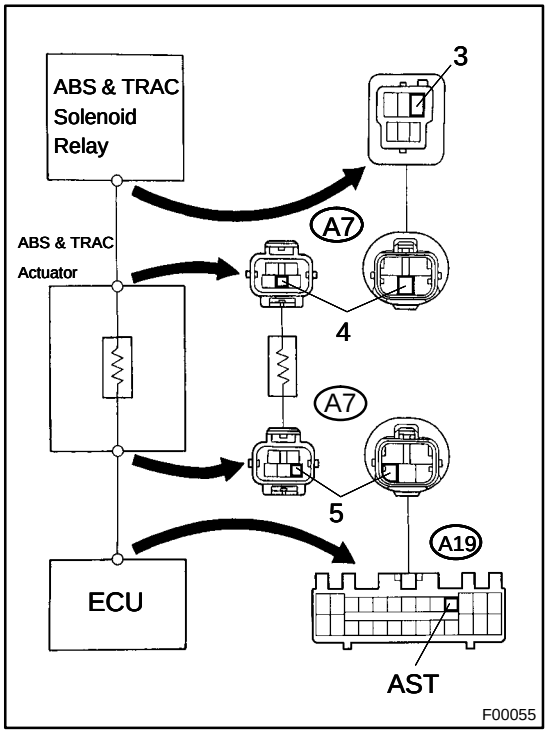
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 3 of ABS & TRAC solenoid relay and terminal AST of ABS & TRAC ECU.**



CHECK:
Check continuity between terminal 3 of ABS solenoid relay and terminal AST of ABS & TRAC ECU.

OK:

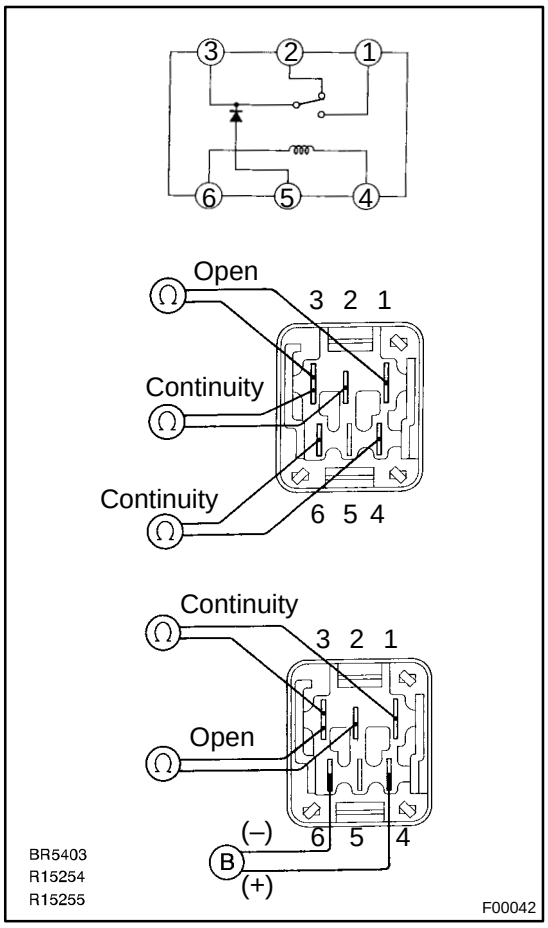
Continuity

HINT:There is a resistance of 33 Ω between terminals A7 – 4 and A7 – 5 of ABS actuator.

NG	**Repair or replace harness or ABS & TRAC actuator.**

OK

3	Check ABS & TRAC solenoid relay.



PREPARATION:

Remove ABS & TRAC solenoid relay from Engine Room R/B No. 3.

CHECK:

Check continuity between each terminal of ABS & TRAC 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 positive voltage between terminals 4 and 6.
(b) Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS & TRAC solenoid relay.**

OK

4	Check for open and short in harness and connector between ABS & TRAC solenoid relay and ABS & TRAC ECU (See page IN–27).

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 connector are normal, the ECU may be defective.

DI0C3–01

DTC	13, 14	ABS & TRAC Motor Relay Circuit

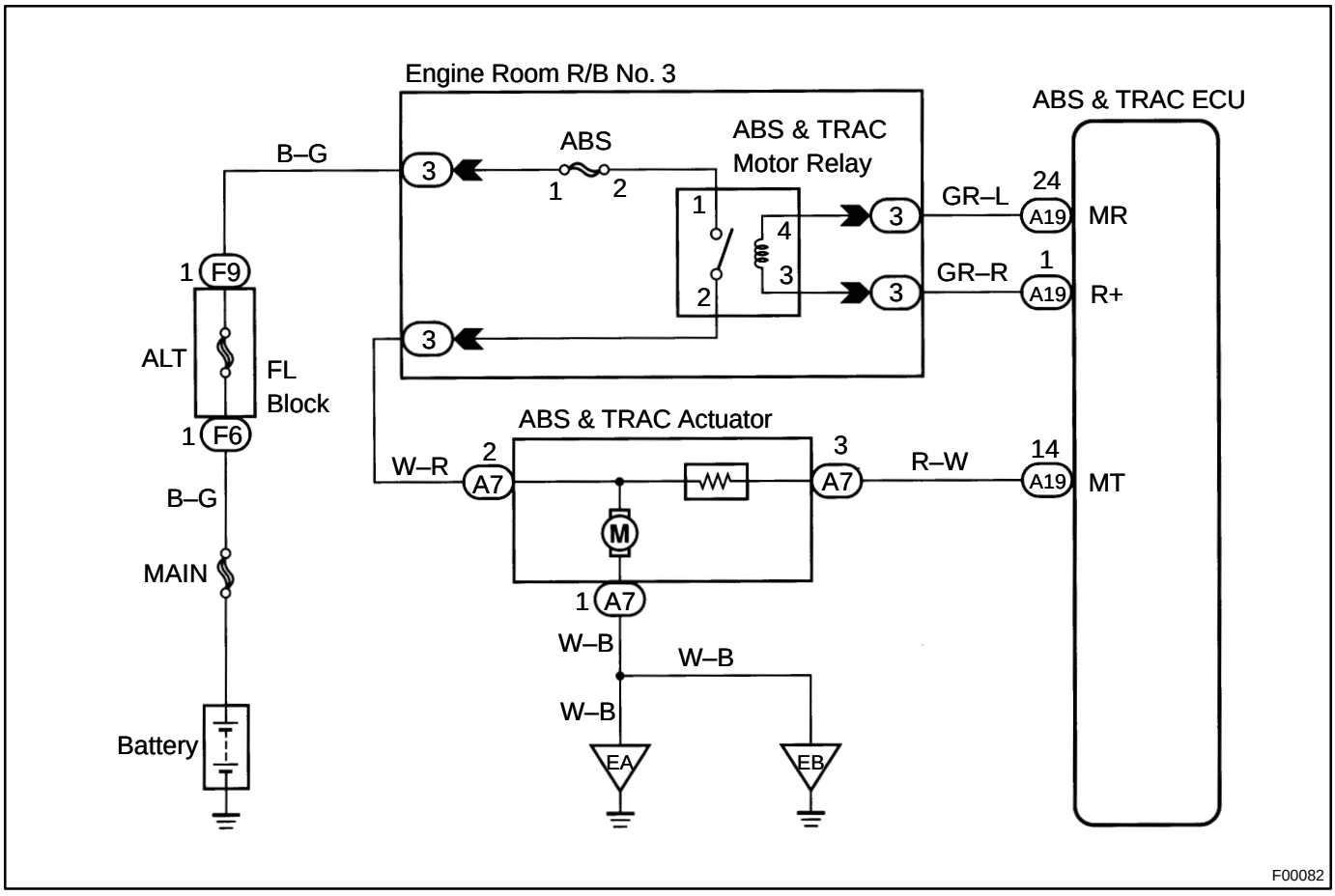
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
13	Conditions (1) to (3) are detected: (1) Malfunction of motor relay monitor. (2) Battery voltage will not exceed more than 17.0 V within 2.16 sec. (3) Battery voltage will not become less than 9.5 V within 2.16 sec., or after the motor relay is ON and motor relay monitor does not ON.	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ECU
14	Motor relay is OFF, and motor relay monitor is ON continues for 20.16 sec. or more.	

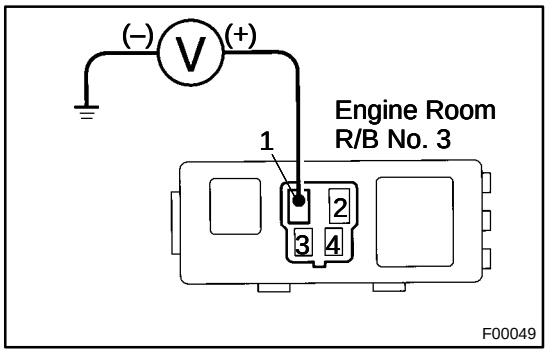
Fail safe function: If trouble occurs in the ABS & TRAC motor relay circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of Engine Room R/B No. 3 (for ABS & TRAC motor relay) and body ground.**



PREPARATION:
Remove ABS & TRAC motor relay from Engine Room R/B No. 3.

CHECK:
Measure voltage between terminal 1 of Engine Room R/B No. 3 (for ABS & TRAC motor relay) and body ground.

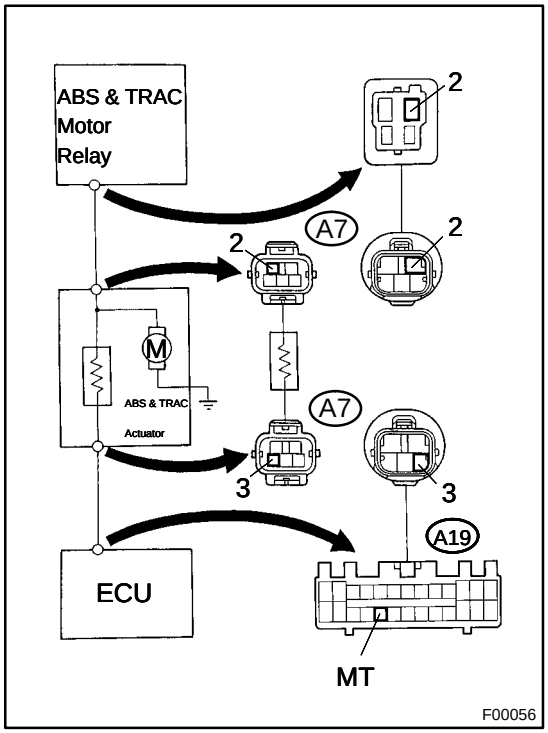
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 2 of ABS & TRAC motor relay and terminal MT of ABS & TRAC ECU.**



CHECK:
Check continuity between terminal 2 of ABS & TRAC motor relay and terminal MT of ABS & TRAC ECU.

OK:

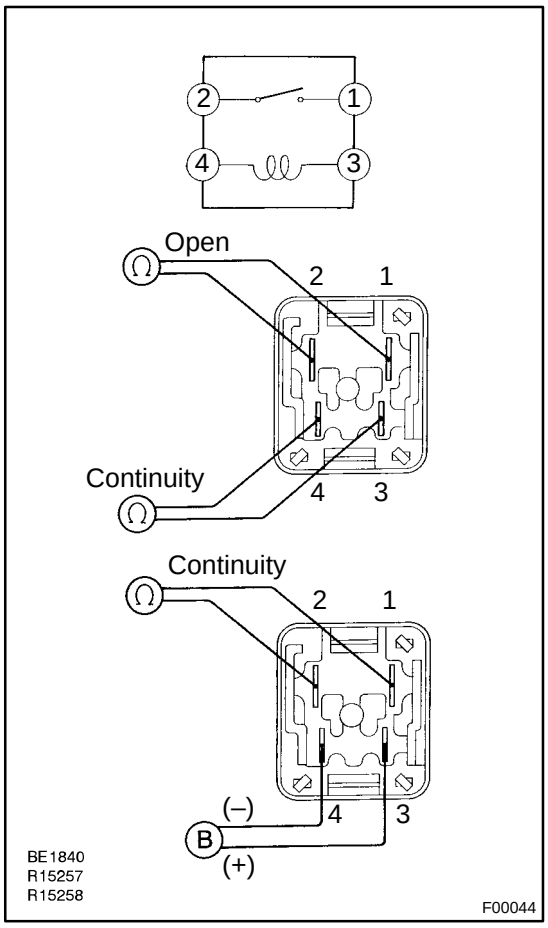
Continuity

HINT:There is a resistance of 33 Ω between terminals A7 – 2 and A7 – 3 of ABS & TRAC actuator.

NG	**Repair or replace harness or ABS & TRAC actuator.**

OK

3	Check ABS & TRAC motor relay.



PREPARATION:

Remove ABS & TRAC motor relay from Engine Room R/B No. 3.

CHECK:

Check continuity between each terminal of ABS & TRAC motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals of ABS & TRAC motor relay.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS & TRAC motor relay.**

OK

4	Check for open and short in harness and connector between ABS & TRAC motor relay and ABS & TRAC ECU (See page IN–27).

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.

DI0C4–01

DTC	21 to 28	ABS & TRAC Actuator Solenoid Circuit

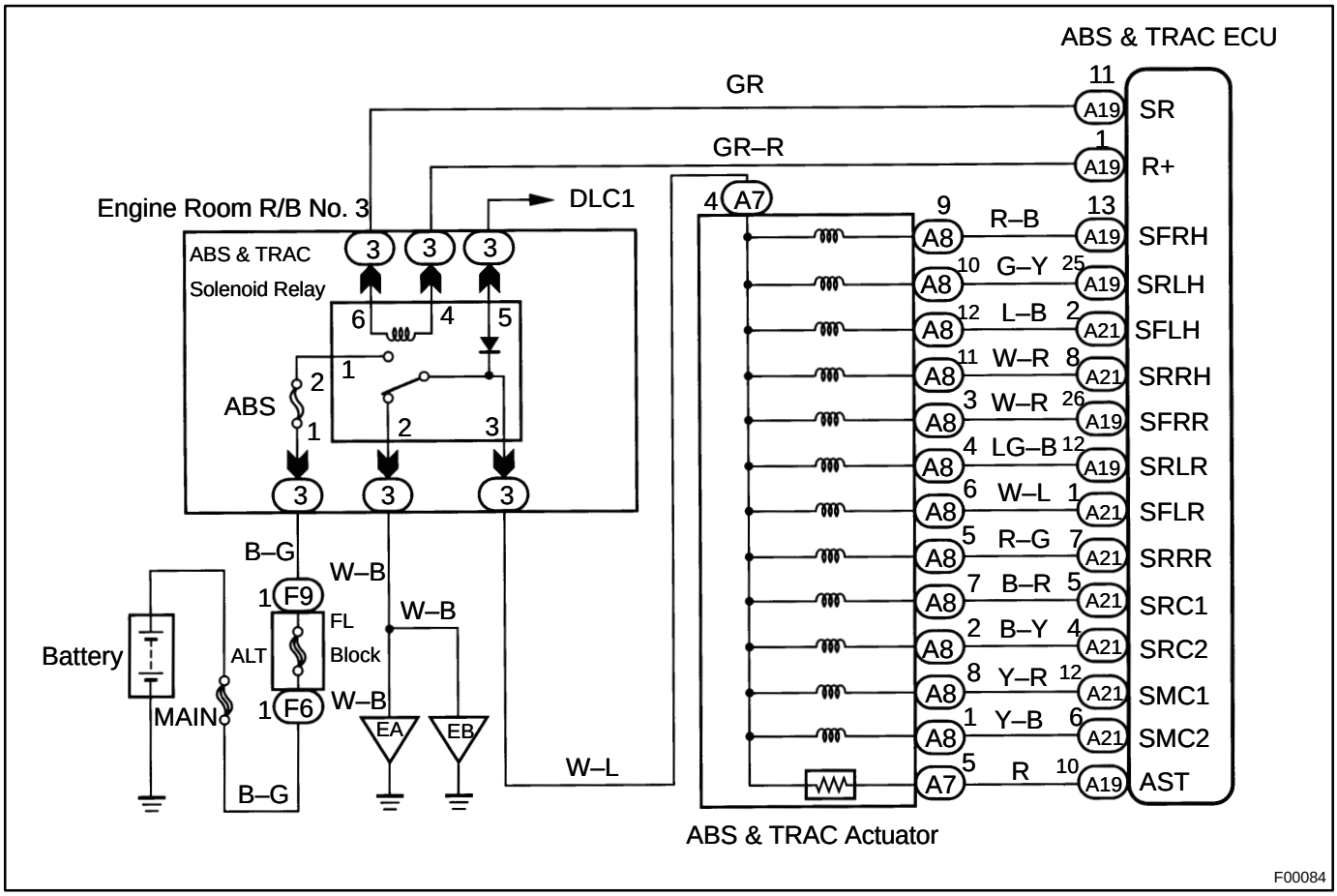
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
21	Conditions (1) and (2) or (3) continued for 0.48 sec. or more: (1) Recovery prohibit run pulse is not output, solenoid relay is ON, AST voltage of ECU terminal is 8.0 V or more, and solenoid output has no change between the last time and this time. (2) Solenoid output is ON, pressure holding solenoid monitor voltage is more than 1.0 V or pressure reduction solenoid monitor voltage is more than 1.5 V. (3) Solenoid output is OFF, solenoid monitor voltage is more than –1.0 V AST voltage of ECU.	●ABS actuator ●SFRR or SFRH circuit ●ECU
22		●ABS actuator ●SFLR or SFLH circuit ●ECU
23		●ABS actuator ●SRRR or SRRH circuit ●ECU
24		●ABS actuator ●SRLR or SRLH circuit ●ECU
25		●ABS actuator ●SMC1 circuit ●ECU
26		●ABS actuator ●SMC2 circuit ●ECU
27		●ABS actuator ●SRC1 circuit ●ECU
28		●ABS actuator ●SRC2 circuit ●ECU

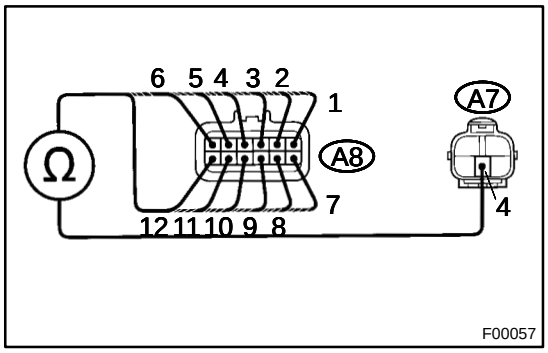
Fail safe function: If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ABS & TRAC actuator solenoid.**



PREPARATION:

Disconnect the 2 connectors from ABS & TRAC actuator.

CHECK:

Check continuity between terminals A7 – 4 and A8 – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 of ABS & TRAC actuator connector.

OK:

Continuity

HINT:Resistance of each solenoid coil is 1.2 Ω.

NG	**Replace ABS & TRAC actuator.**

OK

2	**Check for open and short in harness and connector between ABS & TRAC ECU and actuator (See page IN–27).**

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

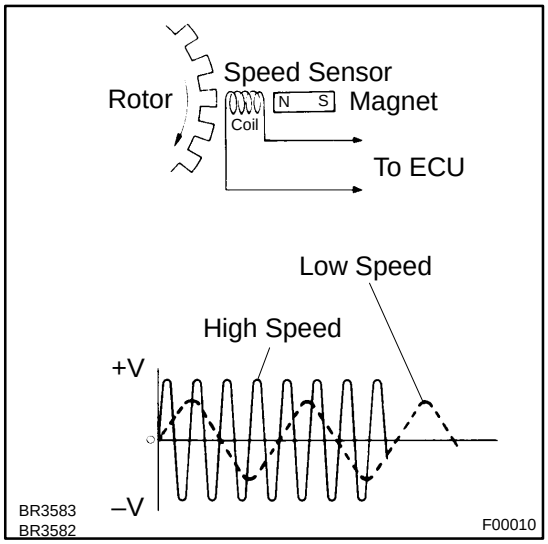
OK

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.

DI0C5–01

DTC	31, 32, 33, 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION

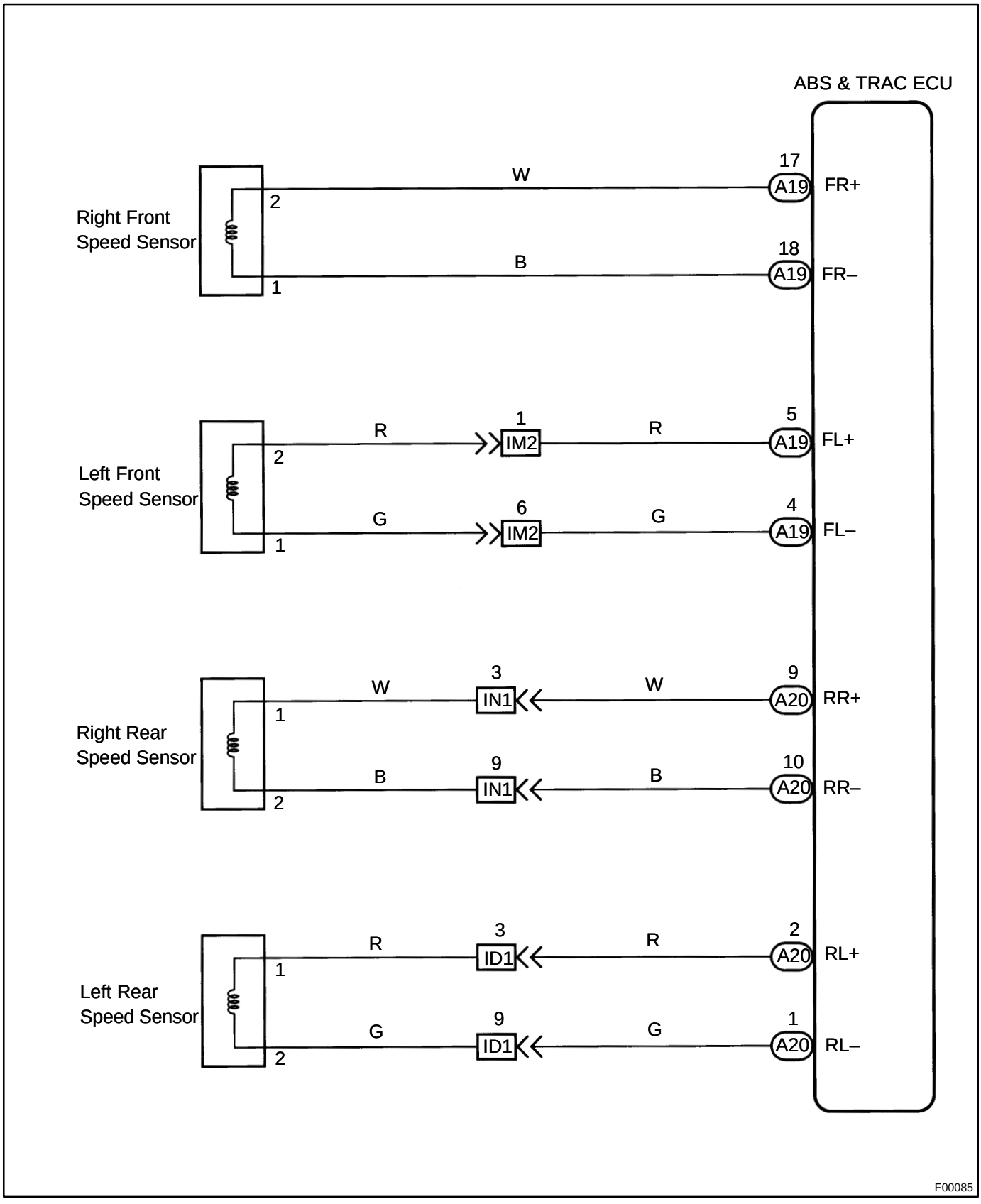


The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control of the ABS and TRAC system. The front and rear rotors each have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from (1) through (3): (1) ABS non–operation, wheel speed is 10 km/h or more, one eighth of maximum wheel speed is greater than the minimum wheel speed, one eighth of maximum wheel speed is smaller than the rear maximum wheel speed or momentary interruption of both the rear wheels are shown in the 15 sec. or more continuously. (2) ABS non–operation, momentary interruption of speed sensor occurs 7 times or more in the mean time of switching the ignition switch ON and OFF or vehicle speed is 20 km/h (12 mph) or more and the condition of noise interference or non–noise interference occurs 75 times or more within 5 sec. (3) Vehicle is at a stop, malfunction signal of vehicle speed sensor hardware open circuit is ON for 1.02 sec. continuously since starting the checking of a certain vehicle.	●Right front, left front, right rear, left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor ●ECU

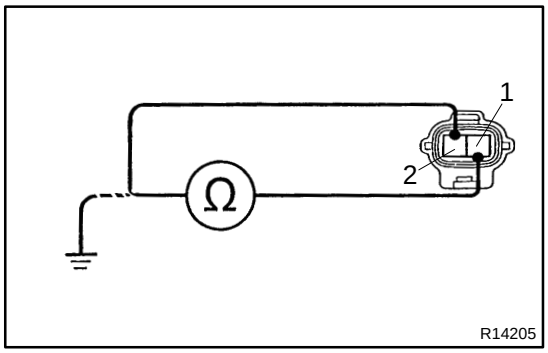
HINT:
DTC No. 31 is for the right front speed sensor.
DTC No. 32 is for the left front speed sensor.
DTC No. 33 is for the right rear speed sensor.
DTC No. 34 is for the left rear speed sensor.
Fail safe function: If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front

PREPARATION:

(a) Remove front fender liner.

(b) Disconnect speed sensor connector.

CHECK:

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

OK:

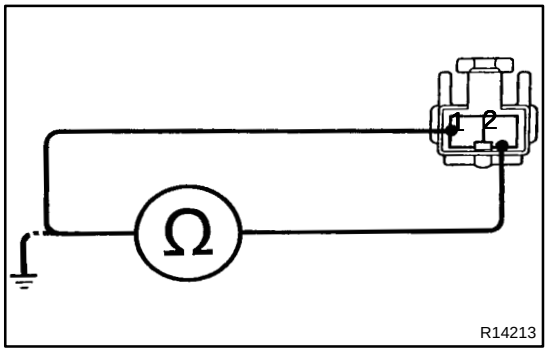
Resistance: 0.6 – 2.5 kΩ

CHECK:

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

OK:

Resistance: 1 MΩ or higher



Rear

PREPARATION:

(a) Remove the seat cushion and seat back.

(b) Disconnect speed sensor connector.

CHECK:

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

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

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

OK:

Resistance: 1 MΩ or higher

NG → **Replace speed sensor.**

NOTICE:Check the speed sensor signal last (See page DI–273).

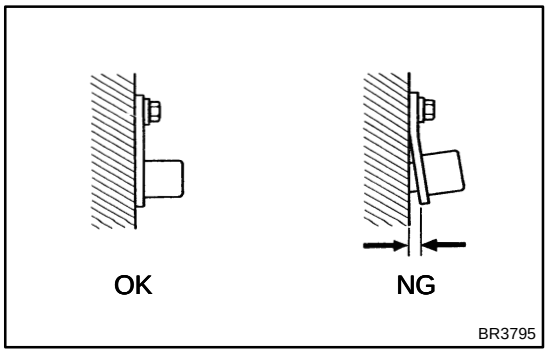
OK

2	**Check for open and short in harness and connector between each speed sensor and ECU (See page IN–27).**

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

OK

3	**Check sensor installation.**



CHECK:
Check the speed sensor installation.
OK:

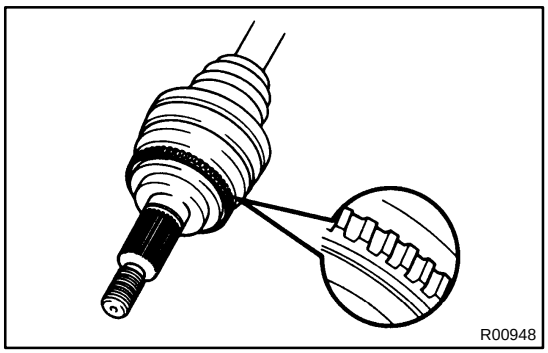
The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:Check the speed sensor signal last (See page DI–273).

OK

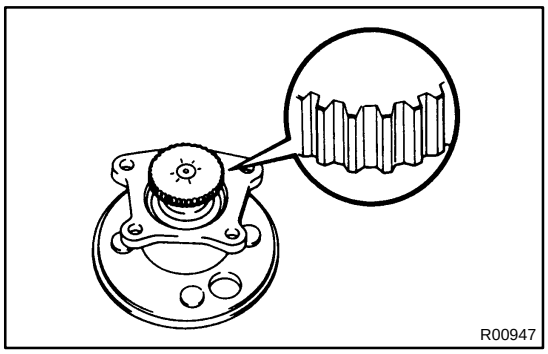
4	**Check sensor rotor and sensor tip.**



Front
PREPARATION:
Remove front drive shaft (See page SA–16).
CHECK:
Check sensor rotor serrations.
OK:

No scratches or missing teeth or foreign objects.
PREPARATION:
Remove the front speed sensor (See page BR–59).
CHECK:
Check the sensor tip.
OK:

No scratches or foreign objects on the sensor tip.



Rear

PREPARATION:

Remove the axle hub (See page SA–46).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–59).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

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

NOTICE:Check the speed sensor signal last (See page DI–273).

OK

Check and replace ABS & TRAC ECU.

DI0C6–01

DTC	41	IG Power Source Circuit

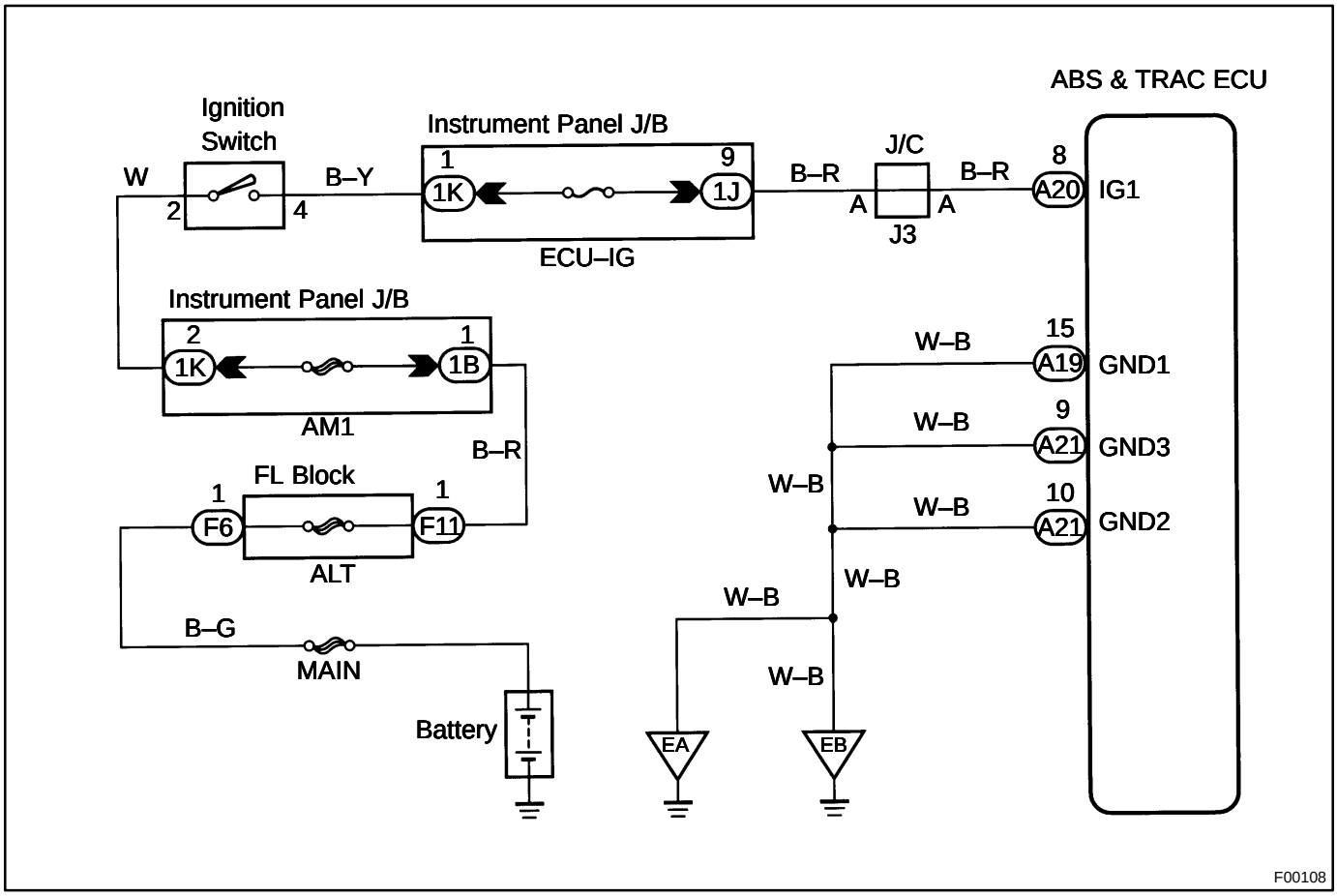
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
41	Detection of any conditions from (1) through (3): (1) Vehicle speed is 3 km/h (1.9 mph) or more and battery voltage is less than 9.5 V continues for 10 sec. or more. (2) Battery voltage has never exceeded more than 17.0 V and has become less than 9.5 V within 2.16 sec., under malfunction of solenoid relay monitor after the solenoid relay is ON, at ECU AST terminal voltage of ECU has become 8.0 V or more or under malfunction of motor relay monitor and after the motor relay is ON, motor relay monitor has become ON. (3) Battery voltage is more than 17.0 V continues for 1.2 sec. or more or battery voltage has become more than 17.0 V within 2.16 sec. and solenoid or motor relay monitor is under malfunction condition.	●Battery ●IC regulator ●Power source circuit ●ECU

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

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

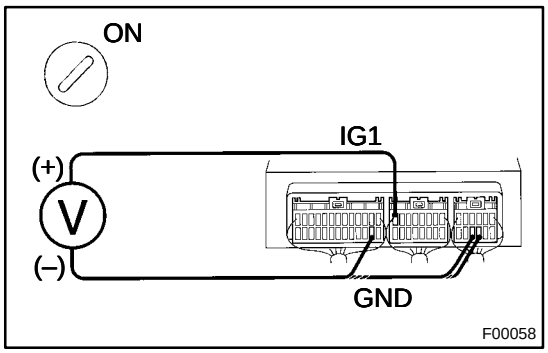
OK:

Voltage: 10 – 14 V

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

OK

2	**Check voltage between terminals IG1 and GND of ABS & TRAC ECU connector.**



PREPARATION:

Remove ABS & TRAC ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of ABS & TRAC ECU connector.

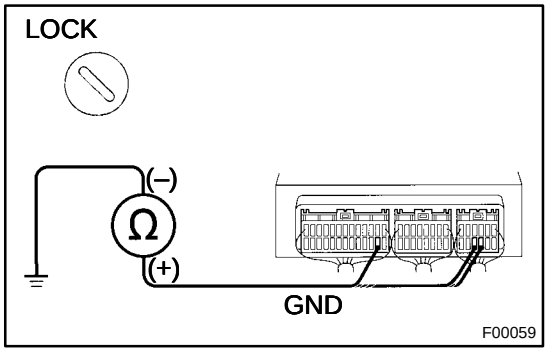
OK:

Voltage: 10 – 14 V

NG → **Check and replace ABS & TRAC ECU.**

OK

3	**Check continuity between terminals GND of ABS & TRAC ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of ABS & TRAC ECU connector and body ground.

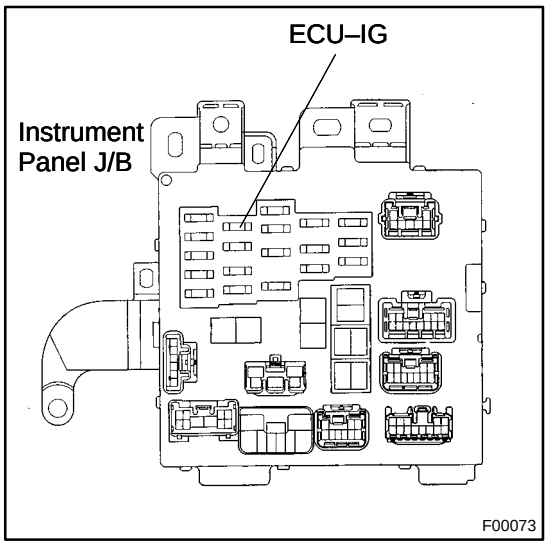
OK:

Resistance: 1 Ω or less

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

OK

4	Check ECU–IG fuse.



PREPARATION:
Remove ECU–IG fuse from Instrument Panel J/B.
CHECK:
Check continuity of ECU–IG fuse.
OK:

Continuity

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

OK

Check for open in harness and connector between ABS & TRAC ECU and battery (See page IN–27).

DI0C7–01

DTC	43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
43	Detection of any conditions from (1) through (8): (1) During TRAC is in non–operation and ABS is output DTC, but TRAC is not during initial lamp checking, terminal WA of ECU is ON and engine speed is 500 rpm or more continues for 1 sec. or more. (2) Solenoid relay circuit is open or short. (3) Motor relay circuit is open or short. (4) ABS solenoid circuit is open or short. (5) TRAC solenoid circuit is open or short. (6) Speed sensor is under malfunction condition. (7) IG power source is down or raise. (8) Pump motor is lock.	●ABS control system

INSPECTION PROCEDURE

1	**Check the DTC for the ABS (See page DI–273).**

***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.

DI0C8–01

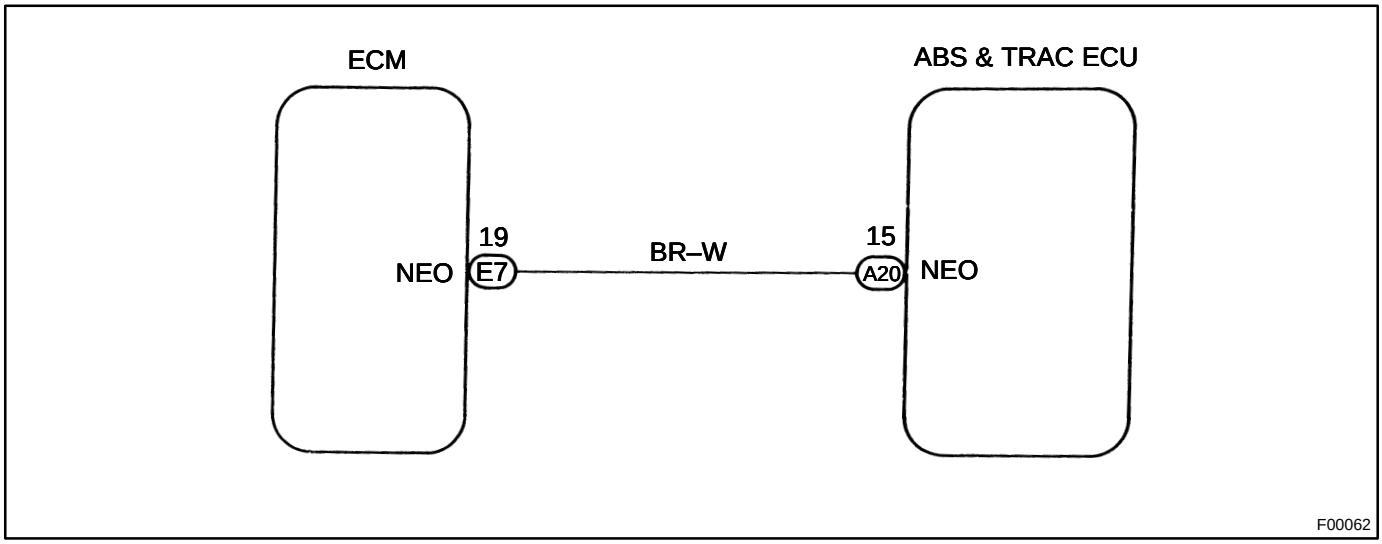
DTC	44	NE Signal Circuit

CIRCUIT DESCRIPTION

The ABS & TRAC ECU receives engine speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
44	Condition (1) or (2) is detected: (1) TRAC is in operation and engine speed is 0 rpm continues for 2.4 sec. or more. (2) TRAC is in non–operation, sift lever is not in P or N position, both the front right and left wheels' speed is 30 km/h (19 mph) or more, engine speed is 0 rpm and does not have communication malfunction, and malfunction information of engine system is OFF.	●NEO circuit ●ECM ●ABS & TRAC ECU

WIRING DIAGRAM



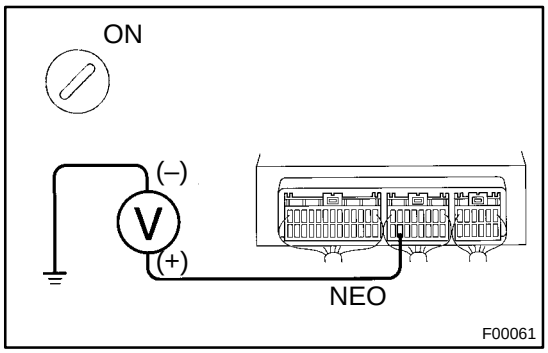
INSPECTION PROCEDURE

1	**Check for open and short in harness and connector between terminal NEO of ABS & TRAC ECU and terminal NEO of ECM (See page IN–27).**

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

OK

2	Check voltage between terminal NEO of ABS & TRAC ECU and body ground.



PREPARATION:

(a) Remove ABS & TRAC ECU with connectors still connected.

(b) Turn ignition switch ON.

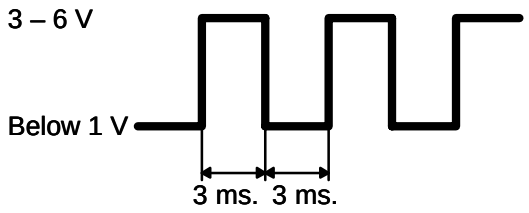
CHECK:

Measure voltage between terminal NEO of ABS & TRAC 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)	2 – 3 V (Pulse)

(Reference)



NG → **Check and replace ABS & TRAC ECU or ECM.**

OK

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

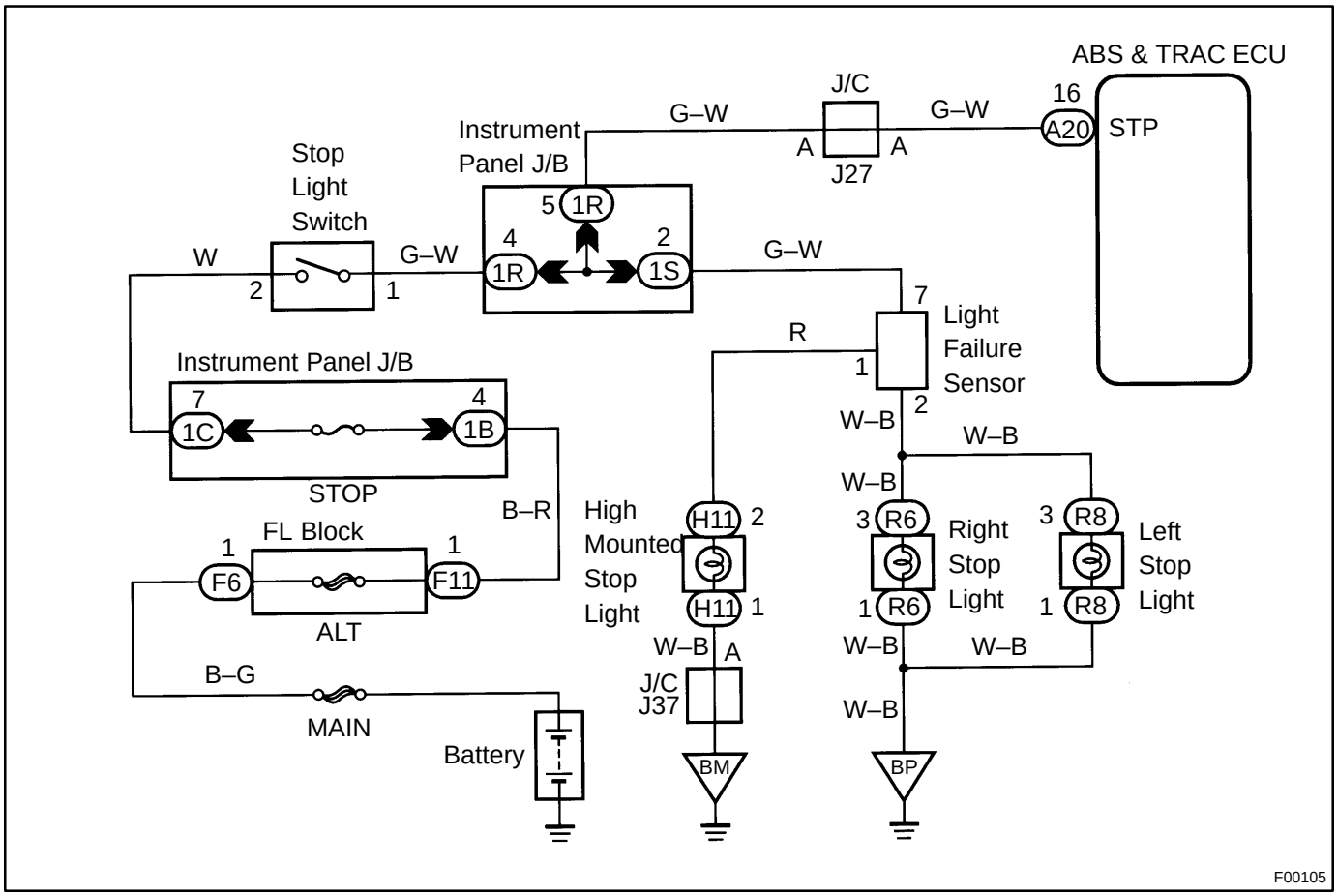
DI0CA–01

DTC	49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
49	Battery voltage has never exceed more than 17.0 V and become less than 9.5 V within 2.16 sec. and the STP terminal voltage of ECU is under open circuit detecting limits continues for 3 sec. or more.	●Stop light switch ●Stop light switch circuit ●ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of stop light.

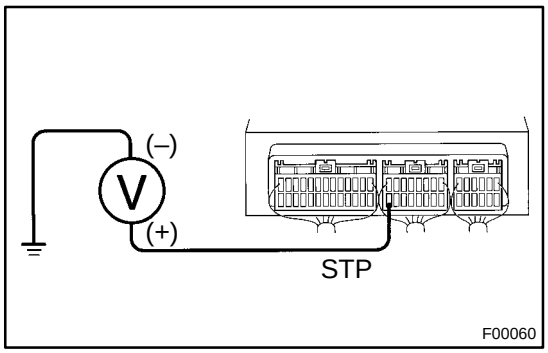
CHECK:

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

NG	Repair stop light circuit (See page BE–50).

OK

2	**Check voltage between terminal STP of ABS & TRAC ECU and body ground.**



PREPARATION:
Remove ABS & TRAC ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of ABS & TRAC ECU and body ground when brake pedal is depressed.
OK:
Voltage: 8 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–282).**

NG

3	**Check for open in harness and connector between ABS & TRAC ECU and stop light Switch (See page IN–27).**

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

OK

Check and replace ABS & TRAC ECU.

DI0CC–01

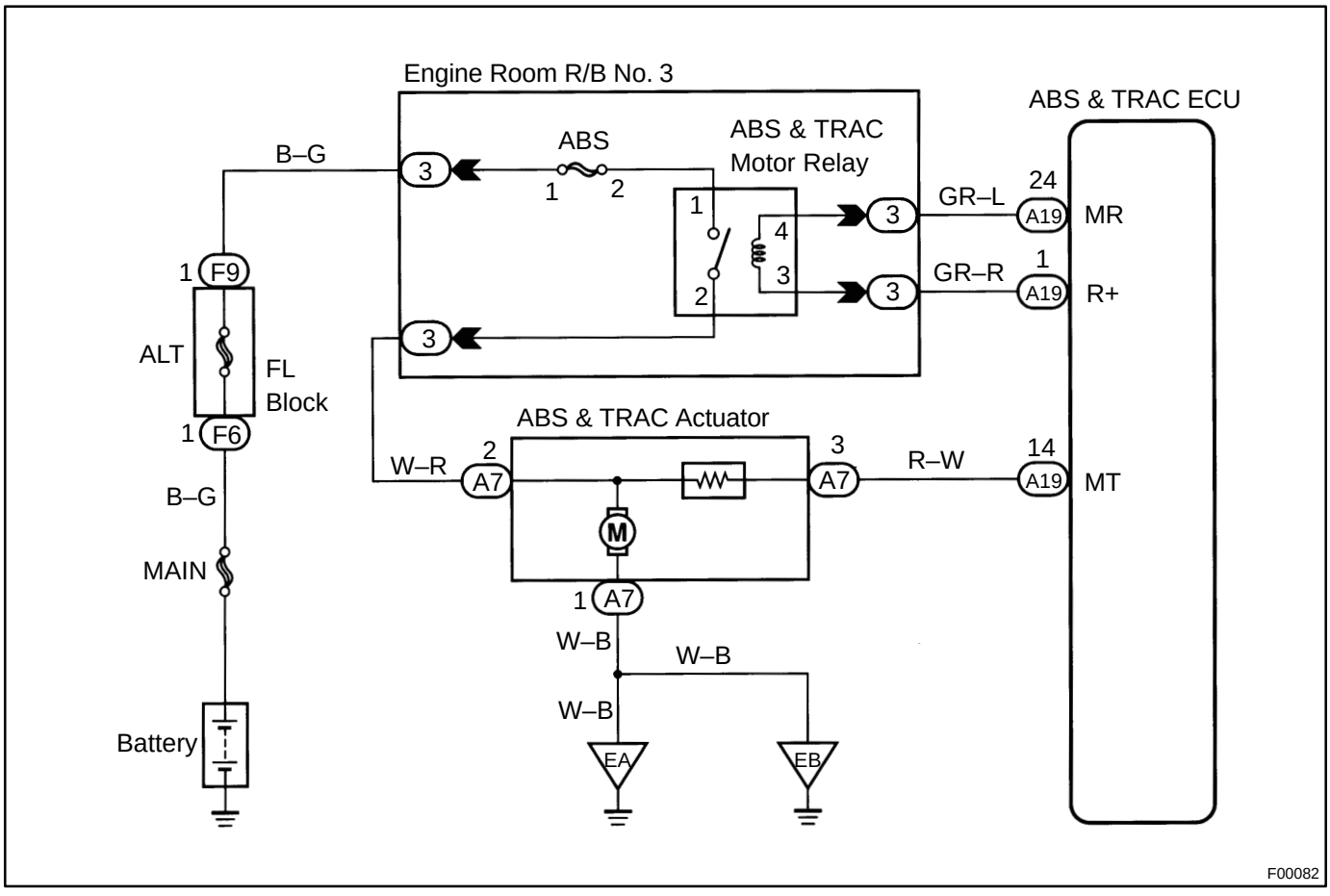
DTC	51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
51	In the midst of initial check, after the current flows to the motor for 3 sec. and motor relay is turned OFF, then within 0.66 sec., the condition that the motor relay monitor is OFF continues for 0.24 sec. or more.	●ABS pump motor

Fail safe function: If trouble occurs in the ABS & TRAC pump motor, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



DI0CD–01

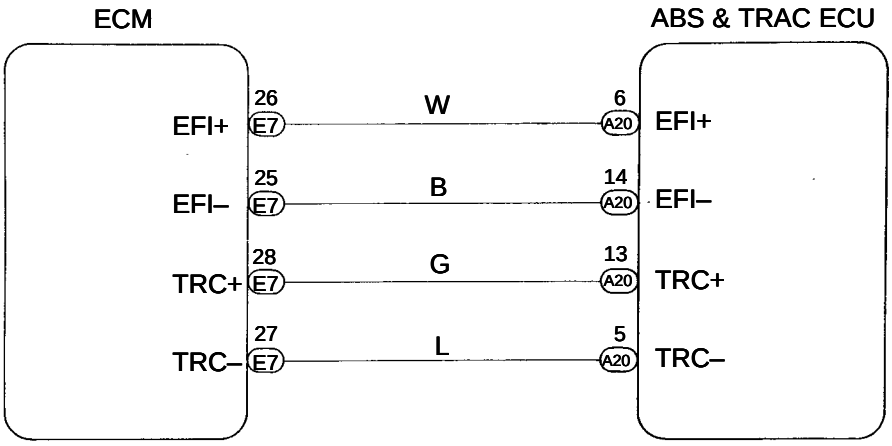
DTC	53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

This circuit is used to send TRAC control information from the ABS & TRAC ECU to the ECM (TRC+, TRC–), and engine control information from the ECM to the ABS & TRAC ECU (EFI+, EFI–).

DTC No.	DTC Detecting Condition	Trouble Area
53	ECM communication data malfunction is detected.	●TRC+ or TRC– circuit ●EFI+ or EFI– circuit ●ECM ●ABS & TRAC ECU

WIRING DIAGRAM



F00063

INSPECTION PROCEDURE

1	**Check for open and short in harness and connector between terminals EFI+, EFI–, TRC+, TRC– of ABS & TRAC ECU and ECM (See page IN–27).**

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

OK

Check and replace ECM or ABS & TRAC ECU.

DI0CE–01

DTC	61	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If trouble occurs in the engine control system, the ECU prohibits TRAC control.

DTC No.	DTC Detection Condition	Trouble Area
61	Conditions (1) and (2) is detected: (1) ECM communication is normal, malfunction information of engine system ON, and engine speed is 500 rpm or more continues for 0.48 sec. or more, and TRAC operation start condition is concluded. (2) ECM communication is normal, malfunction information of engine system is ON, engine speed is 500 rpm and more continues for 1 sec. or more, and the engine system memorizes DTC.	Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page DI–3).**

***1** → **Repair engine control system according to the code output.**

***2**

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON.

DI0CG–01

DTC	Always ON	ABS & TRAC ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	ABS & TRAC ECU internal malfunction is detected.	●ECU

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

INSPECTION PROCEDURE

1	**Is DTC output?**

Check DTC on page DI–273.

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

NO

2	**Is normal code displayed?**

YES → **Check ABS & TRAC solenoid relay. Check for short in harness and connector between solenoid relay and DLC1 (See page IN–27).**

NO

3	**Is ABS warning light go off?**

YES → **Check for open or short in harness and connector between ECU–IG fuse and ABS & TRAC ECU (See page IN–27).**

NO

4	**Check battery positive voltage.**

PREPARATION:
Start the engine.
CHECK:
Check the battery positive 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 ABS & TRAC ECU.
(c) Turn the ignition switch ON.
CHECK:
Check the ABS warning light goes off.

OK → **Check and replace ABS & TRAC ECU.**

NG

Check for short in harness and connector between ABS warning light, DLC1, DLC2, and ABS & TRAC ECU (See page IN–27).

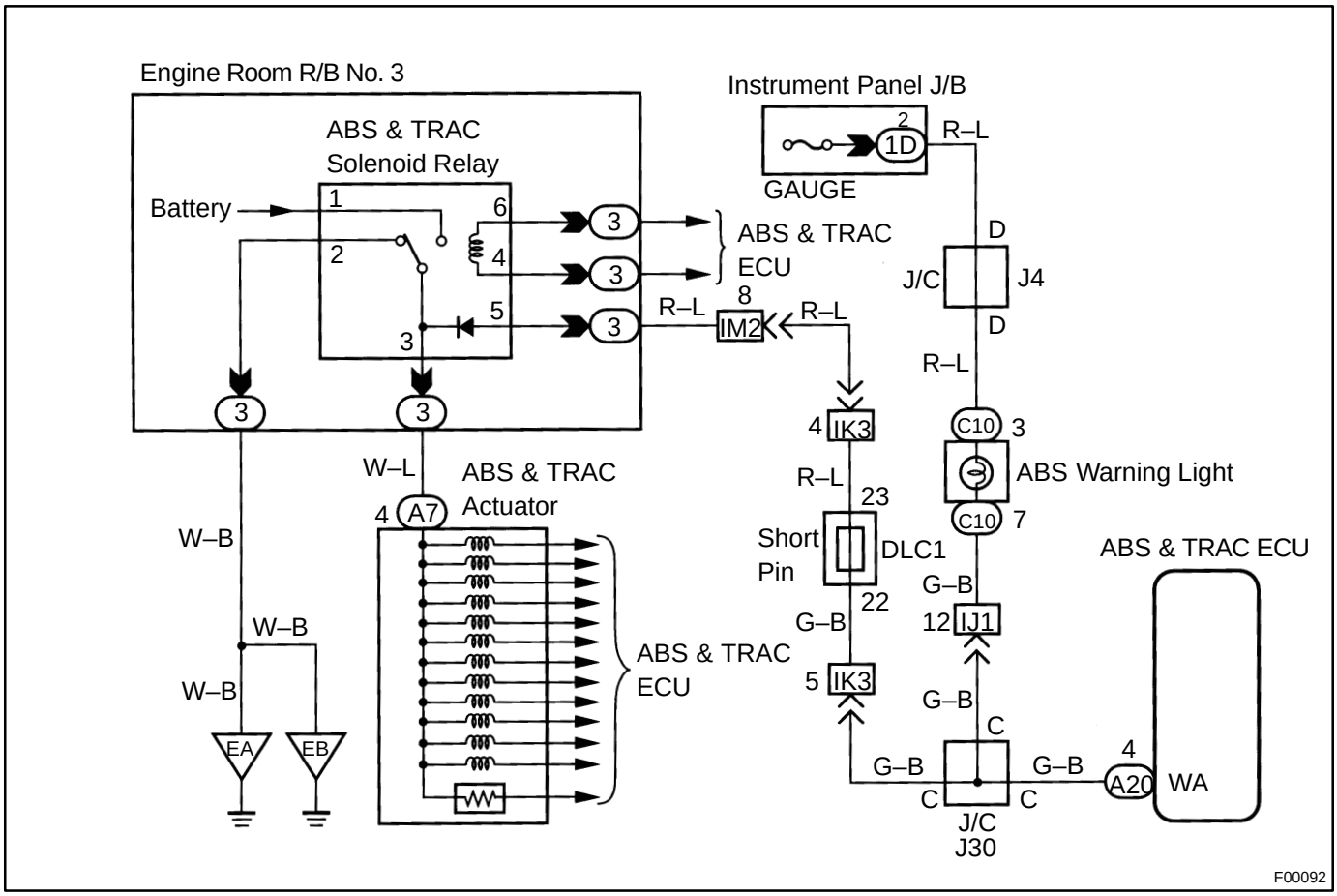
DI0CI–01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and E_1 of the DLC1 or DLC2 make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

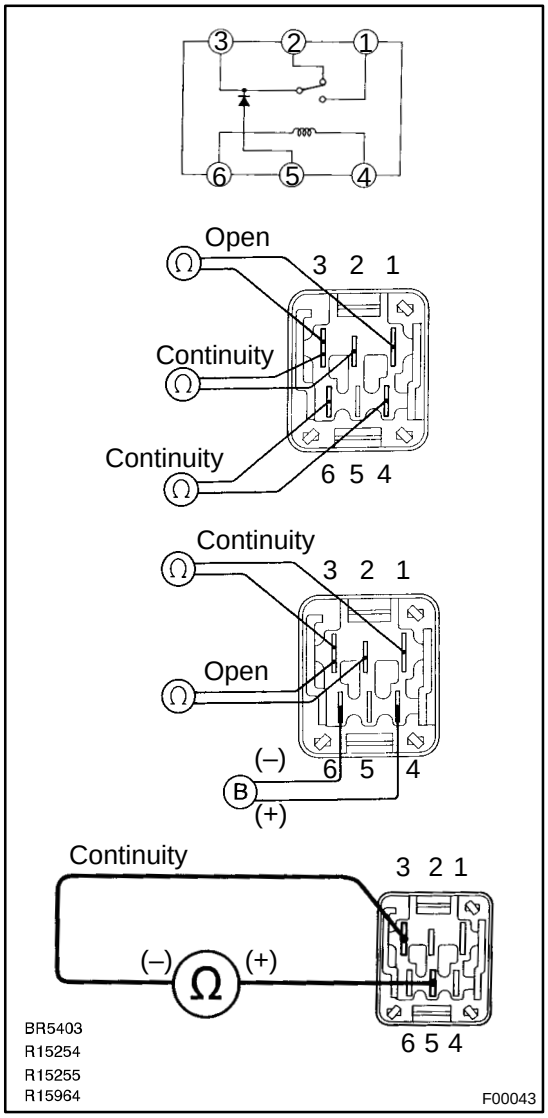
1	**Check ABS warning light.**

See Combination Meter Troubleshooting on page BE–58.

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

OK

2	Check ABS & TRAC solenoid relay.



PREPARATION:

Remove ABS & TRAC solenoid relay from Engine Room R/B No. 3.

CHECK:

Check continuity between each terminal of ABS & TRAC 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 positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

Connect the ~ test lead to terminal 5 and the ⊖ lead to terminal 3. Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the ⊖ test lead to terminal 5 and the ~ lead to terminal 3. Recheck continuity between terminals.

NG → **Replace ABS & TRAC solenoid relay.**

OK

Check for open in harness and connector between DLC1, ABS & TRAC solenoid relay and body ground (See page IN–27).

3	**Is DTC output?**

Check DTC on page DI–273.

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

NO

4	**Does ABS warning light go off?**

NO → **Check for short in harness and connector between ABS warning light, DLC1 and ABS & TRAC ECU (See page IN–27).**

YES

5	**Check ABS & TRAC solenoid relay (See step 2).**

NG → **Replace ABS & TRAC solenoid relay.**

OK

Check for short in harness and connector between DLC1 and ABS & TRAC solenoid relay (See page IN–27).

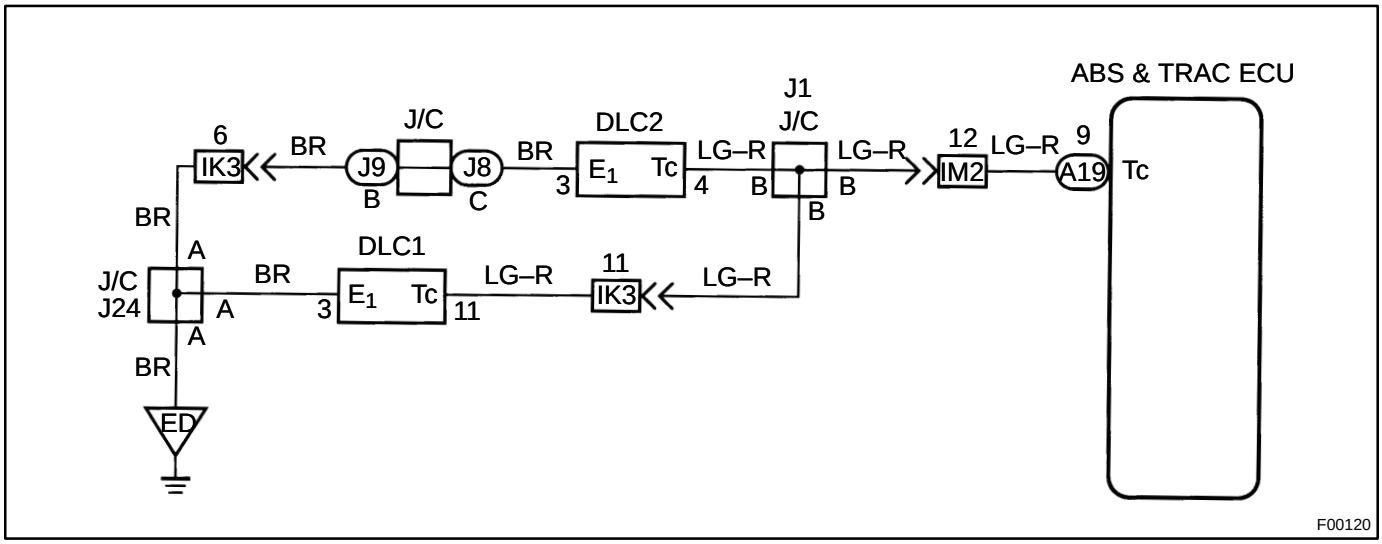
DI0CK–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

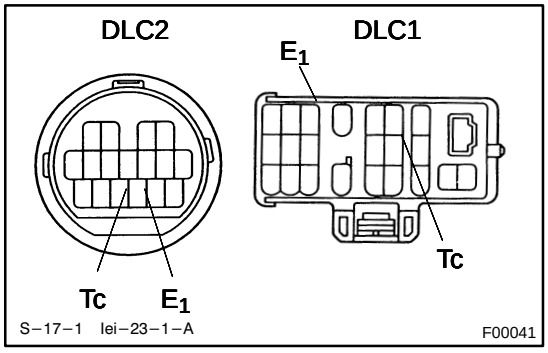
Connecting between terminals Tc and E_1 of the DLC1 or the DLC2 causes the ECU to display the DTC by blinking the ABS warning light and TRAC OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2 or DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E_1 of DLC2 or DLC1.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short in harness and connector between ABS & TRAC ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–27).**

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

OK

Check and replace ABS & TRAC ECU.

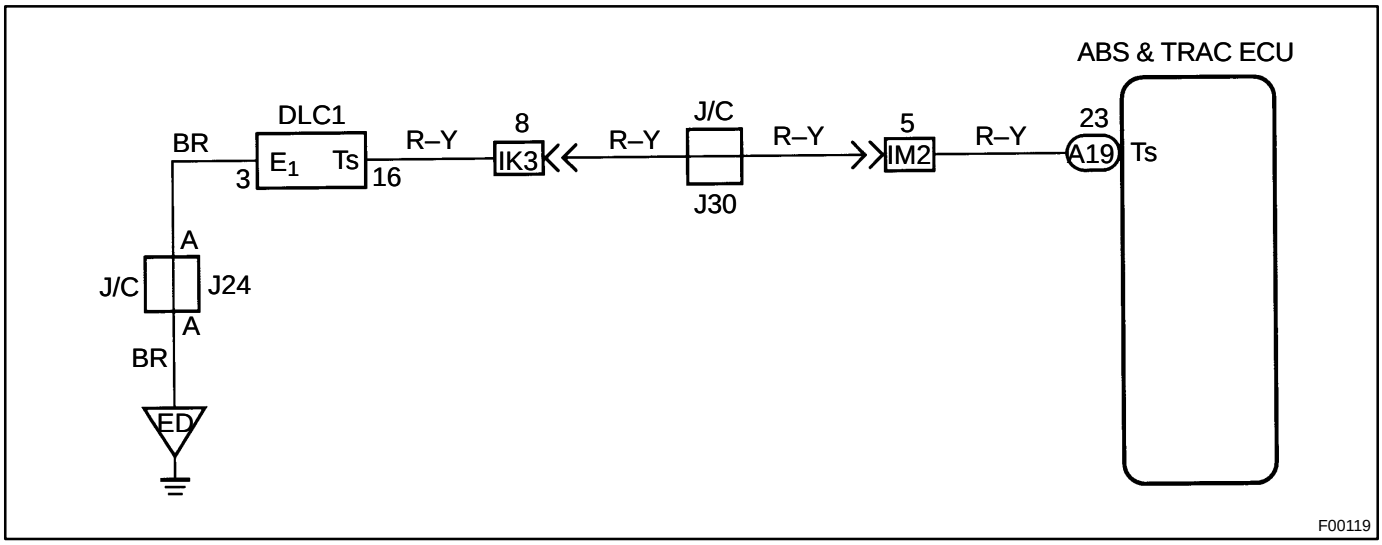
DI0CM–01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

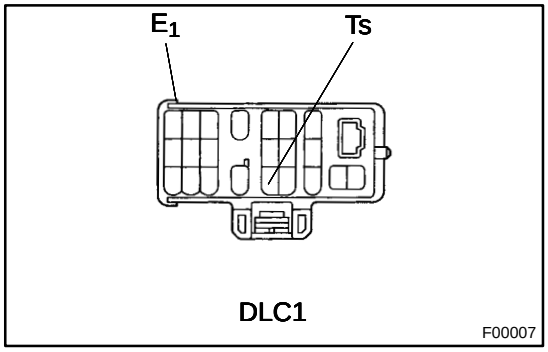
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and E_1 of DLC1.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short in harness and connector between ABS & TRAC ECU and DLC1, DLC1 and body ground (See page IN–27).**

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

OK

Check and replace ABS & TRAC ECU.

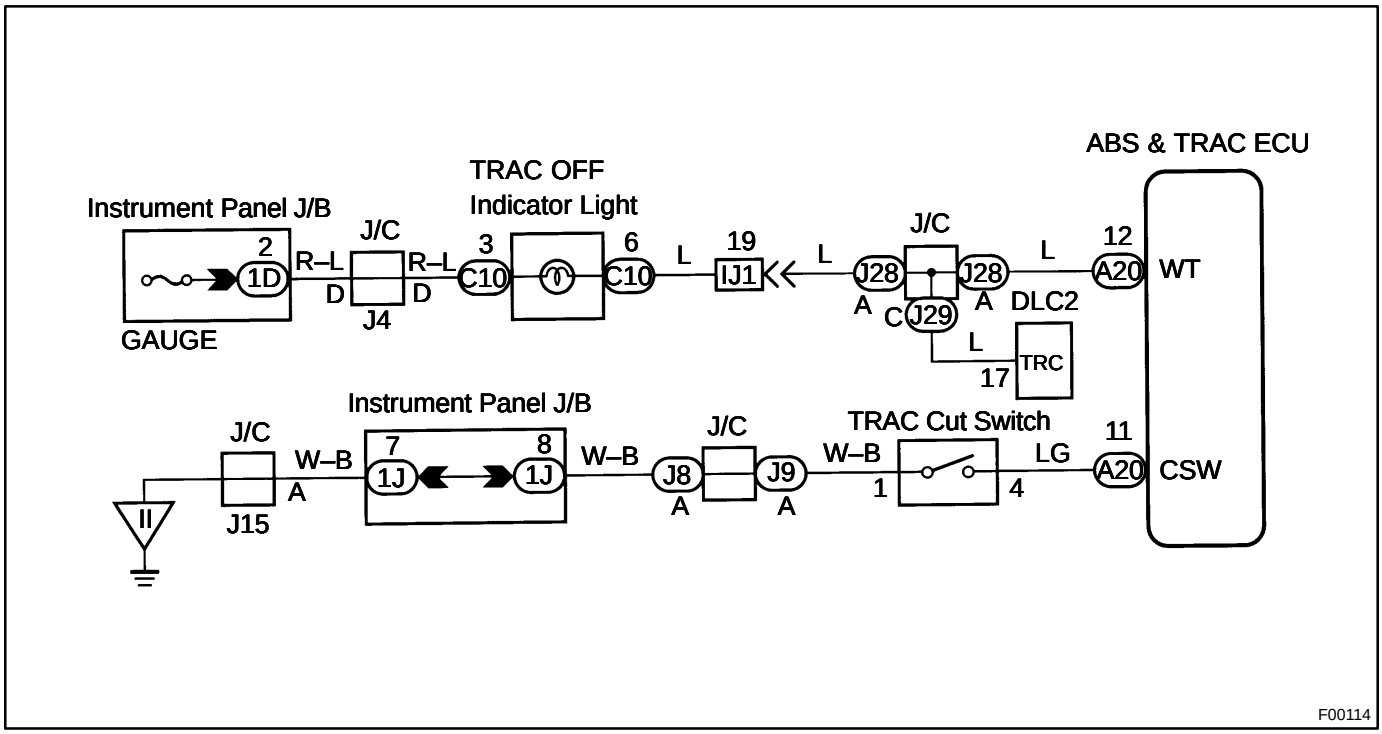
DI0CN–01

TRAC OFF Indicator, TRAC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC control main switch. When the TRAC cut switch is pushed on, TRAC control goes off and the TRAC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

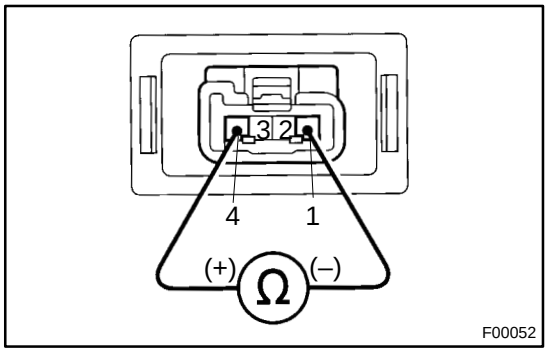
1	**Check DTC.**

Check DTC on page DI–273.

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

NO

2	**Check TRAC cut switch.**



PREPARATION:

(a) Remove TRAC cut switch.

(b) Disconnect TRAC cut switch connector.

CHECK:

Measure resistance between terminals 1 and 4 of TRAC cut switch when TRAC cut switch is on and off.

OK:

TRAC cut switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRAC cut switch.**

OK

3	**Check for open and short in harness and connector between terminal CSW of ABS & TRAC ECU and TRAC cut switch and body ground (See page IN–27).**

NG → **Repair or replace combination meter.**

OK

4	**Check TRAC OFF indicator light.**

See combination meter troubleshooting on page BE–58.

NG → **Repair or replace combination meter.**

OK

5	**Check for open and short in harness and connector between terminal WT of ABS & TRAC ECU and TRAC OFF indicator light (See page IN–27).**

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

OK

Check and replace ABS & TRAC ECU.

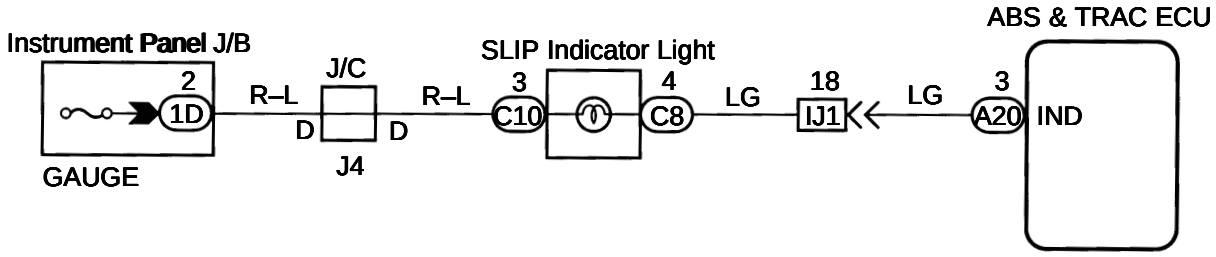
DI0CP–01

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC operation.

WIRING DIAGRAM



F00097

INSPECTION PROCEDURE

1	**Check SLIP indicator light.**

See combination meter troubleshooting on page BE–58.

NG → **Repair or replace combination meter.**

OK

2	**Check for short in harness and connector between ABS & TRAC ECU and SLIP indicator light (See page IN–27).**

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

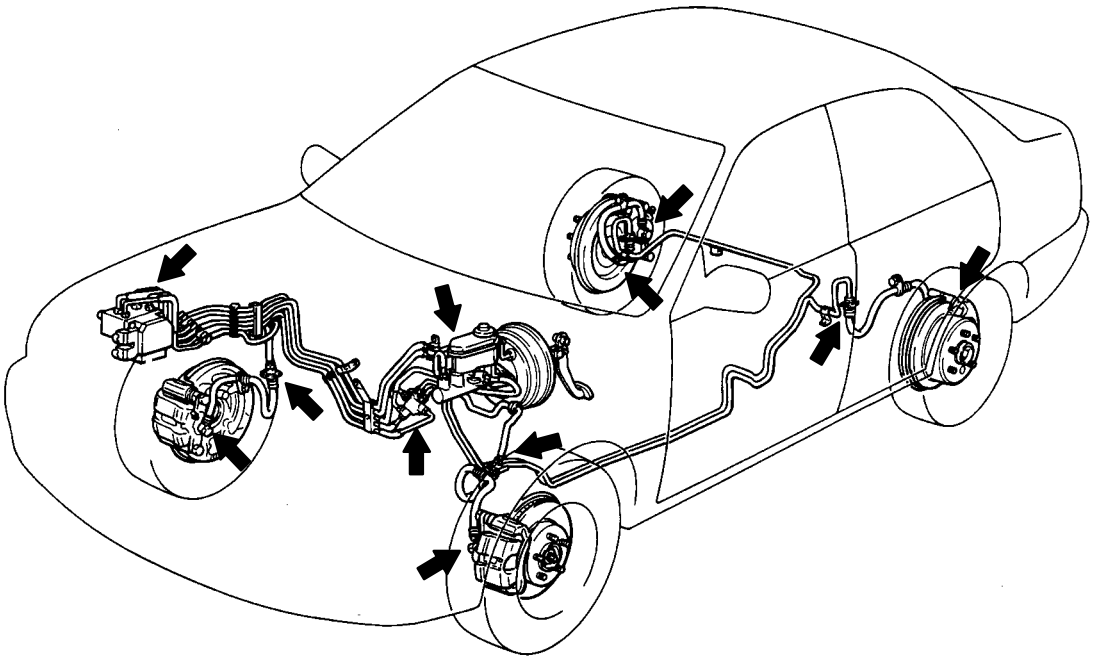
OK

Check and replace ABS & TRAC ECU.

DI0CR–01

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

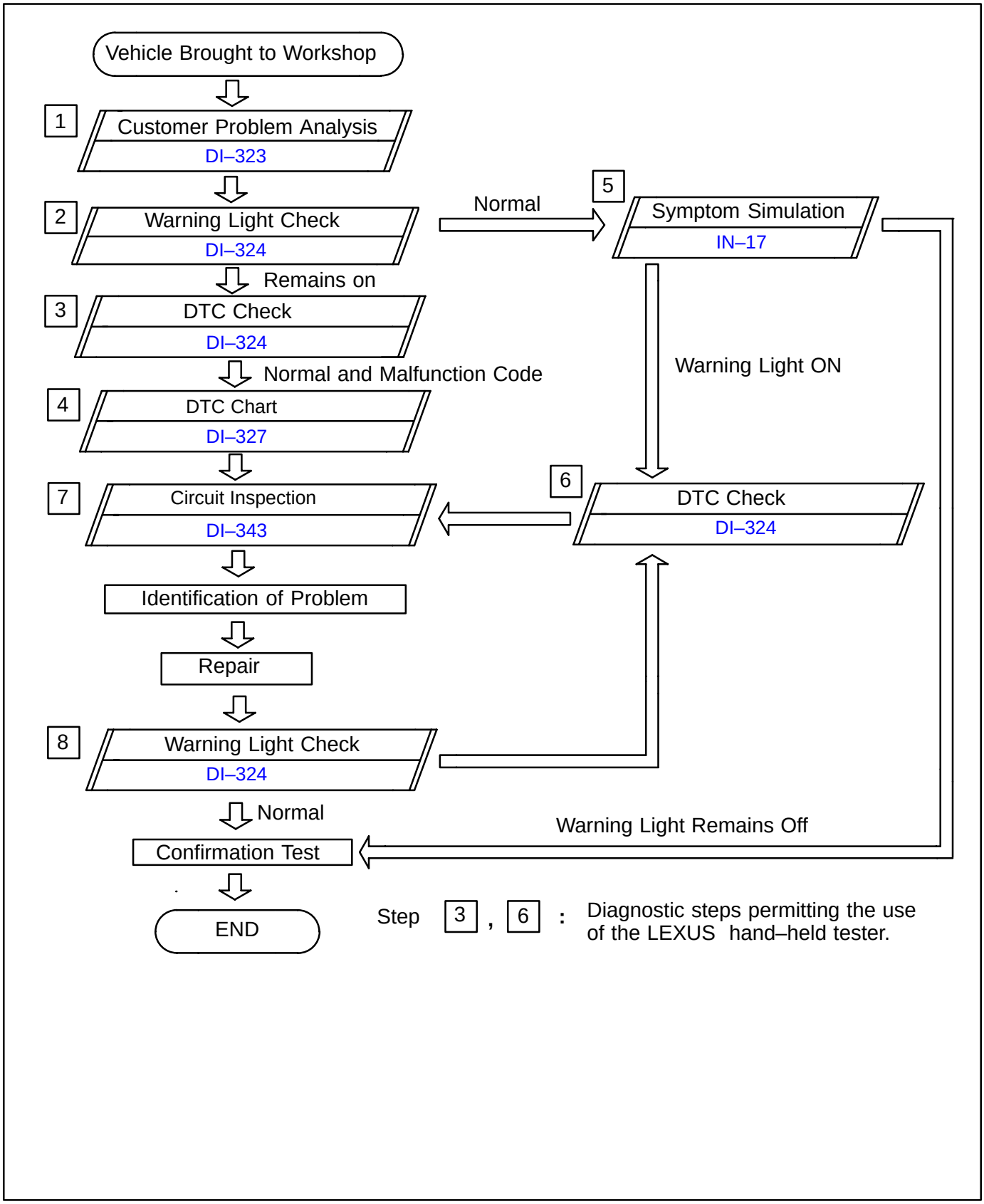


F00070

SUPPLEMENTAL RESTRAINT SYSTEM

DI0AT–01

HOW TO PROCEED WITH TROUBLESHOOTING



DI0AU–01

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 Dist Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

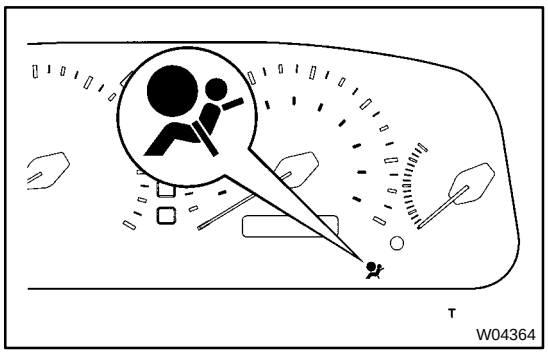
Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details Of Problem	

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.]

DI0AV–01



PRE–CHECK

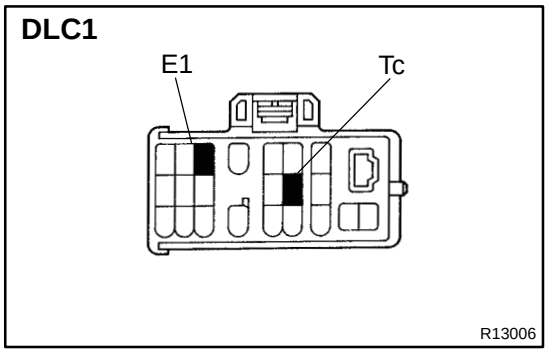
1. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch to ACC or ON 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 ACC or 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" on page DI–362, DI–364.



2. DTC CHECK (Using diagnosis check wire)

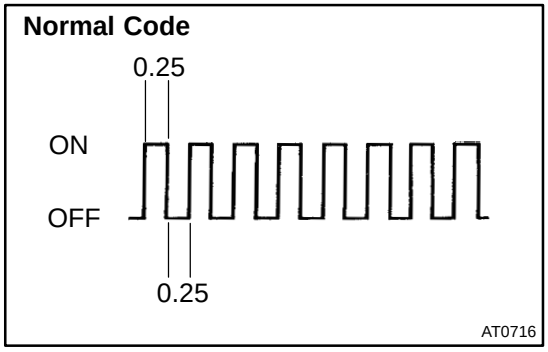
(a) OUTPUT DTC

(1) Turn the ignition switch to the ACC or ON position and wait approx. 20 seconds.

(2) Using SST, connect terminals Tc and E1 of the DLC1.
SST 09843–18020

NOTICE:Never make a mistake with the terminal connecting position as this will cause a malfunction.

HINT:DTC check and troubleshooting of each DTC can also be done using DLC2.



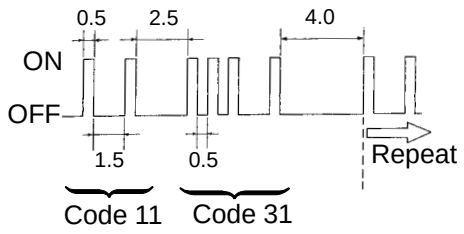
(b) READ DTC

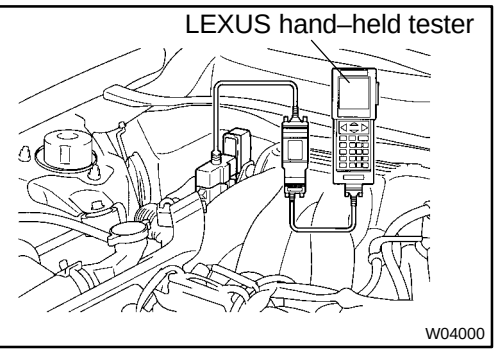
Read the 2–digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are as shown on the illustration.

- Normal code indication
  The light will blink 2 times per 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.

Code 11 and 31





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 it does not output a DTC or outputs a DTC without terminal connection, proceed to the Tc terminal circuit inspection on page DI–367.

3. DTC CHECK (Using LEXUS hand–held tester)

(a) Hook up the LEXUS hand–held tester to the DLC1 or DLC2.

(b) Read the DTCs by following the prompts on the tester screen.

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

4. DTC CLEARANCE

When the ignition switch is turned off, the diagnostic trouble code is cleared.

5. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

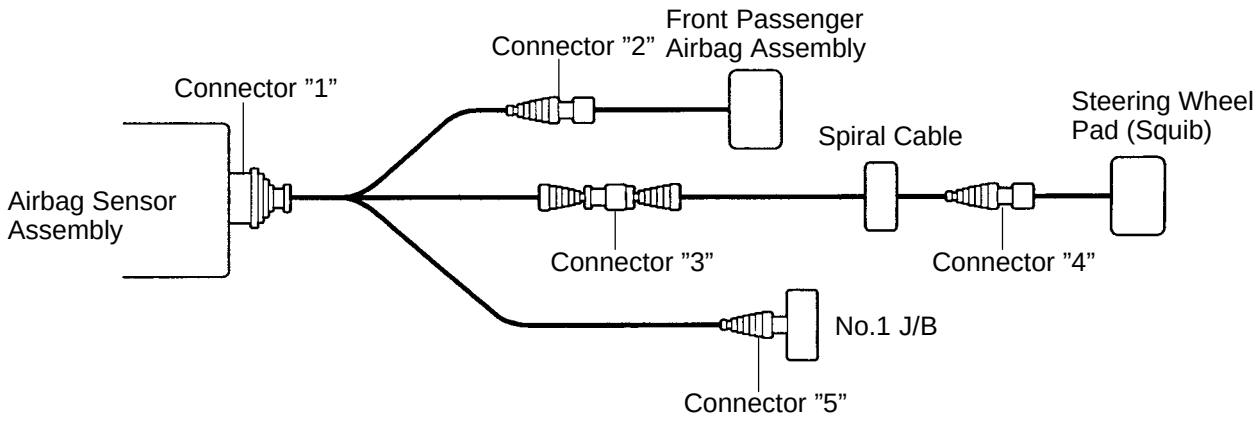
An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

When release of the airbag activation prevention mechanism is directed in the troubleshooting procedure, as shown in the illustration of the connectors "1" and "3" below, insert paper which is the same thickness as the male terminal, between the terminal and the short spring.

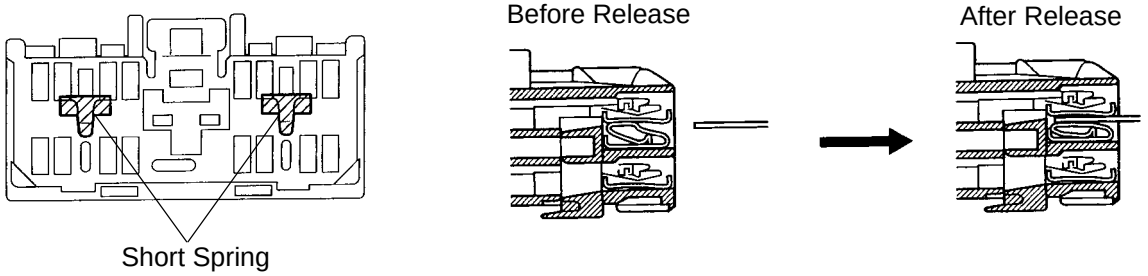
CAUTION:NEVER RELEASE the airbag activation prevention mechanism on the steering wheel pad connector.

NOTICE:

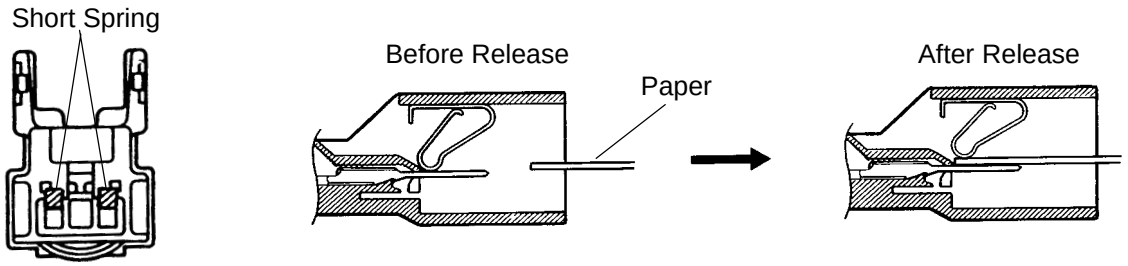
- **Do not release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.**
- **If the paper inserted is too thick the terminal and short spring may be damaged, so always use paper the same thickness as the male terminal.**



Airbag Sensor Assembly Connector (Connector ”1”)



Spiral Cable Connector (Connector ”3”)



W01805
W03146 W03147
AB0130 AB0045 AB0046

H00067

DI0AW–01

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.).

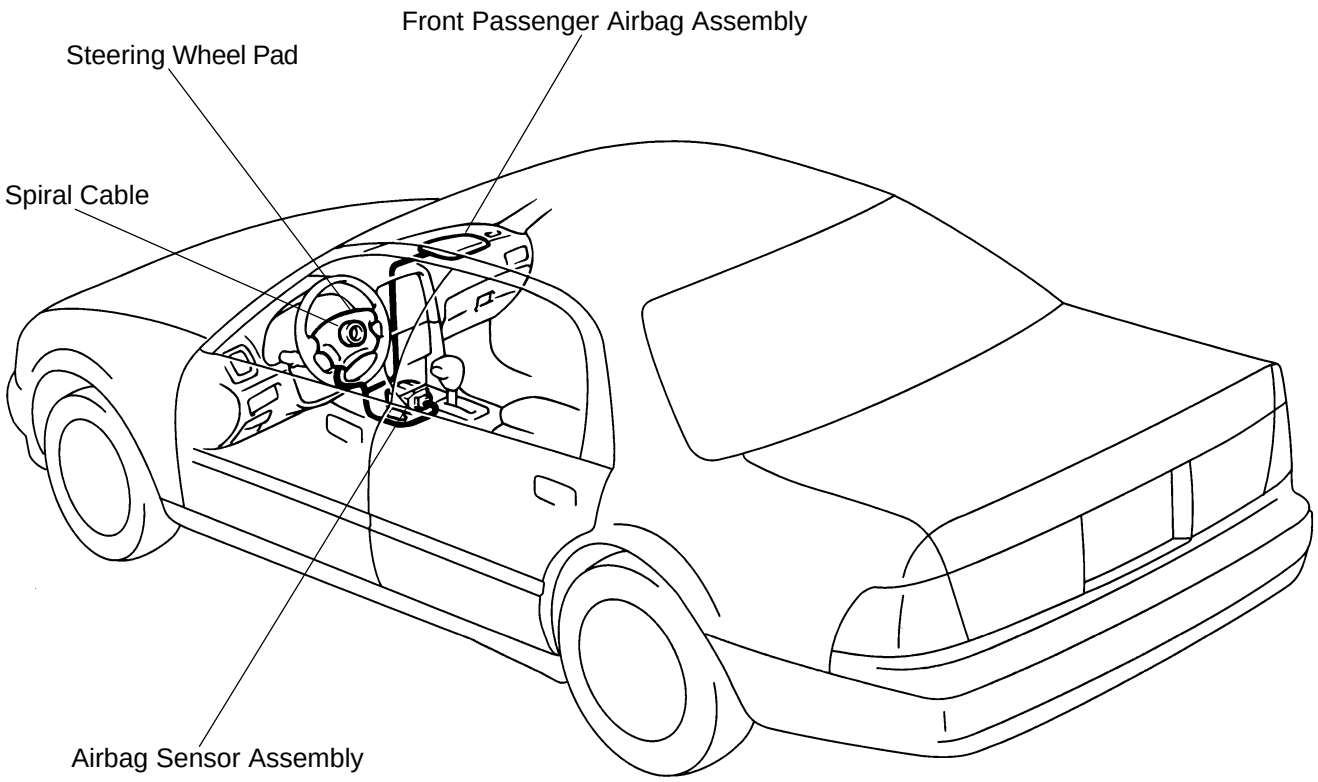
DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
Normal (DI–359)	●System normal	–	OFF
	●Voltage source drop	●Battery ●Airbag sensor assembly	ON
11 (DI–331)	●Short in squib circuit (to ground)	●Squib (driver airbag and front passenger airbag) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
12 (DI–337)	●Short in squib circuit (to B+)	●Squib (driver airbag and front passenger airbag) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
13 (DI–343)	●Short in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
14 (DI–347)	●Open in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
31 (DI–351)	●Airbag sensor assembly malfunction	●Airbag sensor assembly	ON
53 (DI–353)	●Short in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
54 (DI–356)	●Open in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON

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.

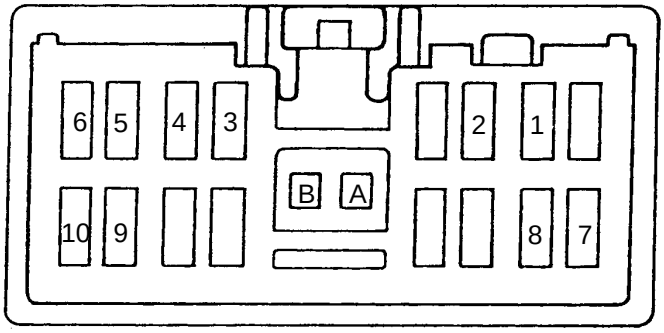
DI0AX–01

PARTS LOCATION



DI0AY–01

TERMINALS OF ECM



W02759

No.	Symbol	Terminal Name
A	–	Electrical Connection Check Mechanism
B	–	Electrical Connection Check Mechanism
1	P–	Squib (Passenger)
2	P+	Squib (Passenger)
3	LA	SRS Warning Light
4	D–	Squib (Driver)
5	D+	Squib (Driver)
6	Tc	Diagnosis
7	E2	Ground
8	E1	Ground
9	IG2	Power Source (IGN Fuse)
10	ACC	Power Source (CIG Fuse)

DI0AZ–01

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
●With the ignition switch at ACC or ON, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed. ●SRS warning light is always lit up even when ignition switch is in the LOCK position.	●SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI–362
●With the ignition switch at ACC or ON, the SRS warning lights does not light up.	●SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	DI–364
●DTC not displayed. ●SRS warning light is always lit up a DTC check procedure. ●DTC displayed without Tc and E1 terminal connection.	●Tc terminal circuit	DI–367

DI0B0–01

CIRCUIT INSPECTION

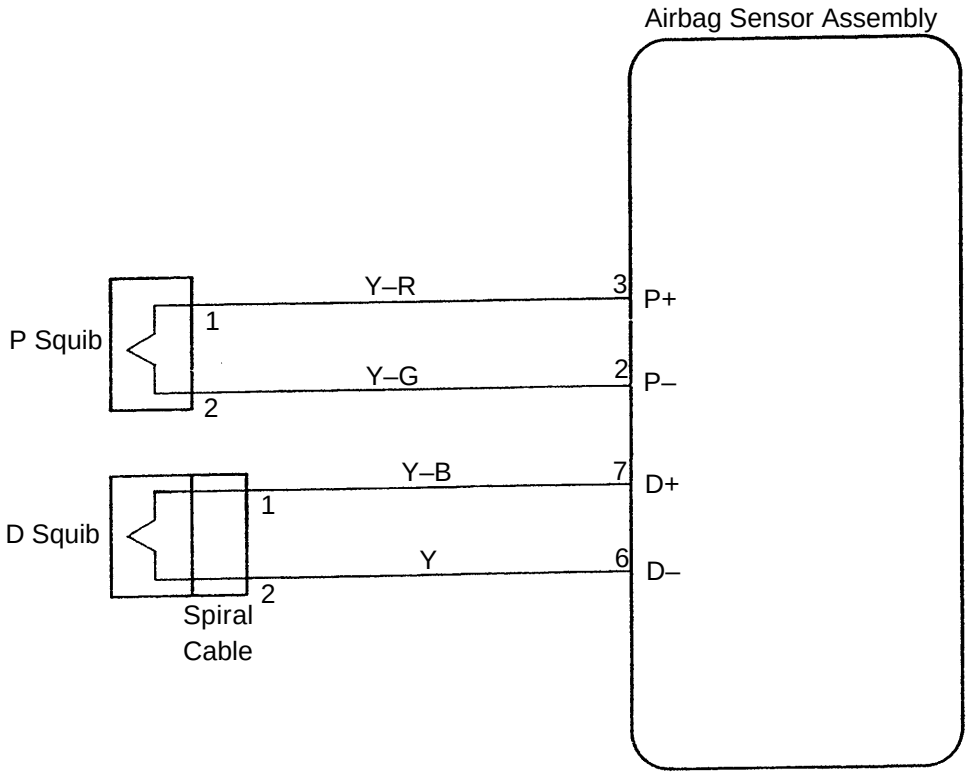
DTC	11	Short in Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The squib circuit consists of the airbag sensor assembly, spiral cable, steering wheel pad and front passenger airbag assembly. If 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 11 is recorded when ground short is detected in the squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
11	●Short circuit in squib wire harness (to ground) ●Squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Front passenger airbag assembly (P squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

WIRING DIAGRAM

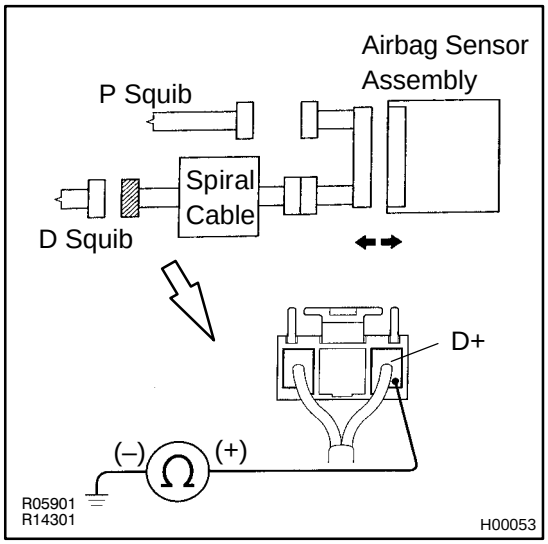


R16017

INSPECTION PROCEDURE

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	**Check D squib circuit.**

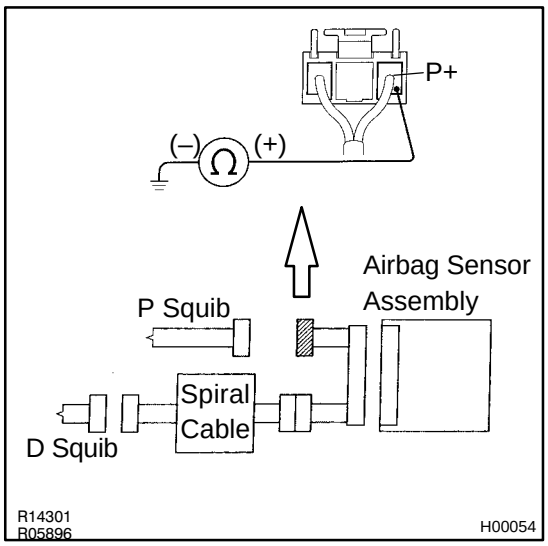


CHECK:
For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D+ and body ground.
OK:
Resistance: 1MΩ or Higher

NG	**Go to step ” 7 ”.**

OK

3	**Check P squib circuit.**

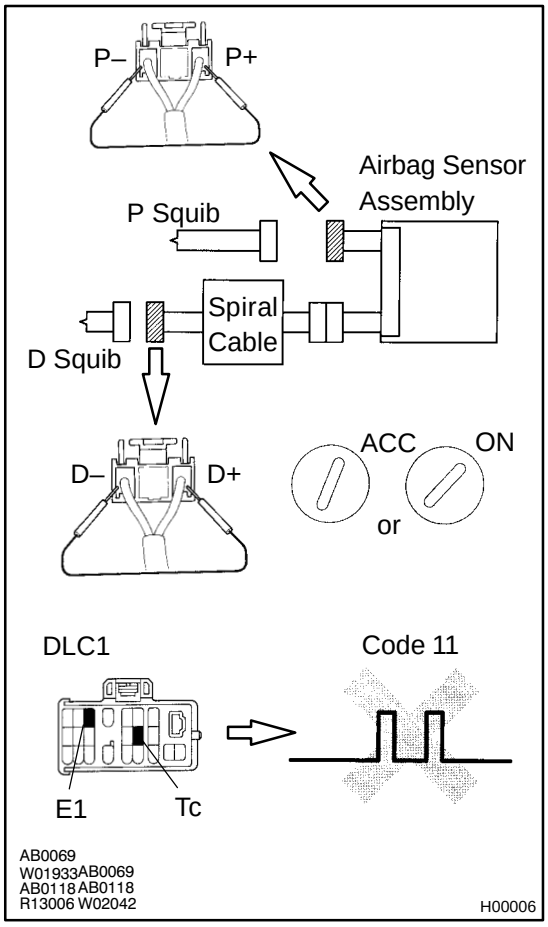


CHECK:
For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and front passenger airbag assembly, measure the resistance between P+ and body ground.
OK:
Resistance: 1MΩ or Higher

NG → **Repair or replace harness or connector between the airbag sensor assembly and front passenger airbag assembly.**

OK

4	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect connector to airbag sensor assembly.
(b) Using a service wire connect D+ and D– on spiral cable side of connector between spiral cable and steering wheel pad.
(c) Using a service wire, connect P+ and P– on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory
(See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC

OK:

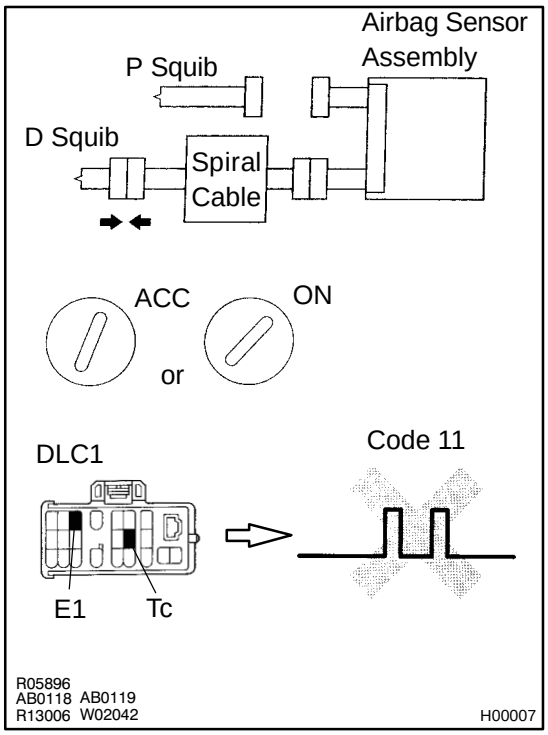
DTC 11 is not output.

HINT:
Codes other than code 11 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

5	Check D squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC.

OK:

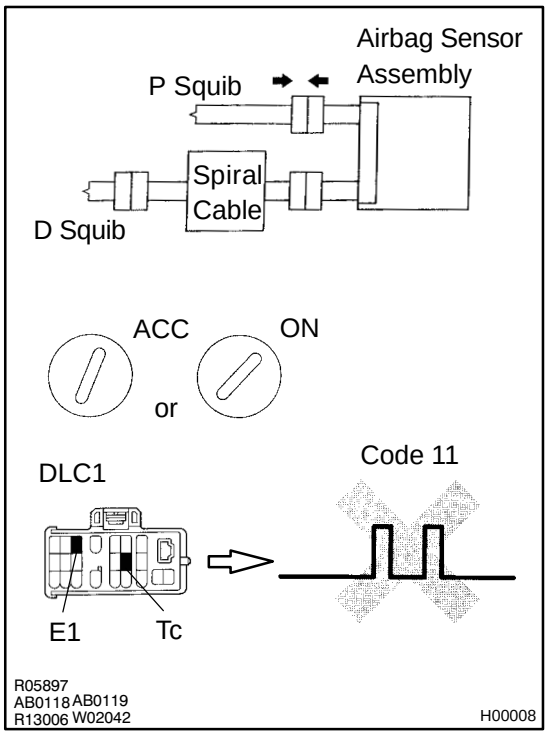
DTC 11 is not output.

HINT:
Codes other than code 11 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

OK

6	Check P squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 11 is not output.

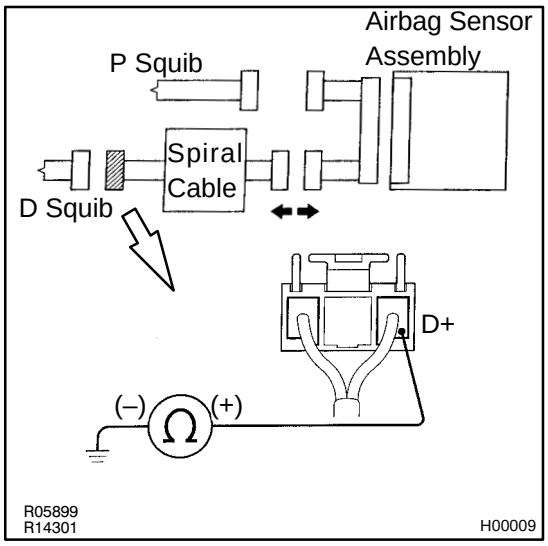
HINT:
Codes other than code 11 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag 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. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

7	Check spiral cable.



PREPARATION:

Disconnect connector between airbag sensor assembly and spiral cable.

CHECK:

Measure resistance between D+ on spiral cable side of connector between spiral cable and steering wheel pad and body ground.

OK:

Resistance: 1MΩ or Higher

NG → **Repair or replace spiral cable.**

OK

Repair or replace harness or connector between airbag sensor assembly and spiral cable.

DI0B1–01

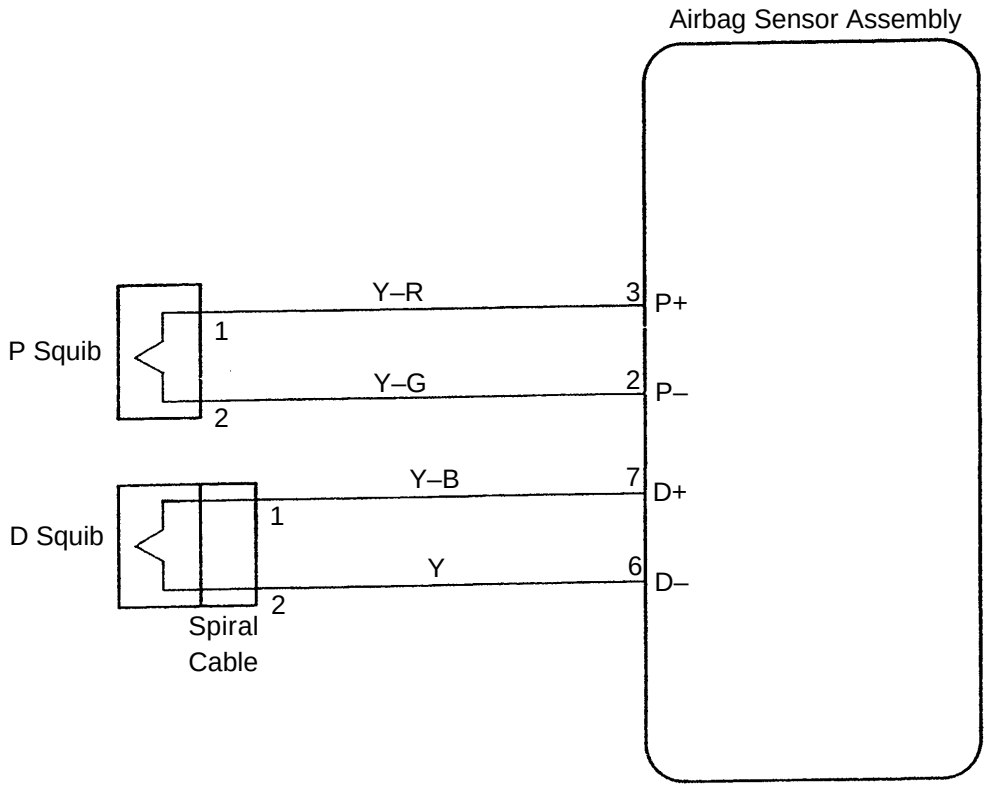
DTC	12	Short in Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The squib circuit consists of the airbag sensor assembly, spiral cable, steering wheel pad and front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each components, see page OPERATION on page RS–2.
DTC 12 is recorded when a B+ short is detected in the squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
12	●Short circuit in squib wire harness (to B+) ●Squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Front passenger airbag assembly (P squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

WIRING DIAGRAM

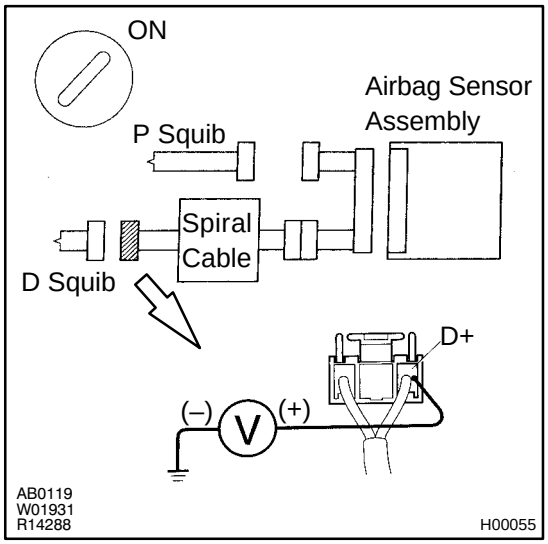


R16017

INSPECTION PROCEDURE

1	**Preparation. (See step " 1 " on page DI–359)**

2	**Check D squib circuit.**

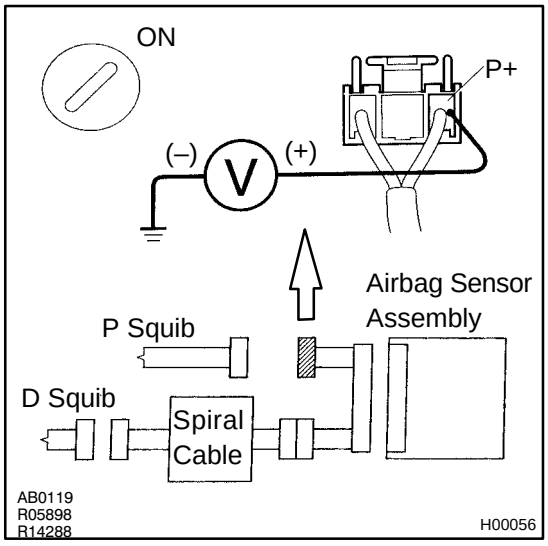


CHECK:
For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the voltage between D+ and body ground.
OK:
Voltage: 0 V

NG → **Go to step " 7 ".**

OK

3	**Check P squib circuit.**

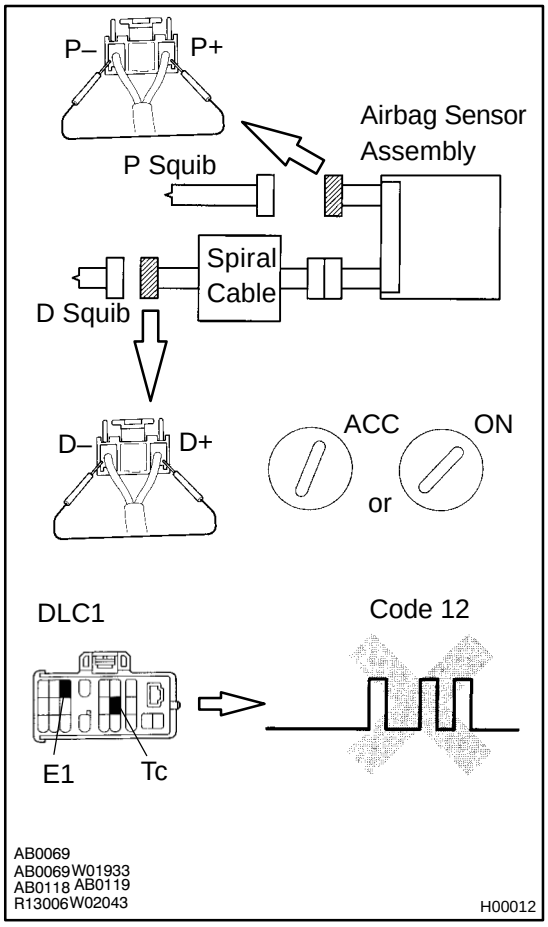


CHECK:
For the connector (on the airbag sensor assembly side) between airbag sensor assembly and front passenger airbag assembly, measure the voltage between P+ and body ground.
OK:
Voltage: 0V

NG → **Repair or replace harness or connector between the airbag sensor assembly and front passenger airbag assembly.**

OK

4	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect connector to airbag sensor assembly.
(b) Using a service wire, connect D+ and D– on spiral cable side of connector between spiral cable and steering wheel pad.
(c) Using a service wire, connect P+ and P– on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory
(See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

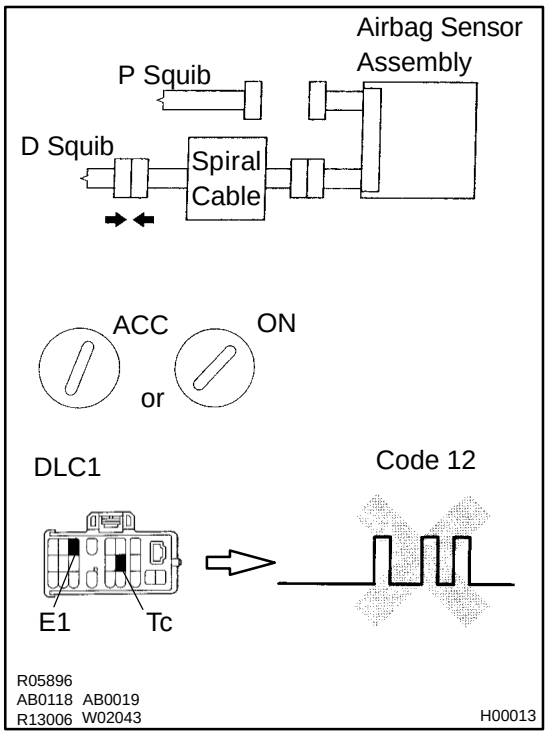
DTC 12 is not output.

HINT: Codes other than code 12 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

5	Check D squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect steering wheel pad connector.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

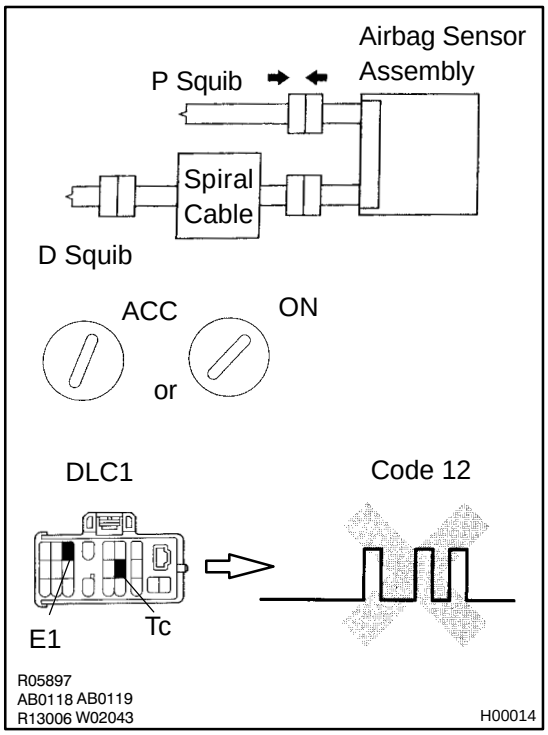
DTC 12 is not output.

HINT: Codes other than code 12 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

OK

6	Check P squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(b) Clear malfunction code stored in memory
(See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 12 is not output.

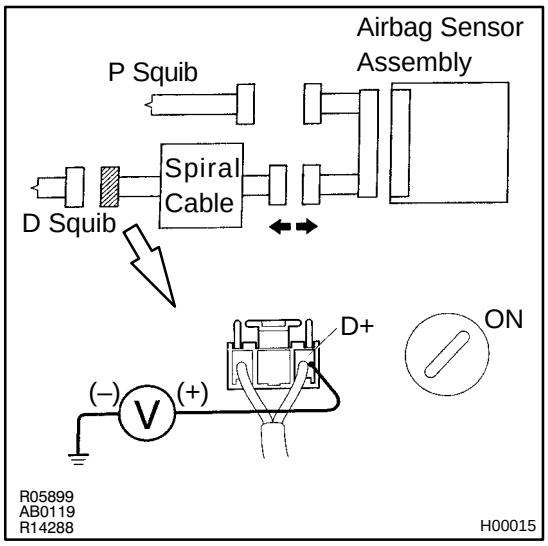
HINT:Codes other than code 12 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag 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.

7	Check spiral cable.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect connector between airbag sensor assembly and spiral cable.
(c) Turn ignition switch ON.

CHECK:

Measure voltage at D+ on spiral cable side of connector between spiral cable and steering wheel pad and body ground.

OK:

Voltage: 0 V

NG → **Repair or replace spiral cable.**

OK

Repair or replace harness or connector between airbag sensor assembly and spiral cable.

DI0B2–01

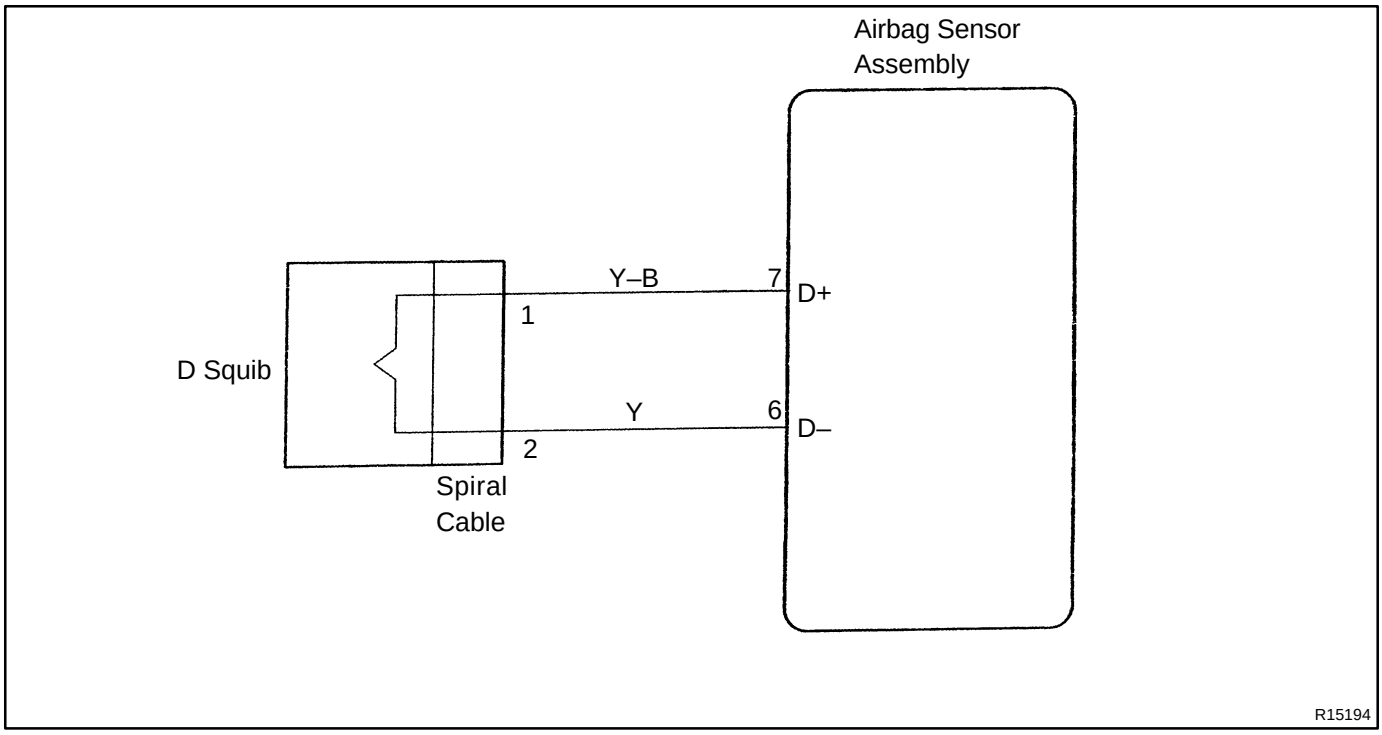
DTC	13	Short in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each components, see OPERATION on page RS–2.
DTC 13 is recorded when a short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
13	●Short circuit between D+ wire harness and D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

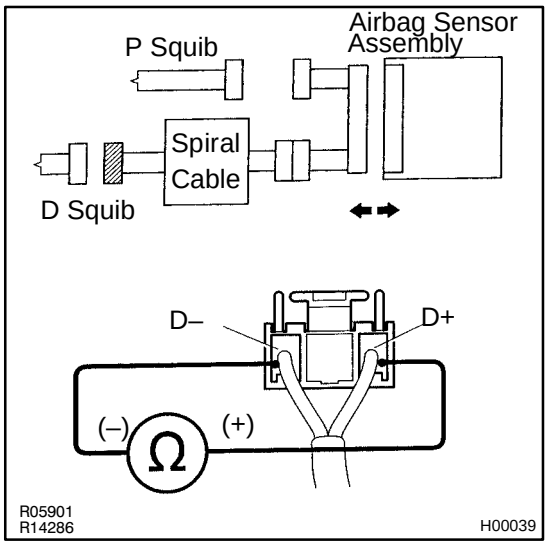
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	Check D squib circuit.



PREPARATION:

Release airbag activation prevention mechanism on airbag sensor assembly side of airbag squib connector (See page DI–324).

CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D+ and D–.

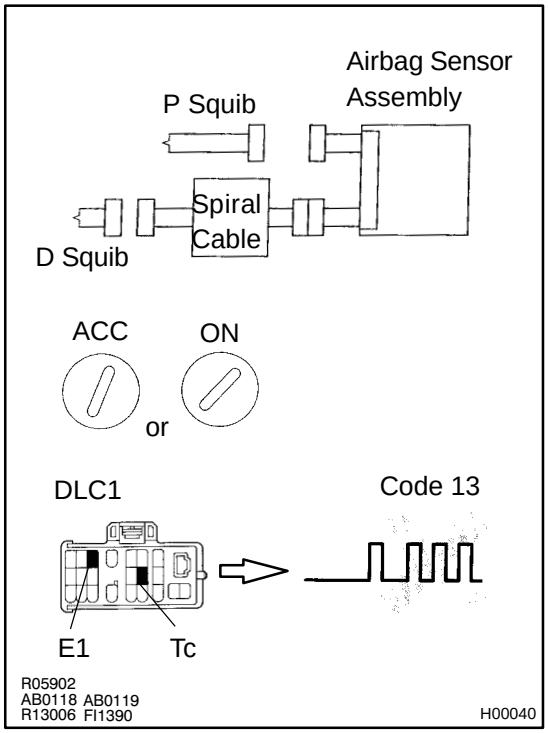
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step ” 5 ”.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect connector to the airbag sensor assembly.
(b) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 13 is not output.

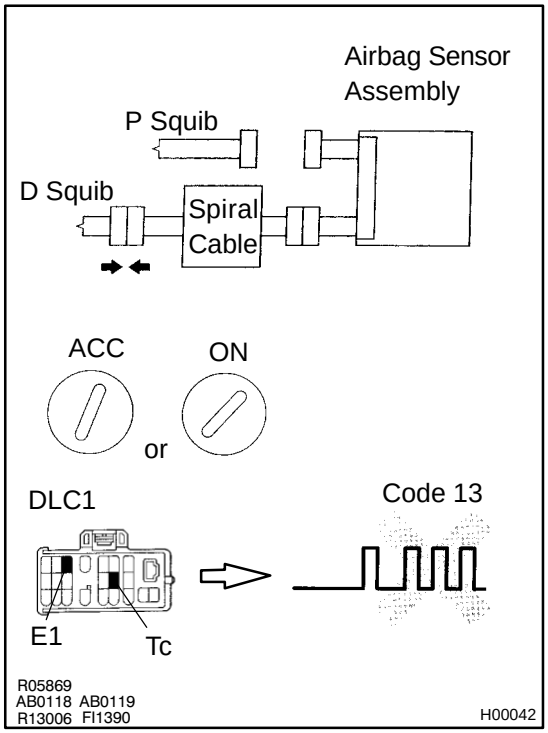
HINT:

Codes other than code 13 may be output at this time, but they are relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	**Check D squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect steering wheel pad connector.
(d) Connect negative (–) terminal cable to battery,and wait at least 2 seconds.

CHECK:

(a) Turn ignition swiitch to LOCK, and wait at least 20 seconds.
(b) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(c) Clear malfunction code stored in memory (See page DI–324).
(d) Turn ignition switch to LOCK, and wait at least 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(f) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(g) Check DTC.

OK:

DTC 13 is not output.

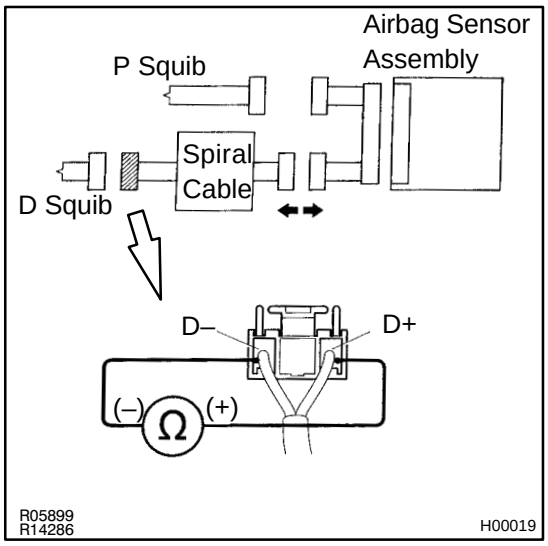
HINT:
Codes other than code 13 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

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.

5	Check spiral cable.



PREPARATION:

(a) Disconnect connector between airbag sensor assembly and spiral cable.

(b) Release airbag activation prevention mechanism on airbag sensor assembly side of airbag squib connector (See page DI–324).

CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D+ and D–.

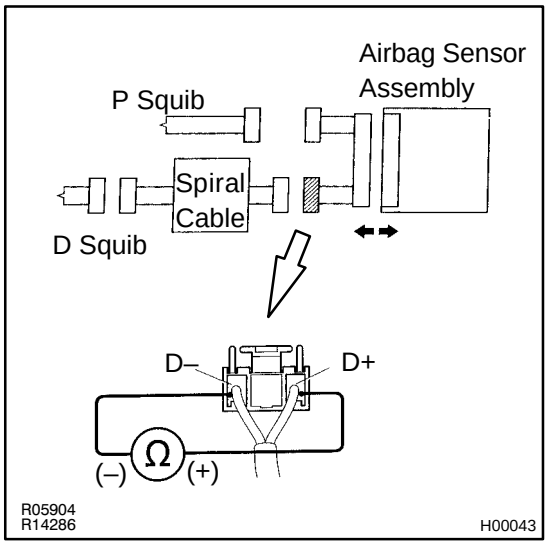
OK:OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



PREPARATION:

Release airbag activation prevention mechanism on airbag sensor assembly side of airbag squib connector (See page DI–324).

CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

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.

DI0B3–01

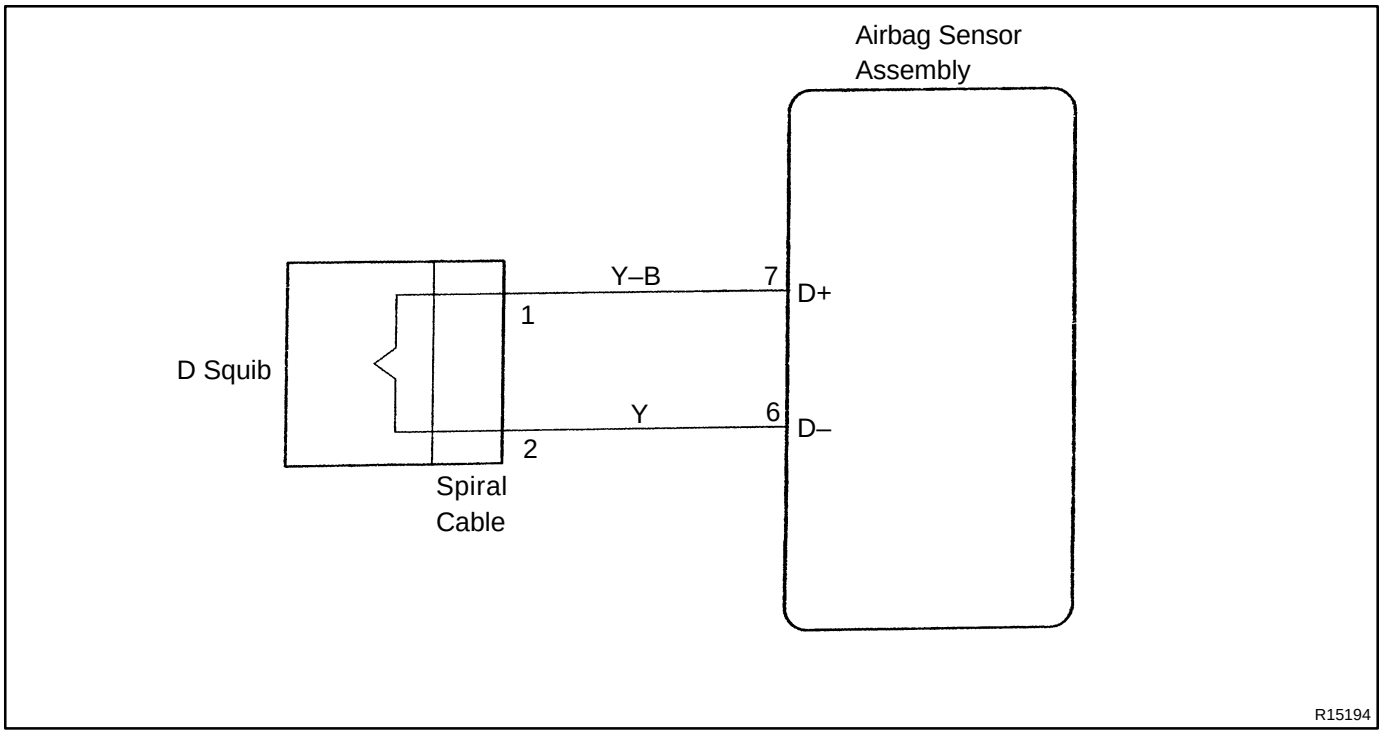
DTC	14	Open in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each components, see OPERATION on page RS–2.
DTC 14 is recorded when an open is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
14	●Open circuit in D+ wire harness or D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

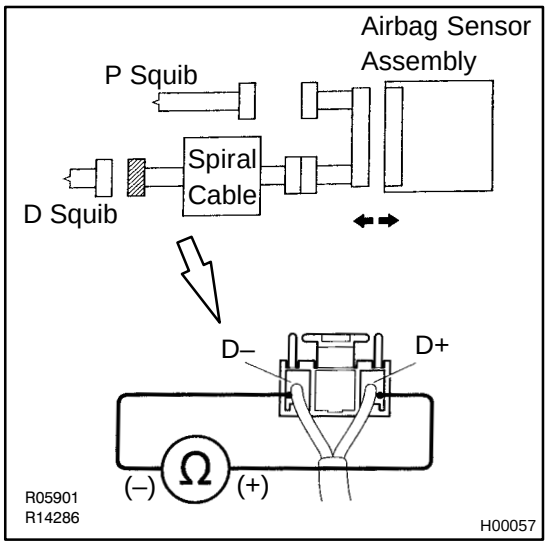
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	Check D squib circuit.



CHECK:

For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D+ and D–.

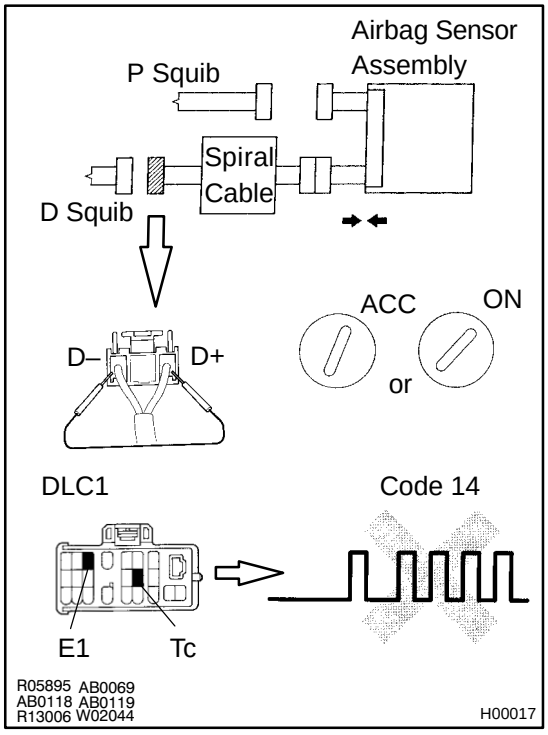
OK:

Resistance: Below 1 Ω

NG	Go to step " 5 ".

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect connector to airbag sensor assembly.
(b) Using a service wire, connect D+ and D– on spiral cable side of connector between spiral cable and steering wheel pad.
(c) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 14 is not output.

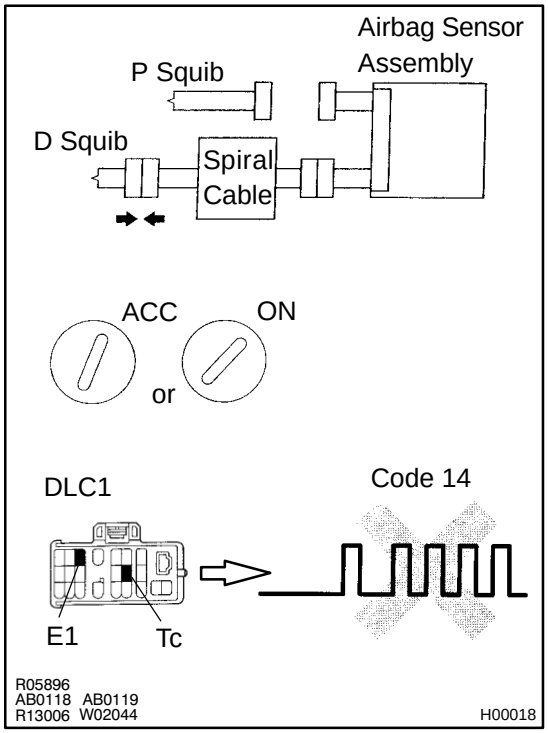
HINT:

Codes other than code 14 may be output at this time, but they are relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	**Check D squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect steering wheel pad connector.
(d) Connect negative (–) terminal cable to battery,and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 14 is not output.

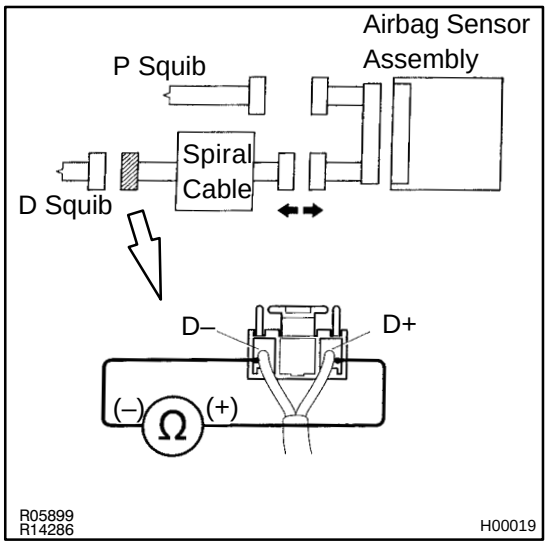
HINT:
Codes other than code 14 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

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.

5	Check spiral cable.



PREPARATION:
Disconnect connector between airbag sensor assembly and spiral cable.

CHECK:
For the connector (on the spiral cable side) between the spiral cable and steering wheel pad, measure the resistance between D+ and D–.

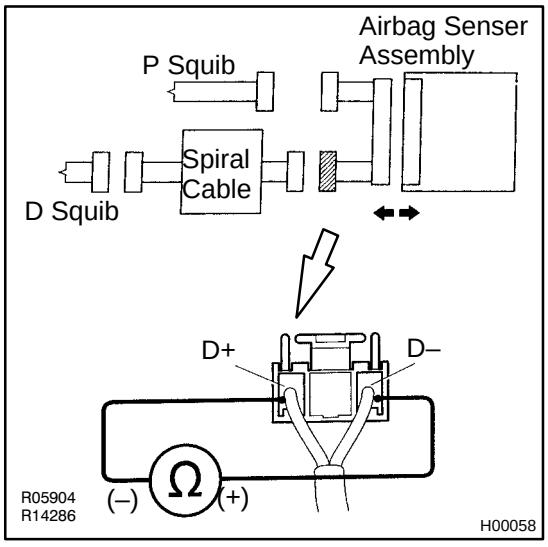
OK:

Resistance: Below 1 Ω

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:
For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

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.

DI0B4–01

DTC	31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly consists of a airbag sensor, safing sensor, drive circuit, diagnosis circuit and ignition control, etc.
It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and diagnosis system malfunction.
DTC 31 is recorded when occurrence of a malfunction in the airbag sensor assembly is detected.

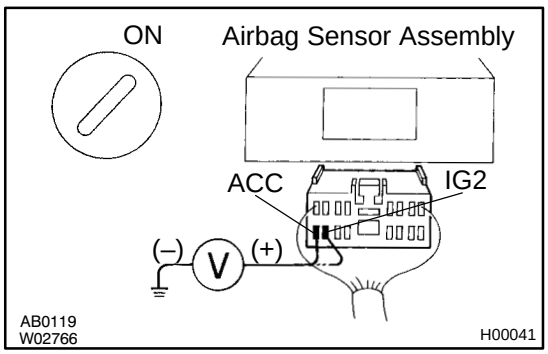
DTC No.	DTC Detecting Condition	Trouble Area
31	●Airbag sensor assembly malfunction	●Airbag sensor assembly

INSPECTION PROCEDURE

HINT:When a malfunction code other than code 31 is displayed at the same time, first repair the malfunction indicated by the malfunction code other than code 31.

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	**Check voltage at IG2 and ACC of airbag sensor assembly**

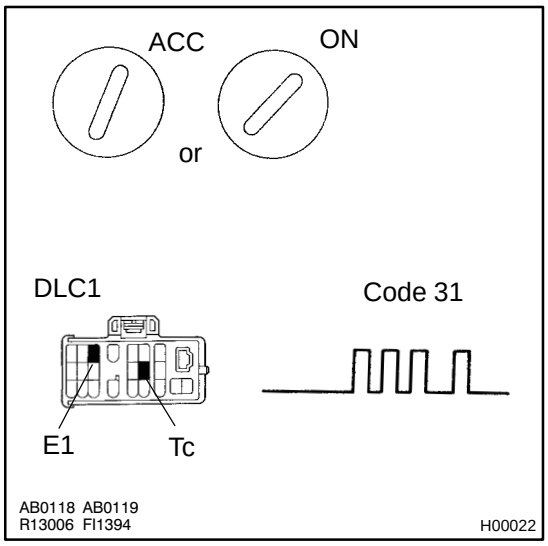


PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals IG2 and ACC of airbag sensor assembly and body ground.
OK:
Voltage: Below 16 V

NG → **Check battery and charging system. (See charging system section)**

OK

3	Is DTC 31 output again?



PREPARATION:

Clear malfunction code.

CHECK:

(a) Turn ignition switch to LOCK, and wait at least 20 seconds.
(b) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(c) Repeat operation in step (a) and (b) at least 5 times.
(d) Using SST, connect terminals Tc and E1 of DLC 1.
SST 09843–18020
(e) Check DTC.

NO → **Using simulation method, reproduce malfunction symptoms (See page IN–17).**

YES

Replace airbag sensor assembly.

DI0B5–01

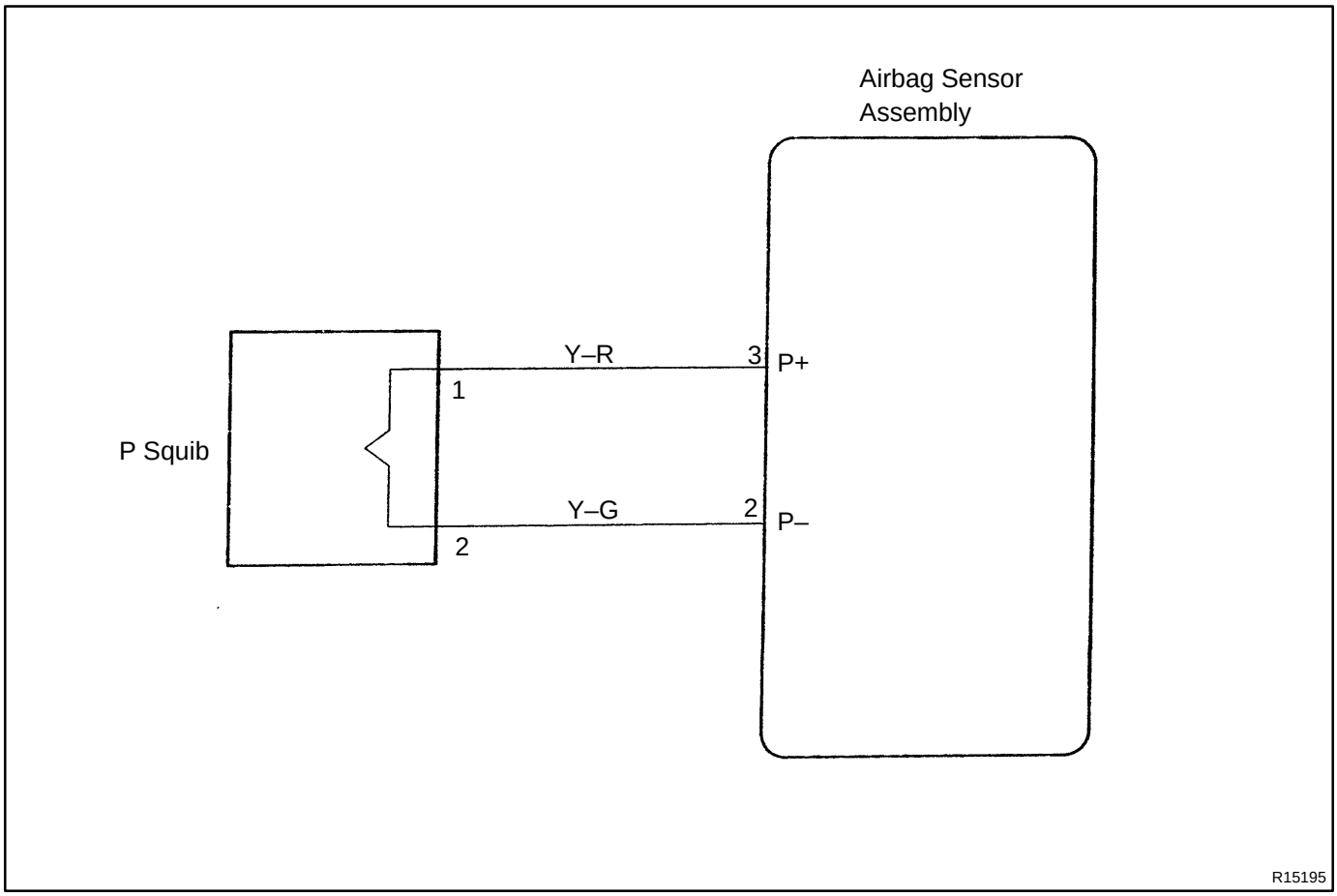
DTC	53	Short in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each components, see OPERATION on page RS–2.
DTC 53 is recorded when a short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
53	●Short circuit between P+ wire harness or P– wire harness of squib ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

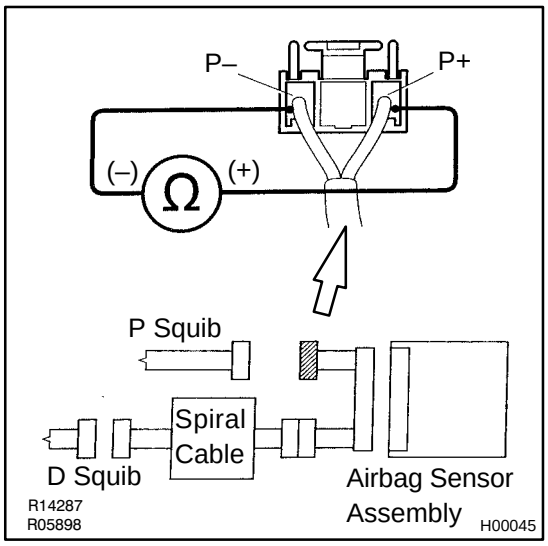
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	Check P squib circuit.



PREPARATION:

Release airbag activation prevention mechanism on airbag sensor assembly side of airbag squib connector (See page DI–324).

CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and front passenger airbag assembly, measure the resistance between P+ and P–.

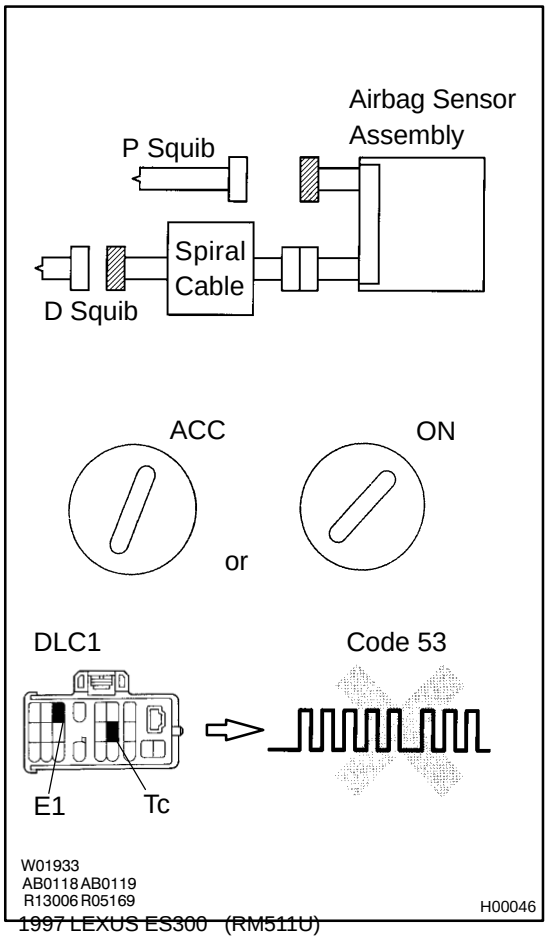
OK:

Resistance: 1MΩ or Higher

NG → **Repair or replace harness or connector between airbag sensor assembly and front passenger airbag assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect connector to airbag sensor assembly.
(b) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminal Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 53 is not output.

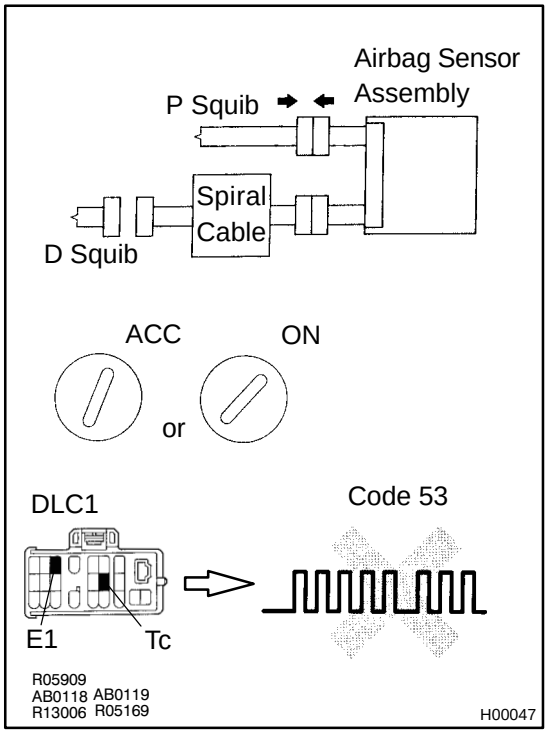
HINT:

Codes other than code 53 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	**Check P squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn igniton switch to LOCK, and wait at least 20 seconds.
(b) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(c) Clear malfunction code stored in memory
(See page DI–324).
(d) Turn ignition switch to LOCK, and wait at least 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(f) Using SST, connect terminal Tc and E1 of DLC1.
SST 09843–18020
(g) Check DTC.

OK:

DTC 53 is not output.

HINT:
Codes other than code 53 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag 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.

DI0B6–01

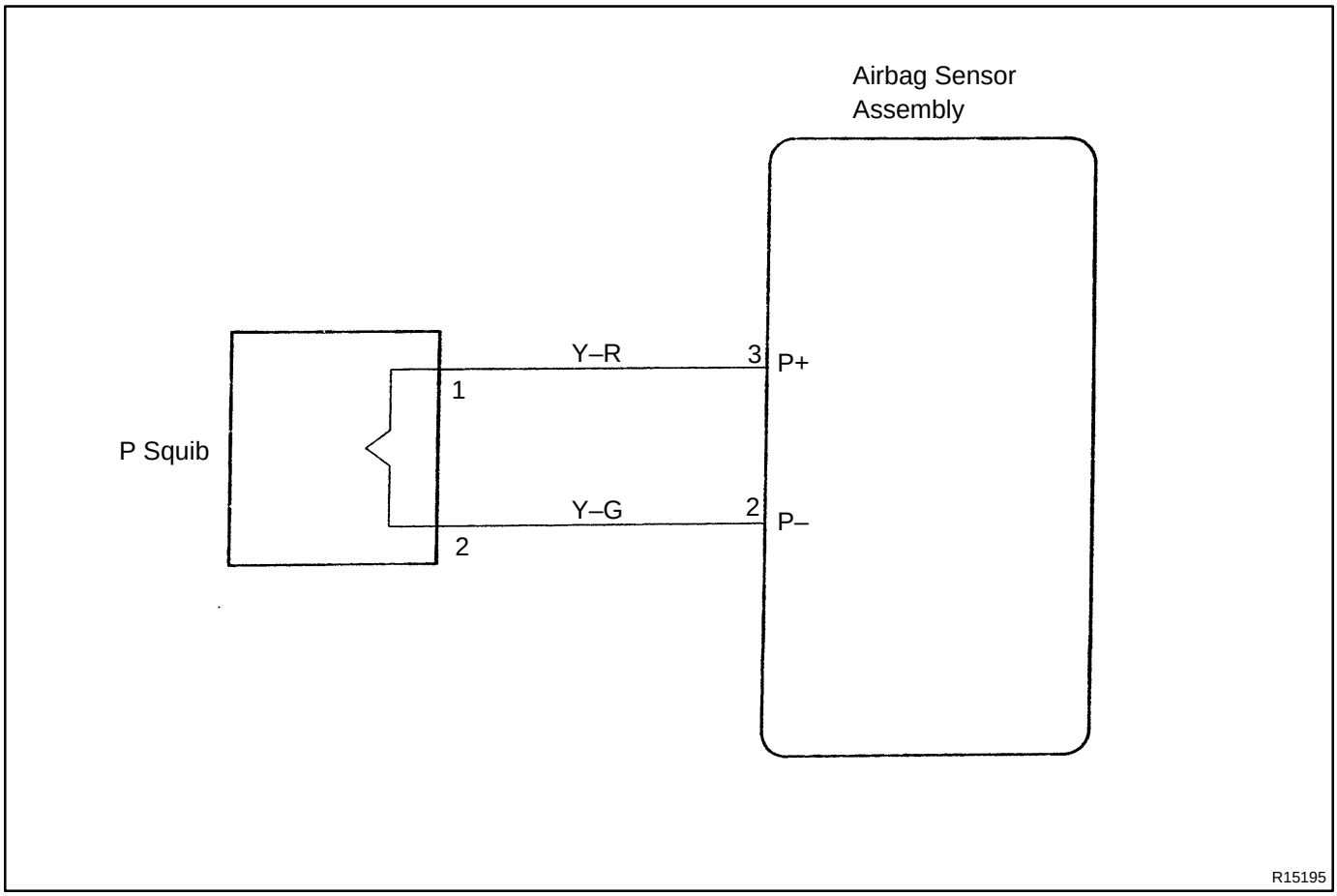
DTC	54	Open in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each components, see OPERATION on page RS–2.
DTC 54 is recorded when an open is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
54	●Open circuit in P+ wire harness or P– wire harness of squib ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

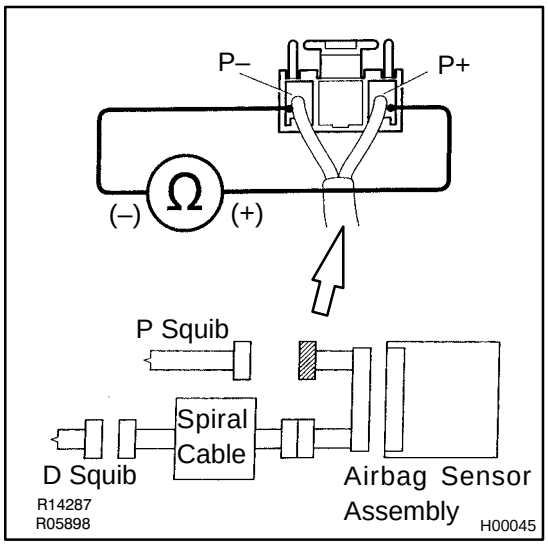
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Preparation. (See step ” 1 ” on page DI–359)**

2	Check P squib circuit.



CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and front passenger airbag assembly measure the resistance between P+ and P–.

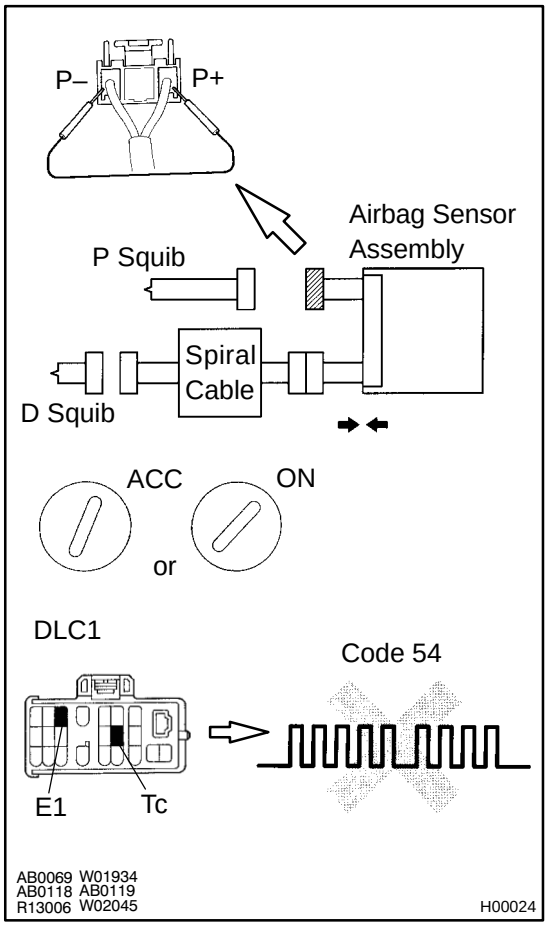
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between airbag sensor assembly and front passenger airbag assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect connector to airbag sensor assembly.
(b) Using a service wire, connect P+ and P– on airbag sensor assembly side of connector between airbag sensor assembly and front passenger airbag assembly.
(c) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory
(See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminal Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 54 is not output.

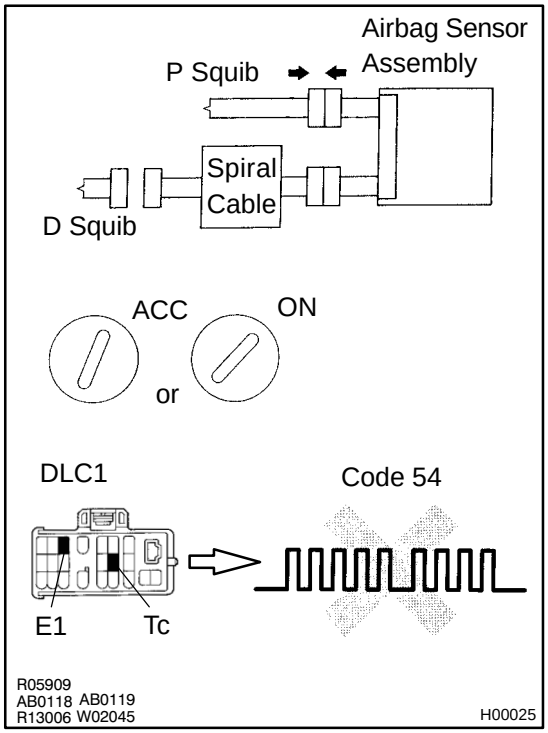
HINT:

Codes other than code 54 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	**Check P squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Connect front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(b) Clear malfunction code stored in memory (See page DI–324).
(c) Turn ignition switch to LOCK, and wait at least 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least 20 seconds.
(e) Using SST, connect terminal Tc and E1 of DLC1.
SST 09843–18020
(f) Check DTC.

OK:

DTC 54 is not output.

HINT:
Codes other than code 54 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag 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.

DI0B7–01

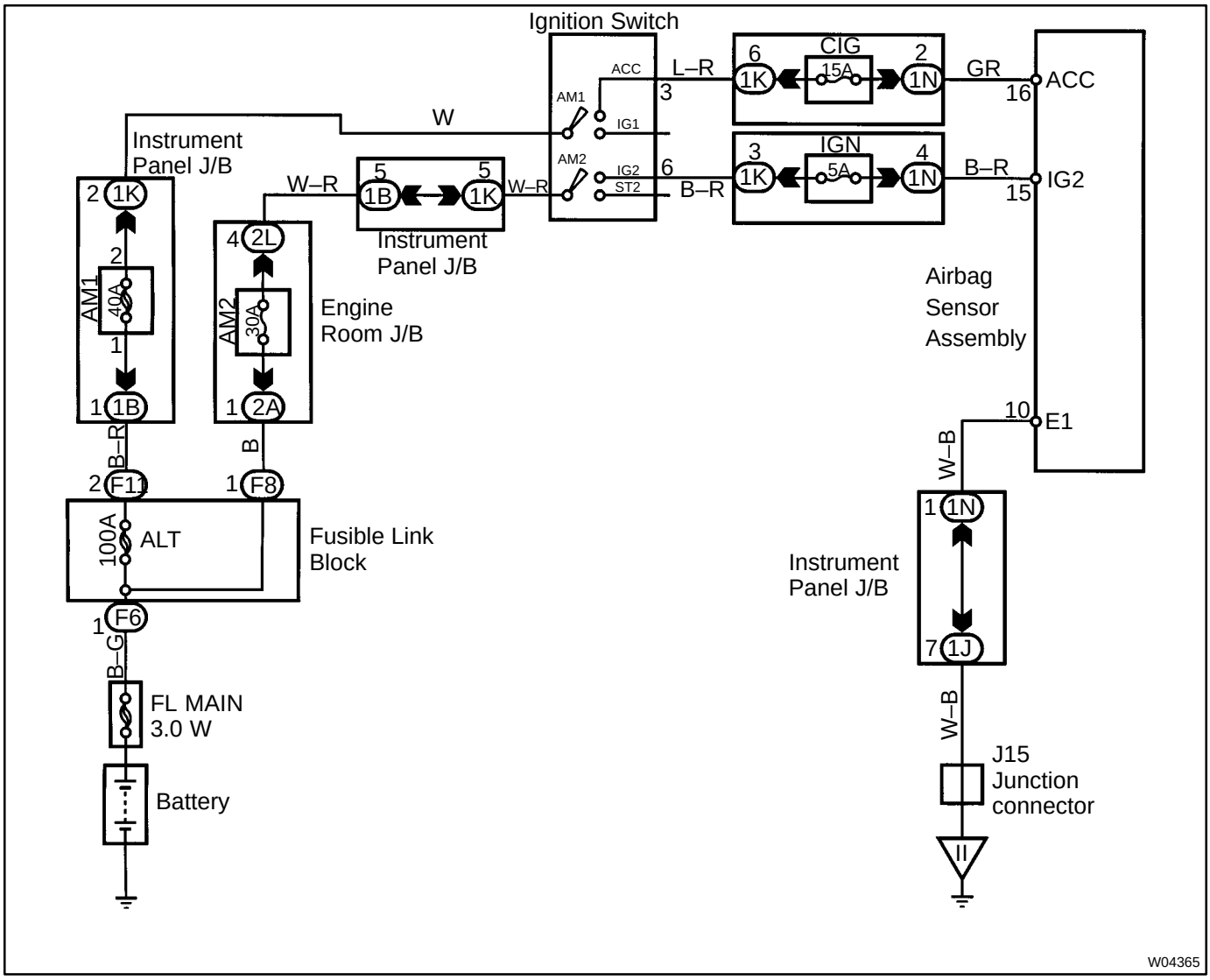
DTC	Normal	Source Voltage Drop

CIRCUIT DESCRIPTION

The SRS is equipped with a voltage–increase circuit (DC–DC converter) in the airbag sensor assembly in case the source voltage drops.
When the battery voltage drops, the voltage–increase circuit (DC–DC converter) functions to increase the voltage of the SRS to normal voltage.
The diagnosis system malfunction display for this circuit is different to other circuits–when the SRS warning light remains lit up and the DTC is a normal code, source voltage drop is indicated.
Malfunction in this circuit is not recorded in the airbag sensor assembly, and the source voltage returns to normal, the SRS warning light automatically goes off.

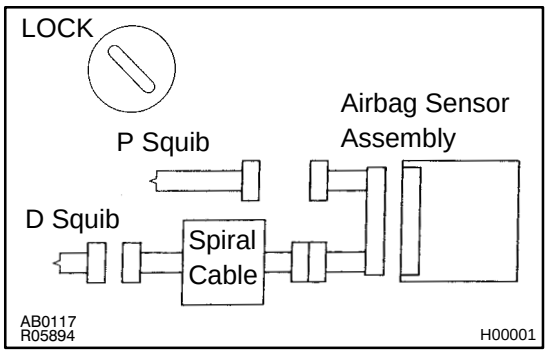
DTC No.	Diagnosis
(Normal)	Source voltage drop.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Preparation.

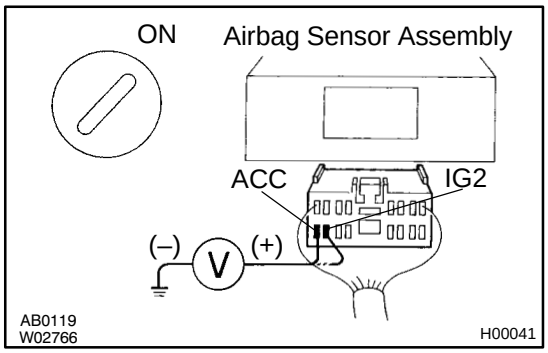


PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(b) Remove steering wheel pad (See page SR–11).
(c) Disconnect connector of front passenger airbag assembly (See page RS–21).
(d) Disconnect connector of airbag sensor assembly (See page RS–35).

CAUTION:
Store the steering wheel pad with the front surface facing upward.

2	Check source voltage.



PREPARATION:

(a) Connect negative (–) terminal cable to battery.
(b) Turn ignition switch ON.

CHECK:

Measure voltage at IG2 or ACC on sensor and operate electric system. (defogger, wiper, headlight, heater blower, etc.)

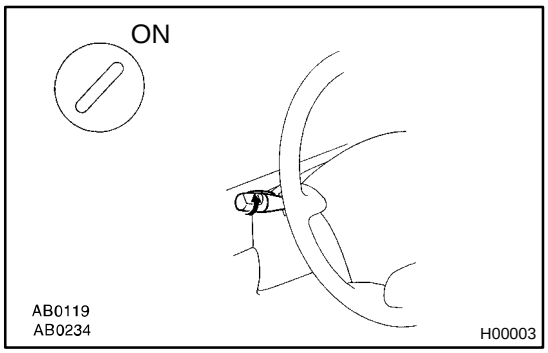
OK:

Voltage: 10 – 14 V

NG → **Check the harness between battery and airbag sensor assembly, and check the battery and charging system.**

OK

3	Does SRS warning light turn off?



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Connect steering wheel pad connector.
(c) Connect front passenger airbag assembly connector.
(d) Connect airbag sensor assembly connector.
(e) Turn ignition switch ON.

CHECK:

Operate electric system (defogger, wiper, headlight, heater blower, etc.) and check that SRS warning light goes off.

NO → **Check for DTCs. If a DTC is output, perform troubleshooting for the DTC. If a normal code is output, replace airbag sensor assembly.**

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.

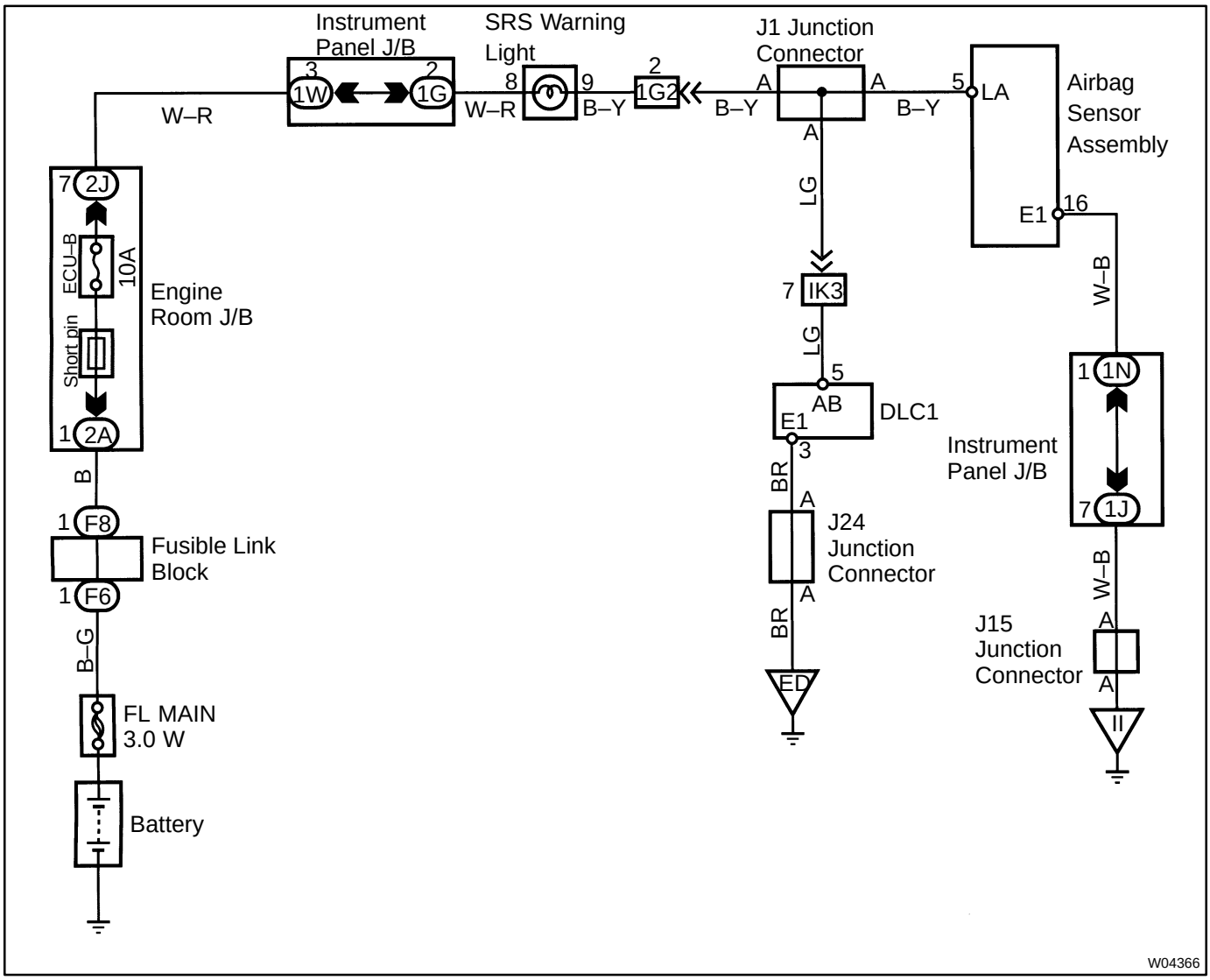
DI0B8–01

SRS Warning Light Circuit Malfunction (Always lights up, when ignition switch is in LOCK position.)

CIRCUIT DESCRIPTION

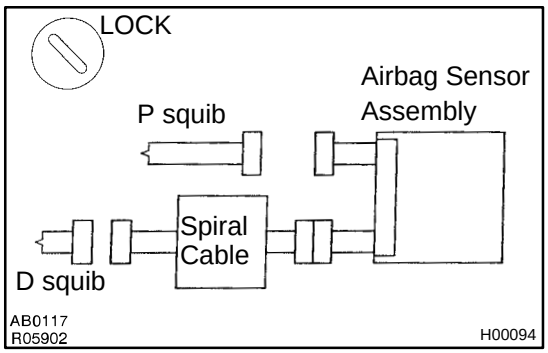
The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ACC or ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by the blinking of the SRS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Preparation.



PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.

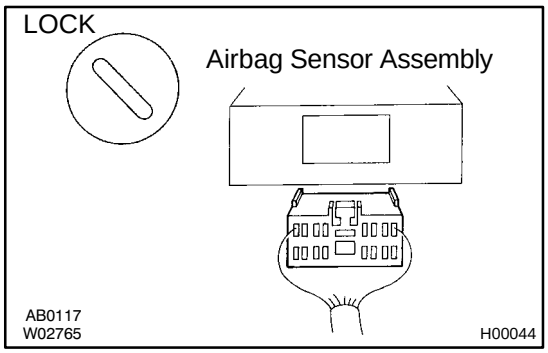
(b) Remove steering wheel pad (See page SR–11).

(c) Disconnet connector of front passenger airbag assembly (See page RS–22).

CAUTION:

Store the steering wheel pad with the front surface facing upward.

2	Does SRS warning light turn off?



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.

(c) Disconnect airbag sensor assembly connector.

(d) Connect negative (–) terminal cable to battery.

CHECK:

Check operation of SRS warning light.

NO → **Check SRS warning light circuit or terminal AB circuit of DLC1.**

YES

Replace airbag sensor assembly.

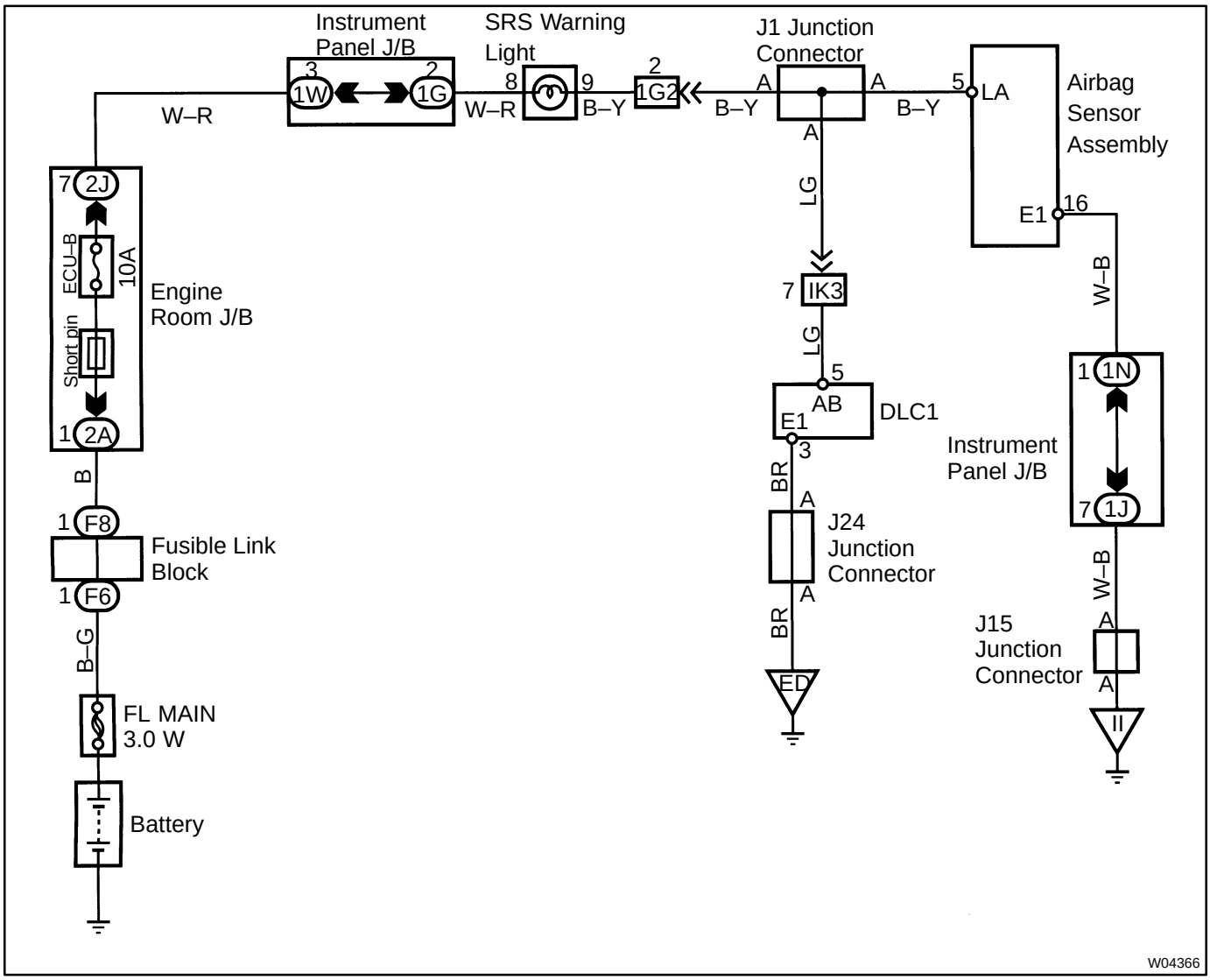
DI0B9–01

SRS Warning Light Circuit Malfunction (Does not light up, when ignition switch is turned to ACC or ON.)

CIRCUIT DESCRIPTION

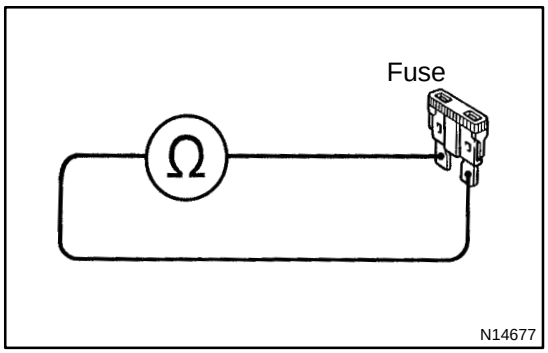
The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from LOCK position to ACC or ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by the blinking of the SRS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–B Fuse.**



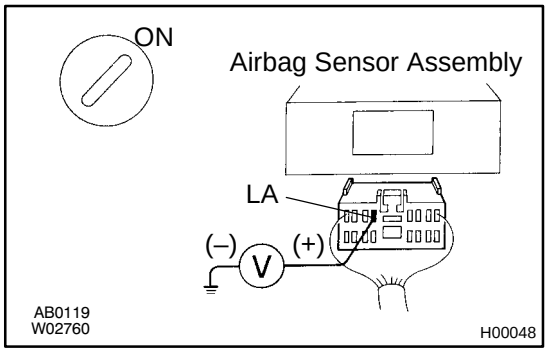
PREPARATION:
Remove ECU–B fuse.
CHECK:
Check continuity of ECU–B fuse.
OK:
Continuity
HINT:
- Fuse may be burnt out even if it appears to be OK during visual inspection.
- If fuse is OK, install it.

NG → **Go to step ” 5 ”.**

OK

2	**Preparation. (See step ” 1 ” on page DI–359)**

3	**Check SRS warning light circuit.**

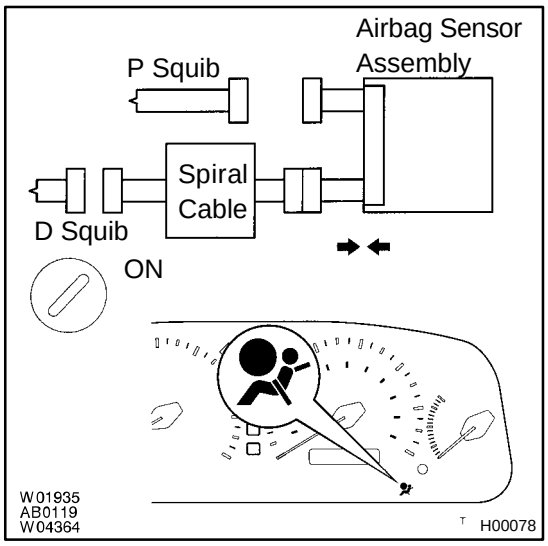


PREPARATION:
(a) Connect negative (–) terminal cable to battery.
(b) Turn ignition switch to ACC or ON.
CHECK:
Measure voltage LA terminal of harness side connector of airbag sensor assembly.
OK:
Voltage: 10 – 14 V

NG → **Check SRS warning light bulb / repair SRS warning light circuit.**

OK

4	Does SRS warning light come on?



PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery.
(b) Connect airbag sensor assembly connector.
(c) Connect negative (–) terminal cable to battery, and wait at least 2 seconds.
(d) Turn ignition switch to ACC or ON.

CHECK:

Check operation of SRS warning light.

NO → **Check terminal LA of airbag sensor assembly. If normal, replace airbag sensor assembly.**

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use simulation method to check.

5	Is new ECU–B fuse burnt out again?

NO → **Using simulation method, reproduce malfunction symptoms (See page IN–17).**

YES

Check harness between ECU–B fuse and SRS warning light.

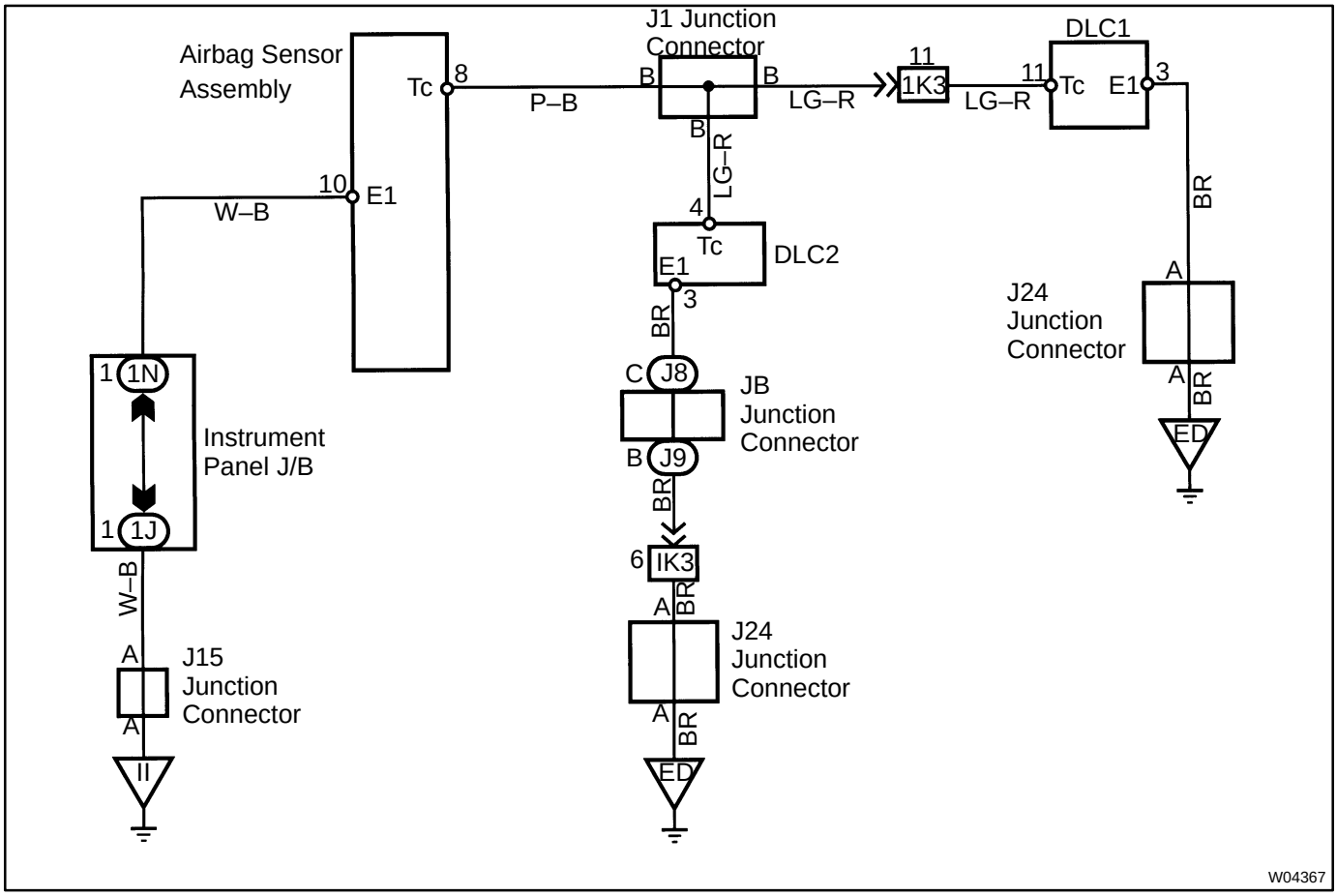
DI0BA–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

By connecting terminals Tc and E1 of the DLC1 the airbag sensor assembly is set in the DTC output mode. The DTCs are displayed by the blinking of the SRS warning light.

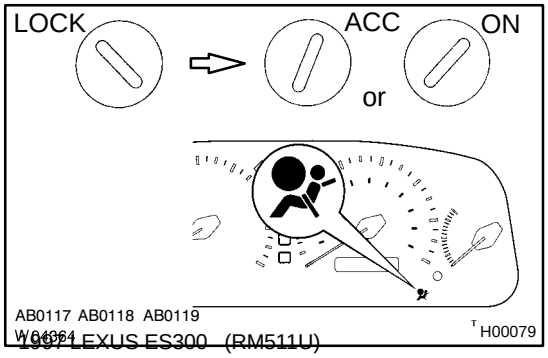
WIRING DIAGRAM



INSPECTION PROCEDURE

If the DTC is not displayed, do the following troubleshooting.

1	**Does SRS warning light up for approx. 6 seconds?**



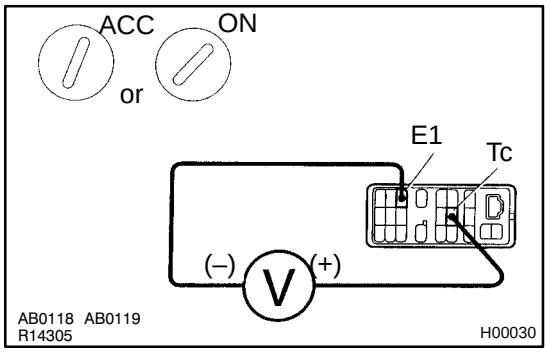
PREPARATION:

Check operation of SRS warning light after ignition switch is turned from LOCK position to ACC or ON position.

NO → **Check SRS warning light system (See page DI–324).**

YES

2	**Check voltage between terminals Tc and E1 of DLC1.**

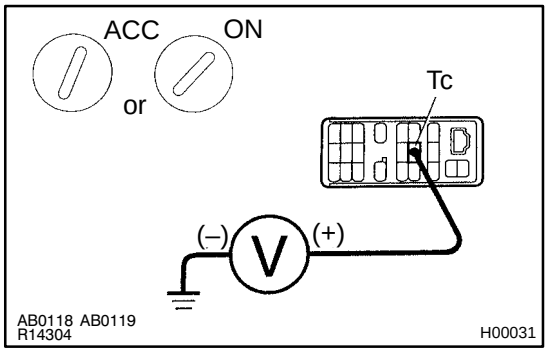


PREPARATION:
Turn ignition switch to ACC or ON.
CHECK:
Measure voltage between terminals Tc and E1 of DLC1.
OK:
Voltage; 10 – 14 V

OK → **Go to step ” 4 ”.**

NG

3	**Check voltage between terminals Tc of DLC1 and body ground**

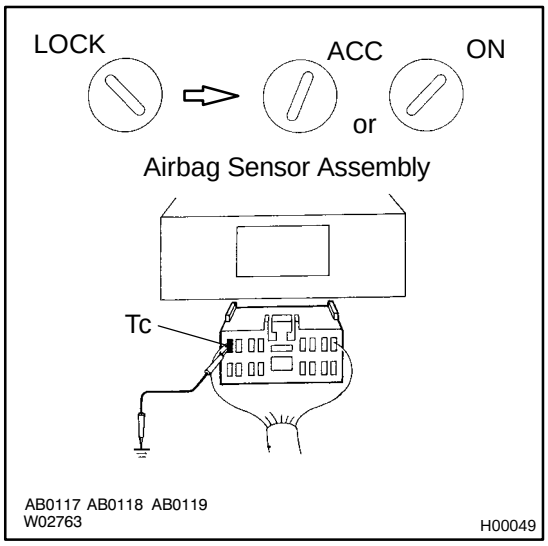


CHECK:
Measure voltage between terminal Tc of DLC1 and body ground.
OK:
Voltage: 10 – 14 V

OK → **Check harness between terminal E1 of DLC1 and body ground.**

NG

4	Check airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Disconnect airbag sensor assembly connector.
(d) Insert service wire into terminal Tc from back side as shown.
(e) Connect airbag sensor assembly connector with service wire.
(f) Connect negative (–) terminal cable to battery.
(g) Turn ignition switch to ACC or ON and wait at least 20 seconds.
(h) Connect service wire of terminal Tc to body ground.

CHECK:

Check operation of SRS warning light.

OK:

SRS waning light comes on.

NOTICE:

Never make a mistake with the terminal connection position as this cause a malfunction.

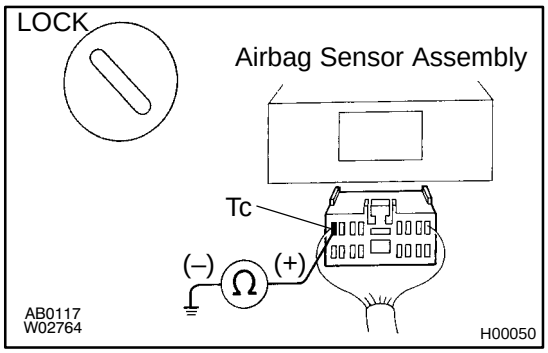
OK → **Check harness between airbag sensor assembly and DLC1.**

NG

Replace airbag sensor assembly.

If the DTC is displayed without a DTC check procedure, perform the following troubleshooting.

1	**Check resistance between terminal Tc of airbag sensor assembly and body ground.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least 90 seconds.
(c) Disconnect airbag sensor assembly connector.

CHECK:

Check resistance between terminal Tc of airbag sensor assembly connector.

OK:

Resistance: 1 MΩ or Higher

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

OK

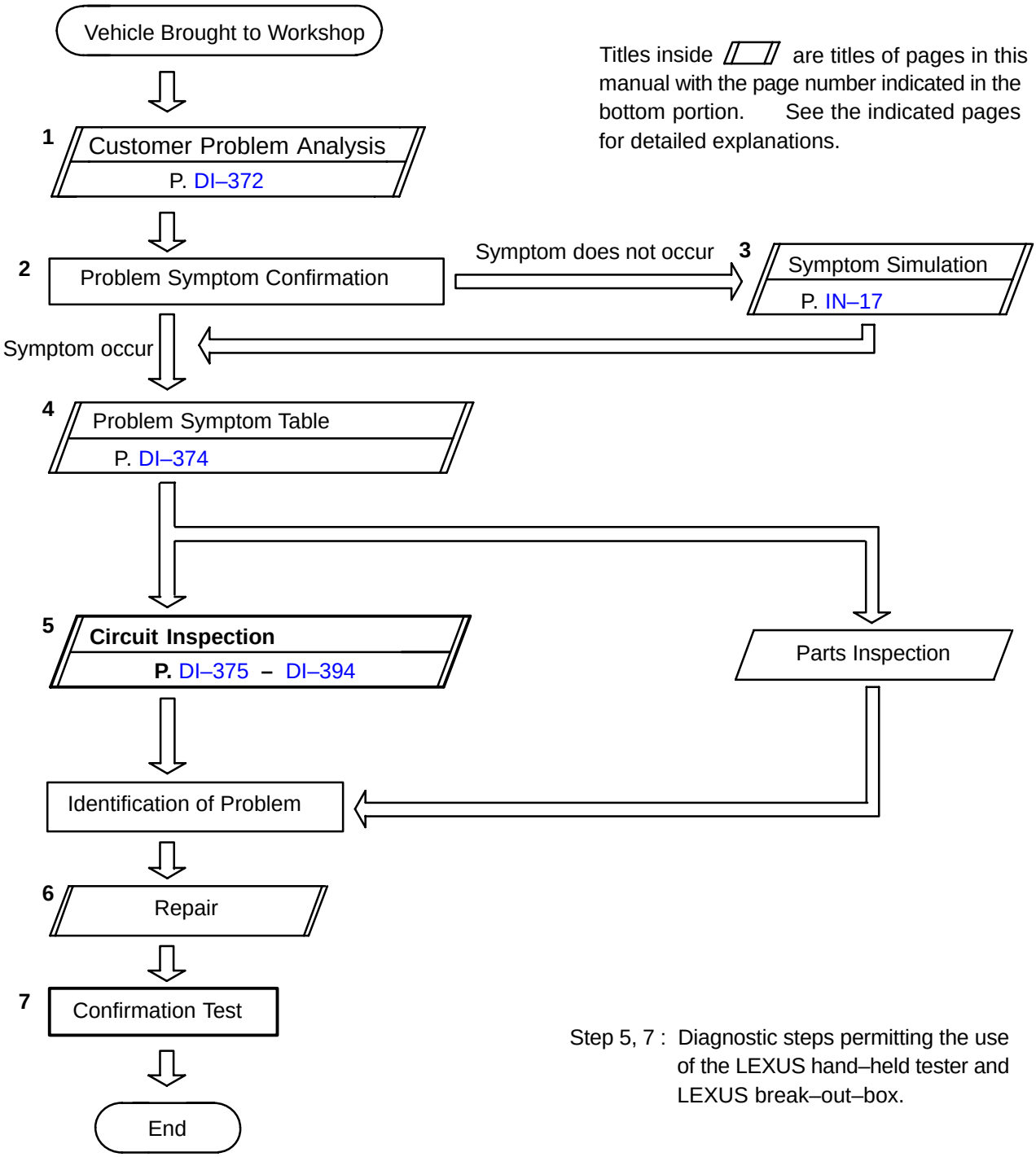
Replace airbag sensor assembly.

POWER SEAT CONTROL SYSTEM

DI0FP–01

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.

Step 5, 7 : Diagnostic steps permitting the use of the LEXUS hand–held tester and LEXUS break–out–box.

DI0FR–01

CUSTOMER PROBLEM ANALYSIS CHECK

POWER SEAT CONTROL SYSTEM Check Sheet

Inspector's name: _____

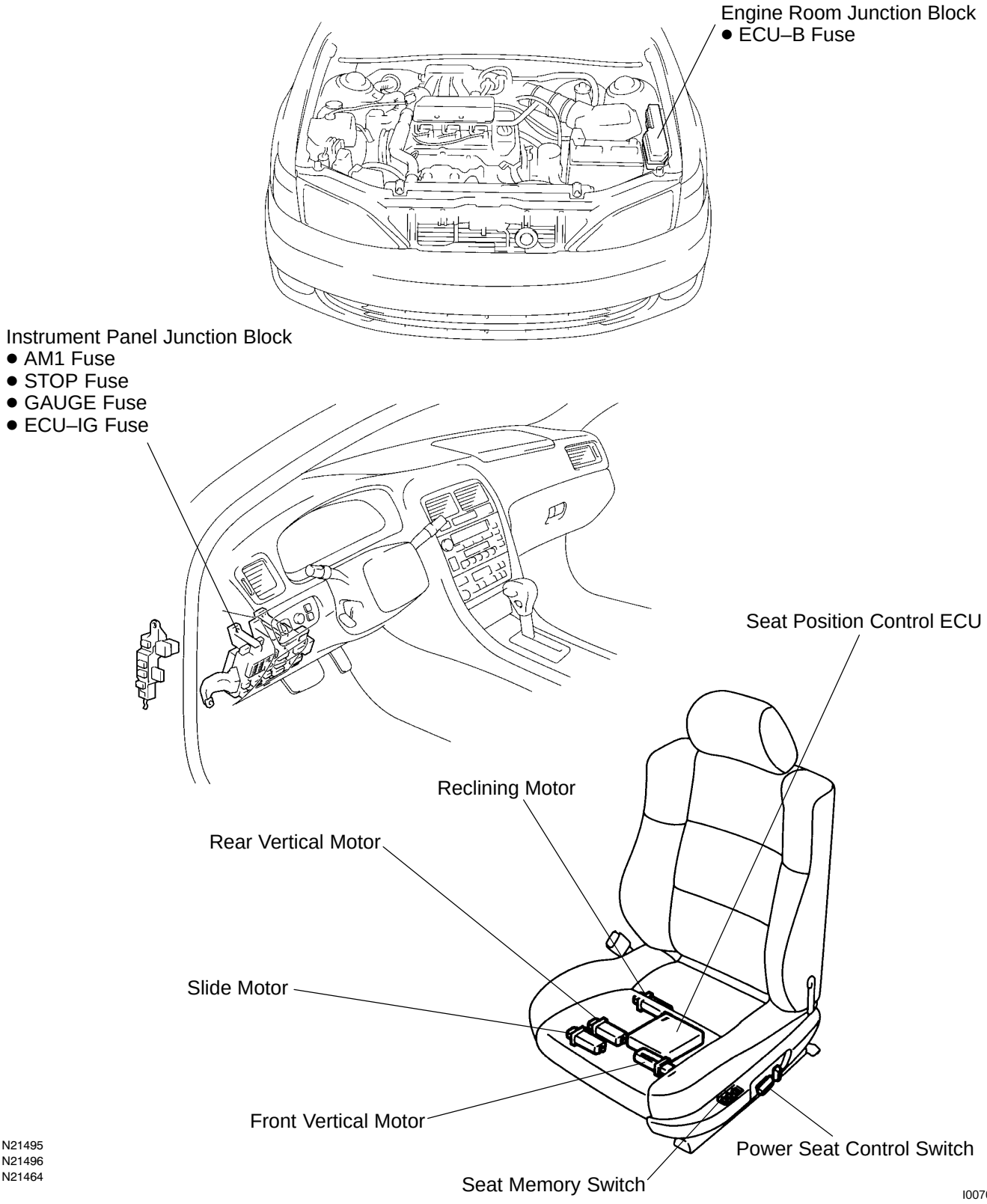
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Date Problem First Occurred	/ /
How Often does Problem Occurs	● Continuous ● Intermittent (Times a day)

Problem Symptom	● Manual Function does not operate.	● Slide ● Front Vertical ● Rear Vertical ● Reclining
	● Return Function does not operate.	● Slide ● Front Vertical ● Rear Vertical ● Does not operate in any conditions ● Only with key inserted ● Only with key not inserted ● Only with memory & return switch 1 or 2
	● Memory function does not operate.	
	● Position return function does not stop when brake pedal is depressed.	

DI0FT–01

PARTS LOCATION



DI0FV–01

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuits for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

- 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 reappears even though there are no abnormalities in any of the other circuits, then check and replace the Seat Position Control ECU as the last step.

Symptom	Suspect Area	See page
Both manual & return functions do not operate(All functions).	1. +B power source circuit 2. Power seat control switch circuit 3. Motor circuit 4. Power seat control ECU	DI–375 DI–392 DI–379 IN–27
Both manual & return functions do not operate(One function only).	1. Motor circuit 2. Power seat control ECU	DI–379 IN–27
One or all functions do not operate for manual operation only.	1. Power seat control switch circuit 2. Power seat control ECU	DI–392 IN–27
Memory function does not operate.	1. Power seat memory switch circuit 2. Ignition switch circuit 3. Park/neutral position switch circuit 4. Power seat control ECU	DI–394 DI–390 DI–388 IN–27
Return operation does not stop when brake pedal is depressed.	1. Stop light switch circuit 2. Power seat control ECU	DI–386 IN–27
Only return function does not operate or operates a little, then stops (All return functions).	1. Power seat memory switch circuit 2.ECU power source circuit 3.Position sensor power source circuit 4.Power seat control ECU	DI–394 DI–377 DI–382 IN–27
Only return function does not operate or operates a little, then stops (Only one return function).	1. Position sensor circuit 2.Power seat control ECU	DI–384 IN–27

DI0FY–01

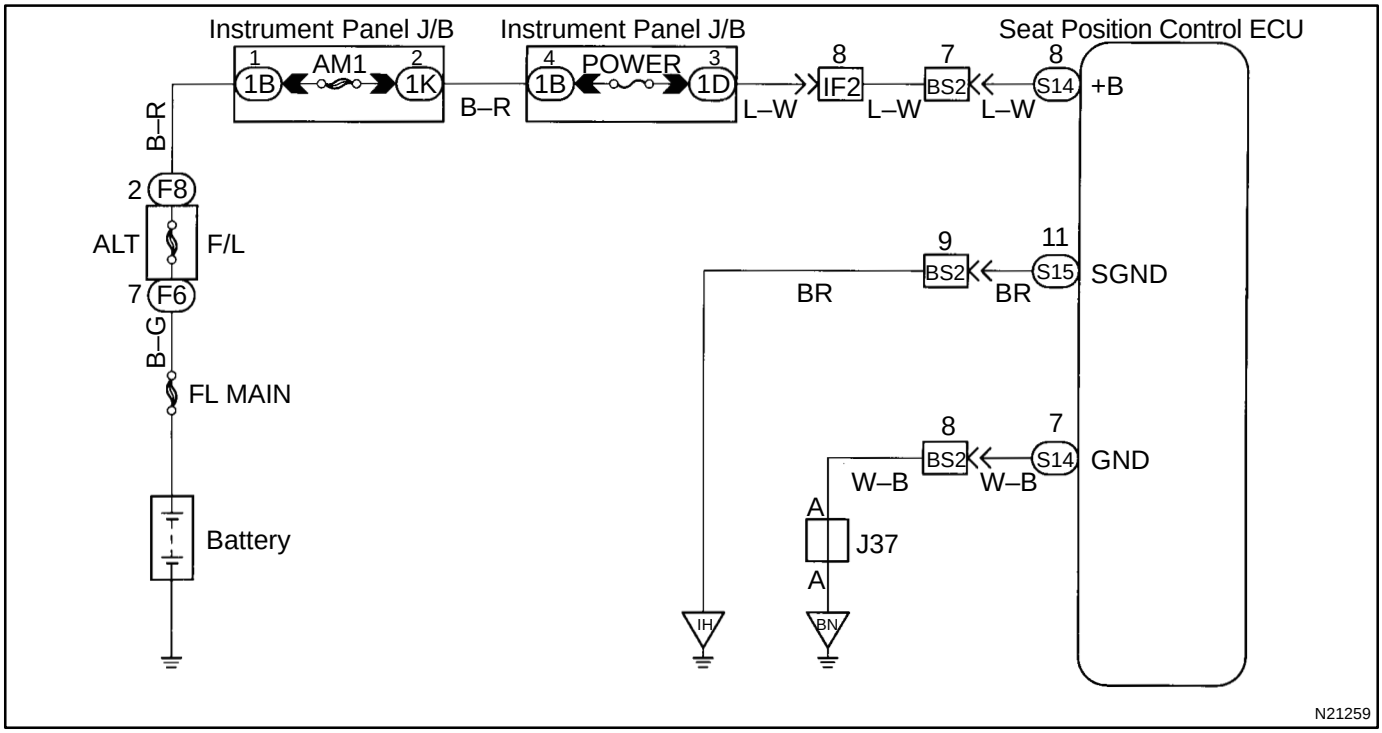
CIRCUIT INSPECTION

+B Power Source Circuit

CIRCUIT DESCRIPTION

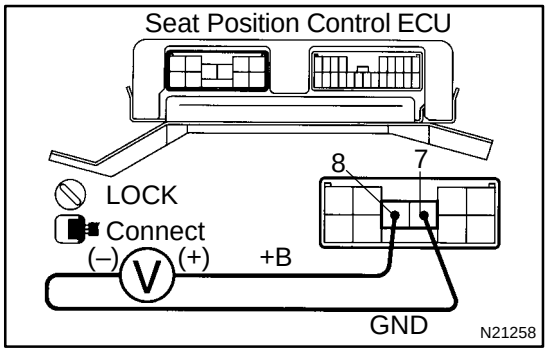
This is the power source for motors such as the slide motor, reclining motor, front vertical motor and rear vertical motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and GND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminals +B and GND of Seat Position Control ECU connector.

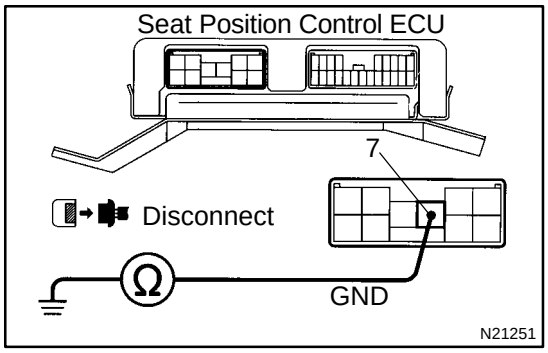
OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	Check continuity between terminals GND of Seat Position Control ECU connector and body ground.



CHECK:

Measure resistance between terminals GND of Seat Position Control ECU connector and body ground.

OK:

Resistance: Continuity (below 1 Ω)

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

OK

3	Check AM1 fuse and POWER fuse.

NG → **Check for short in all the harness and components connected to the AM1 and POWER fuse, and repair them (See attached wiring diagram).**

OK

Check and repair harness or connector between Seat Position Control ECU and battery.

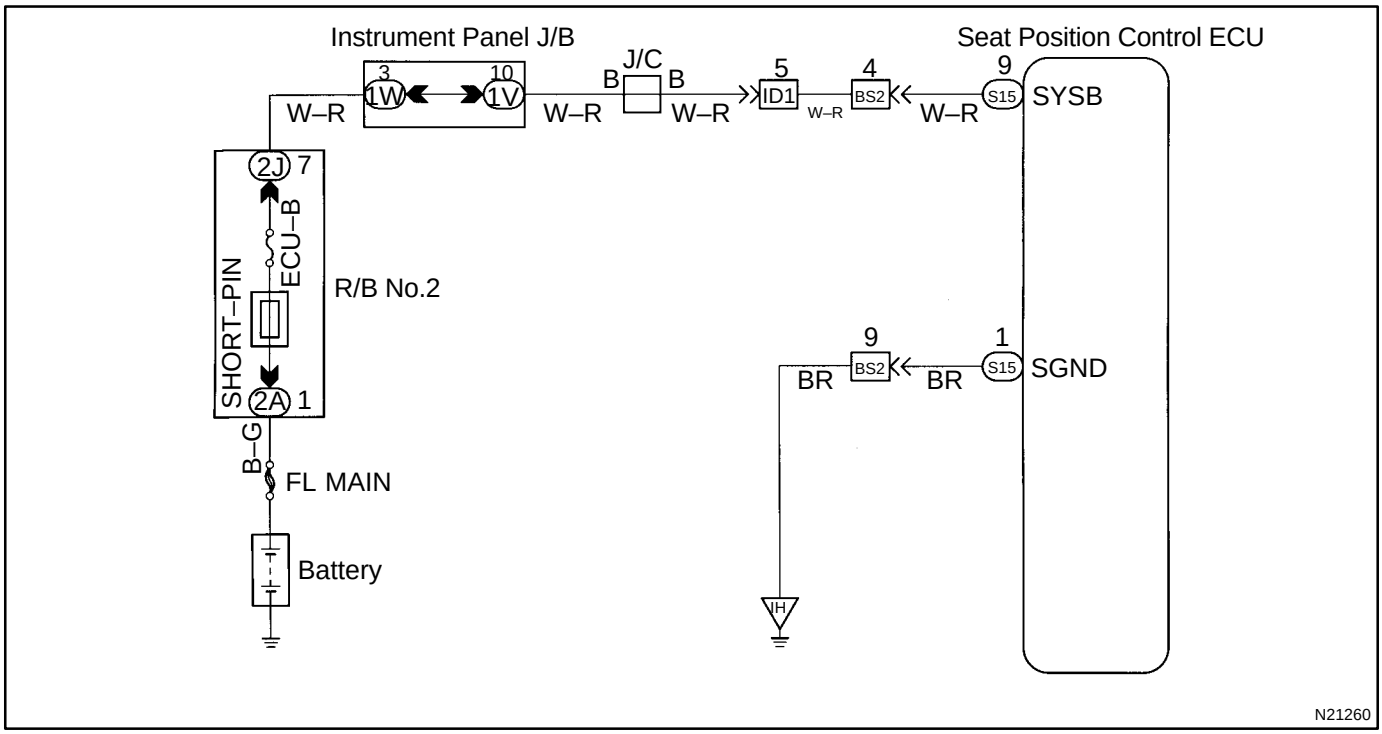
DI0G1–01

ECU Power Source Circuit

CIRCUIT DESCRIPTION

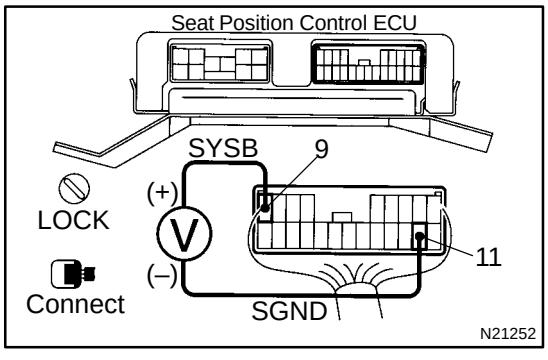
This circuit provides power for ECU operation and is also the power source for the sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals SYSB and SGND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminals SYSB and SGND of Seat Position Control ECU connector.

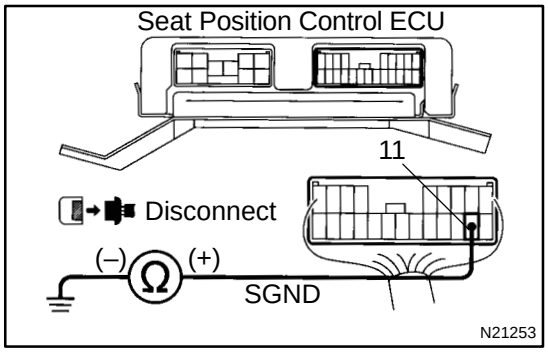
OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	Check continuity between terminals SGND of Seat Position Control ECU connector and body ground.



CHECK:

Measure resistance between terminal SGND of Seat Position Control ECU connector and body ground.

OK:

Resistance: Continuity (below 1 Ω)

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

OK ↓

3	Check ECU–B fuse.

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

OK ↓

Check and repair harness or connector between Seat Position Control ECU and battery.

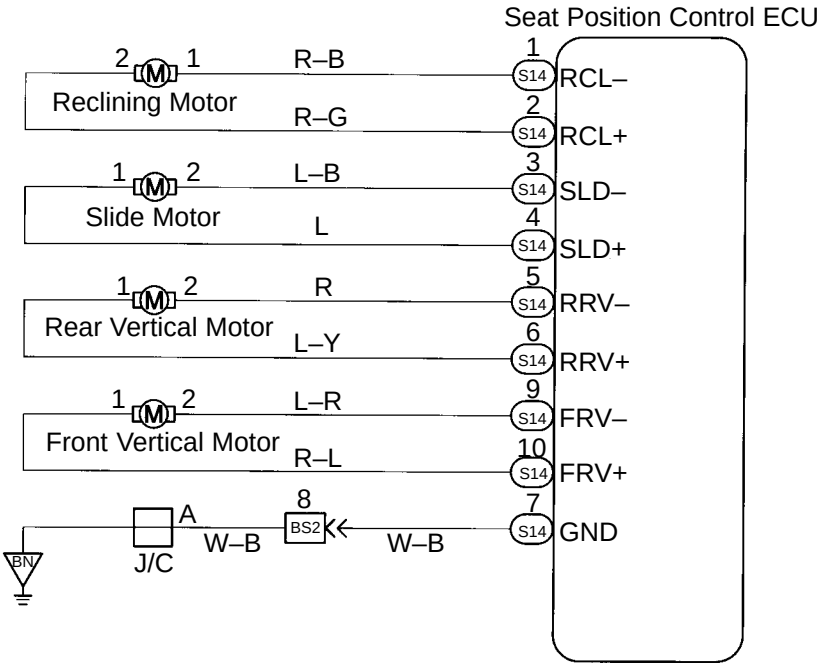
DI0G4–01

Motor Circuit

CIRCUIT DESCRIPTION

The Seat Position Control ECU controls the 4 motors for slide, front vertical, rear vertical and reclining.

WIRING DIAGRAM

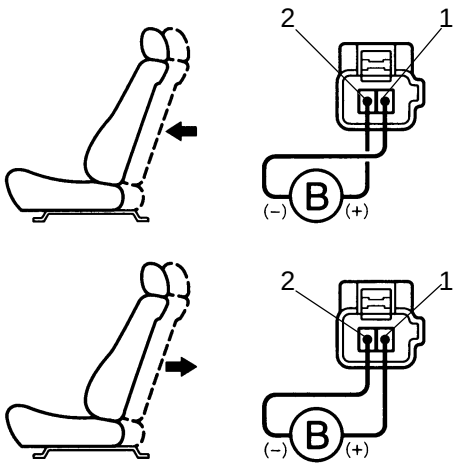


N21261

INSPECTION PROCEDURE

1	**Check motor.**

Slide Motor



1997 LEXUS ES300 (RM511U)

N21468

PREPARATION:

1. Remove seat.
2. Disconnect each motor connector.

CHECK:

Check seat movement when battery positive voltage is applied to each motor.

Slide motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the slide motor connector.

OK:

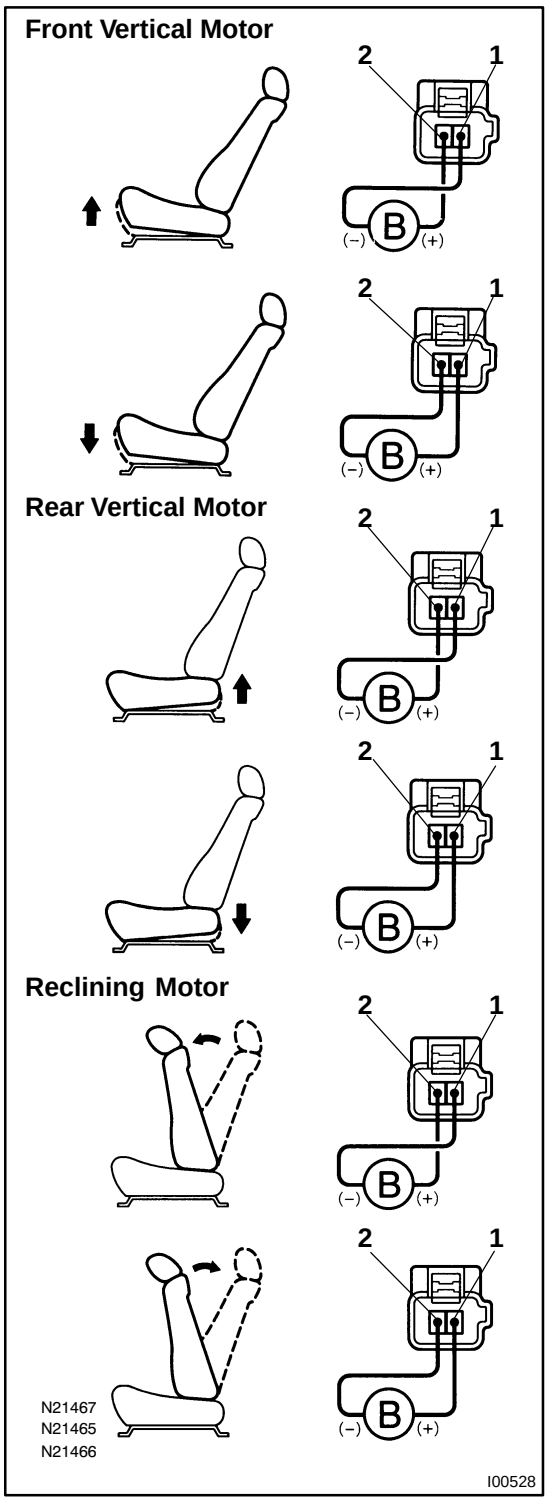
The seat moves forward.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the slide motor connector.

OK:

The seat moves back.



Front vertical motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the front vertical motor connector.

OK:

The front of the seat cushion rises.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the front vertical motor connector.

OK:

The front of the seat cushion lowers.

Rear vertical motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the rear vertical motor connector.

OK:

The front of the seat cushion rises.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the rear vertical motor connector.

OK:

The front of the seat cushion lowers.

Reclining motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the reclining motor connector.

OK:

The seat back return to up right.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the reclining motor connector.

OK:

The seat back reclining.

NG → **Replace motor.**

OK

2	**Check harness and connector between Seat Position Control ECU and motor (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–374).

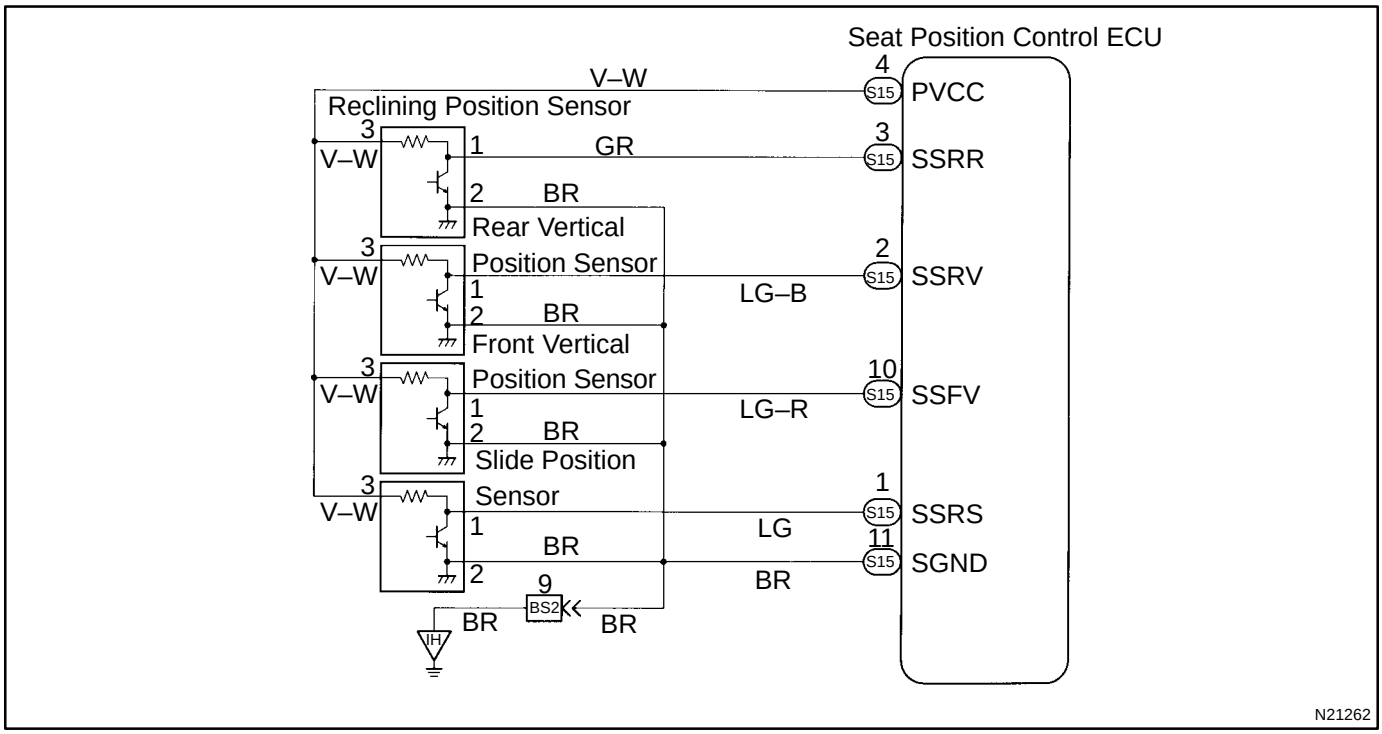
DI0G6–01

Position Sensor Power Source Circuit

CIRCUIT DESCRIPTION

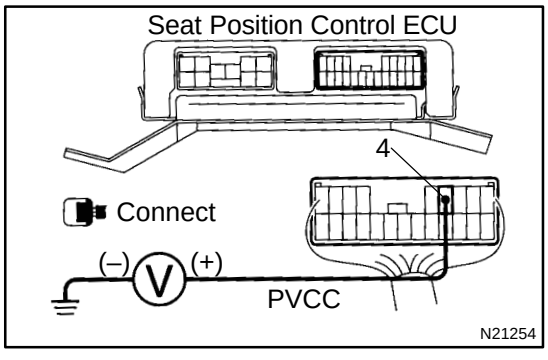
This circuit provides power to the slide, front vertical and reclining sensors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal PVCC of Seat Position Control ECU connector and body ground.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

While operating the Power Seat Control Switch and moving the seat, check voltage between terminal PVCC of Seat Position Control ECU connector and body ground.

OK:

Voltage: 7.2 – 8.8 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	**Check harness and connector connected to terminal PVCC of Seat Position Control ECU (See page IN–27).**

CHECK:

Check for open or short in the harness and check connectors for the position sensor power source circuit outlined in the diagram with a thick line (–). (See page DI–382)

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

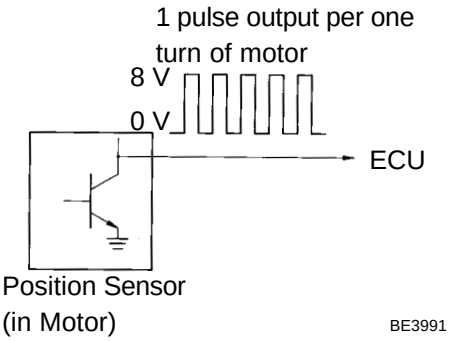
OK →

Check and replace Seat Position Control ECU.

DI0G9–01

Position Sensor Circuit

CIRCUIT DESCRIPTION



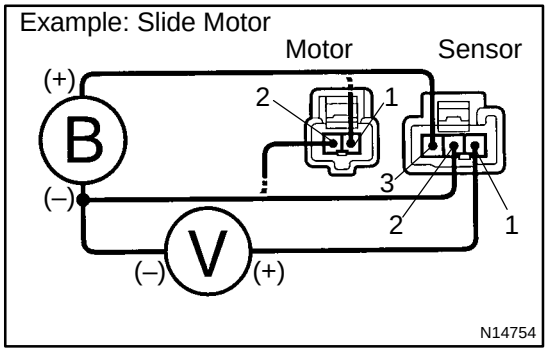
The position sensor senses movement of the seat and send pulse signals to the ECU. The position sensor sends pulse to the ECU in proportion to the amount of seat movement, as shown in the diagram on the left.
The ECU uses the number of pulses to constantly calculate the position relative to the memory position and returns the seat to the memorized position.
If a malfunction occurs in a position sensor and a sensor signal is not in put to the ECU even when the motor operates, the ECU prohibits return operation.

WIRING DIAGRAM

See page DI–382.

INSPECTION PROCEDURE

1	**Check position sensor.**



PREPARATION:
Disconnect the connector of the sensor and the connector of the motor leading to the sensor.
CHECK:
(a) Connect positive ~ lead to terminal 3 of sensor and negative ⊖ lead to terminal 2.
(b) Measure voltage between terminal 1 of sensor and body ground when battery positive voltage is applied between terminals 1 and 2 of motor connector.

HINT:
When the battery positive voltage is applied the motor connector terminals, ~ and ⊖ are interchangeable.

OK:

Condition	Voltage
Motor stopped (Check several times with the motor in a different position each time.)	0 V or battery positive voltage according to stop position.
with motor turning	half of battery positive voltage

NG → **Replace position sensor.**

OK

2	**Check harness and connectors between Seat Position Control ECU and position sensors (See page IN–27).**

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

OK

Check and replace Seat Position Control ECU.

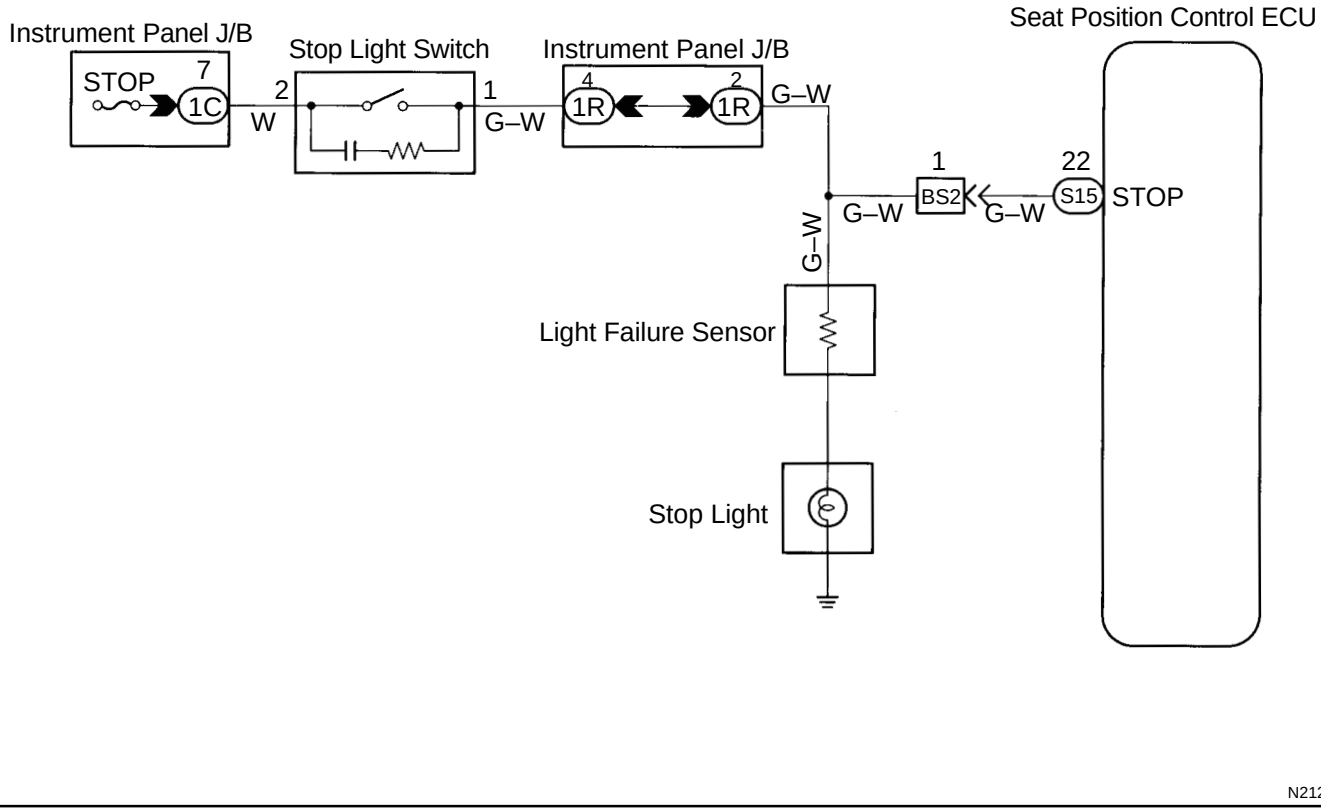
DI0GB–01

Stop Light Switch Circuit

CIRCUIT DESCRIPTION

The stop light switch sends a brake ON or OFF signal to the ECU. When the ECU receives a brake ON signal, it prohibits return operation of the seat.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check stop light operation.**

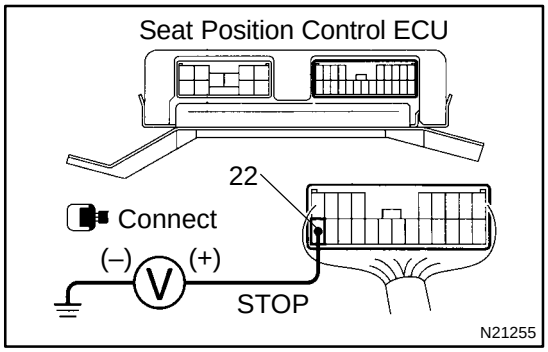
CHECK:

Check that the stop light comes on when the brake pedal is depressed, and turns off when the pedal is released.

NG → **Check stop light circuit (See page BE–2).**

OK

2	**Check voltage between terminal STOP of Seat Position Control ECU connector and body ground.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminal STOP of Seat Position Control ECU and body ground when the brake pedal is depressed and released.

OK:

Brake pedal	Voltage
Depressed	10 ~ 14 V
Released	0 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

Check and repair harness and connector between Seat Position Control ECU and stop light switch.

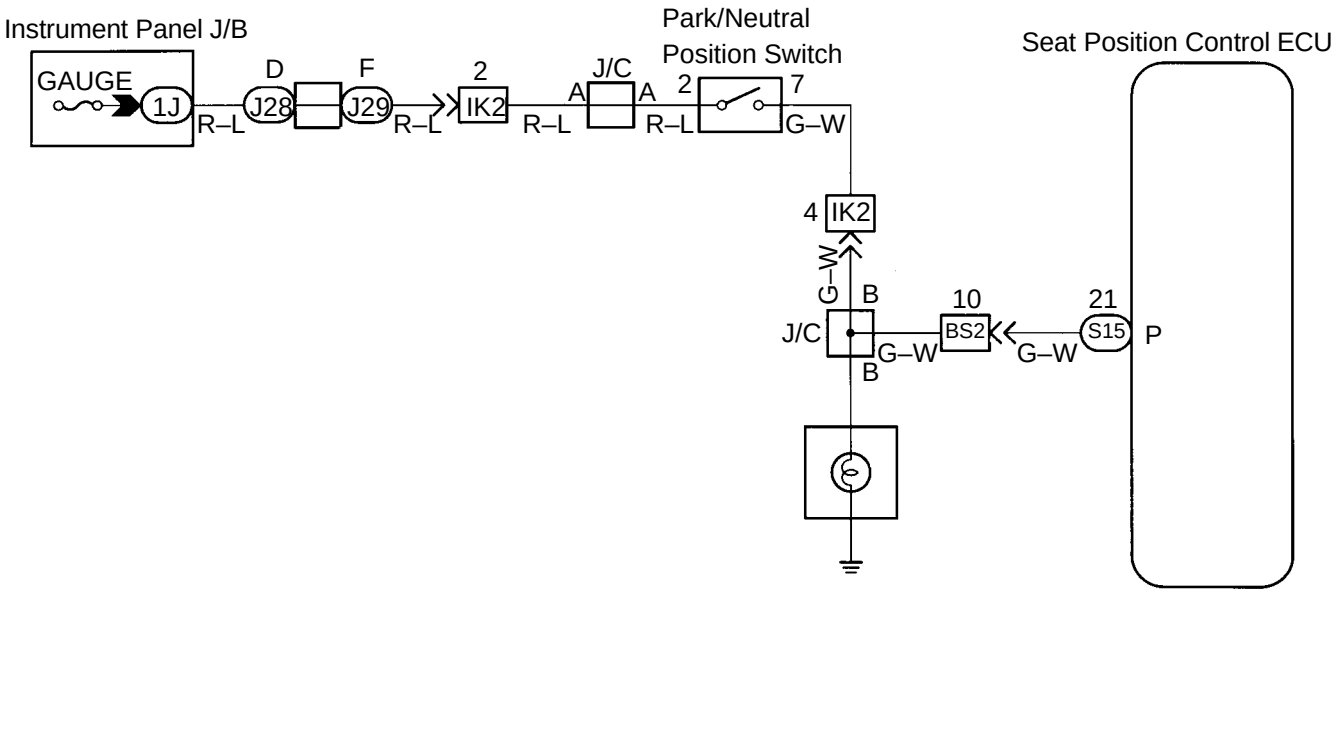
DI0GE–01

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

The park/neutral position switch detects the P position when the lever is shifted into P and sends a signal to the ECU. When the return switch is turned ON with the IG SW ON and the shift in P position, the ECU performs return operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift position indicator.**

CHECK:

Check that P lights up on the shift indicator when P position is shifted into, and that P is OFF when shifting into another position.

NG	**Check shift position indicator circuit (See page BE–2).**

NG

2	**Check voltage between terminal P of Seat Position Control ECU connector and body ground.**

PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminal P of Seat Position Control ECU connector and body ground when the shift lever is positioned to the following ranges.

OK:

Shift position	Voltage
P	10 ~ 14 V
Other than P	0 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG → **Check and repair harness and connector between Seat Position Control ECU and park/neutral position switch.**

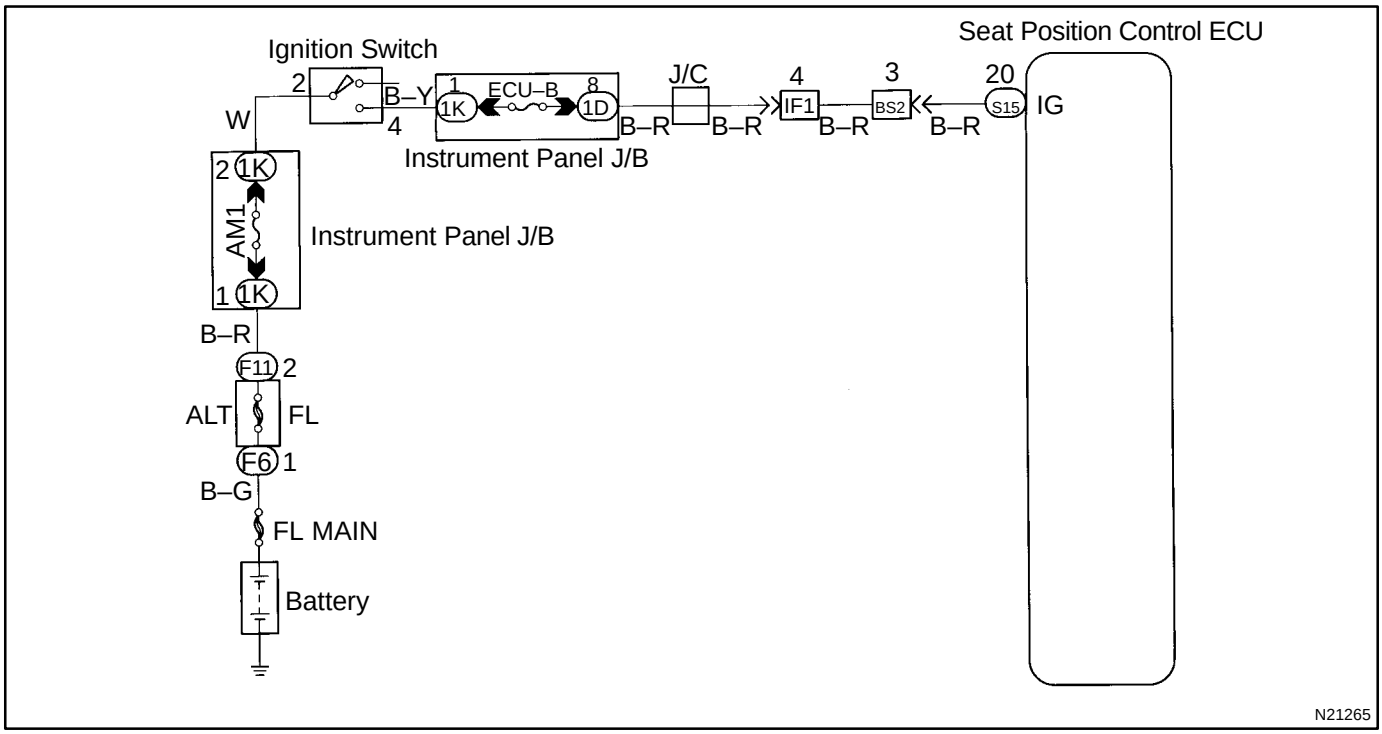
DI0GF–01

Ignition Switch Circuit

CIRCUIT DESCRIPTION

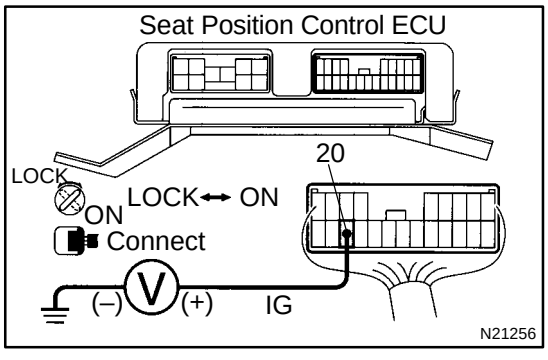
This circuit sends an ignition switch ON or OFF signal to the ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal IG of Seat Position Control ECU connector and body ground.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminal IG of Seat Position Control ECU connector and body ground when ignition switch is on and off.

OK:

Ignition switch	Voltage
ON	10 ~ 14 V
OFF	0 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	Check ECU–IG fuse.

NG → Check for short in all the harness and components connected to ECU–IG fuse.

NG

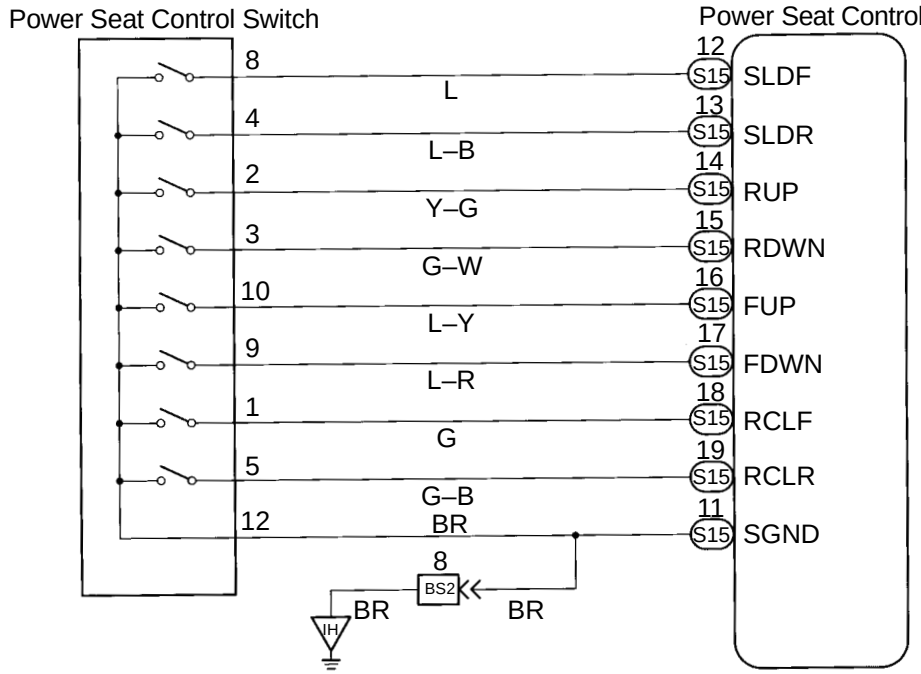
Check and repair harness or connector between Seat Position Control ECU and battery.

Power Seat Control Switch Circuit

CIRCUIT DESCRIPTION

When the power seat control switch is operated, a signal is sent from the power seat control switch to the ECU and the ECU sends a signal to the motor to make it operate.
Even if a malfunction should occur with the position sensor and return operation is prohibited, manual operation will occur as normal.

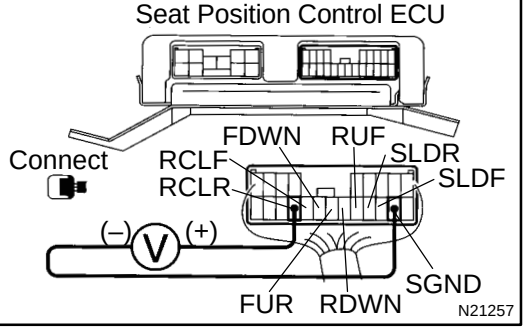
WIRING DIAGRAM



N21266

INSPECTION PROCEDURE

1	**Check voltage between each terminal of the Power Seat Control Switch and SGND of Seat Position Control ECU connector.**



N21257

PREPARATION:
Remove Seat Position Control ECU with connectors still connected.

CHECK:
Measure voltage between each terminal of the Power Seat Control Switch and SGND of Seat Position Control ECU connector. (The illustration shows inspection of the reclining as an example.)

OK:

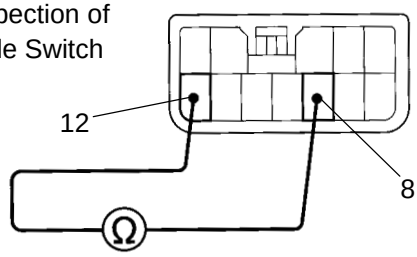
At each terminal with switch ON	0 V
At each terminal with switch OFF	10 ~ 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	**Check power seat control switch.**

(Example)
Inspection of
Slide Switch



PREPARATION:
Disconnect power seat control switch connector.
CHECK:
Check continuity of each terminal.
OK:

Switch position	Terminal
Neutral	–
Slide switch FRONT	8 – 12
Slide switch BACK	4 – 12
Front vertical switch UP	10 – 12
Front vertical switch DOWN	10 – 12
Rear vertical switch UP	2 – 12
Rear vertical switch DOWN	3 – 12
Reclining switch FORWARD	1 – 12
Reclining switch REARWARD	5 – 12

NG → **Replace power seat control switch.**

OK

3	**Check harness and connectors between Seat Position Control ECU and power seat control switch (See page IN–27).**

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

OK

Check and replace Seat Position Control ECU.

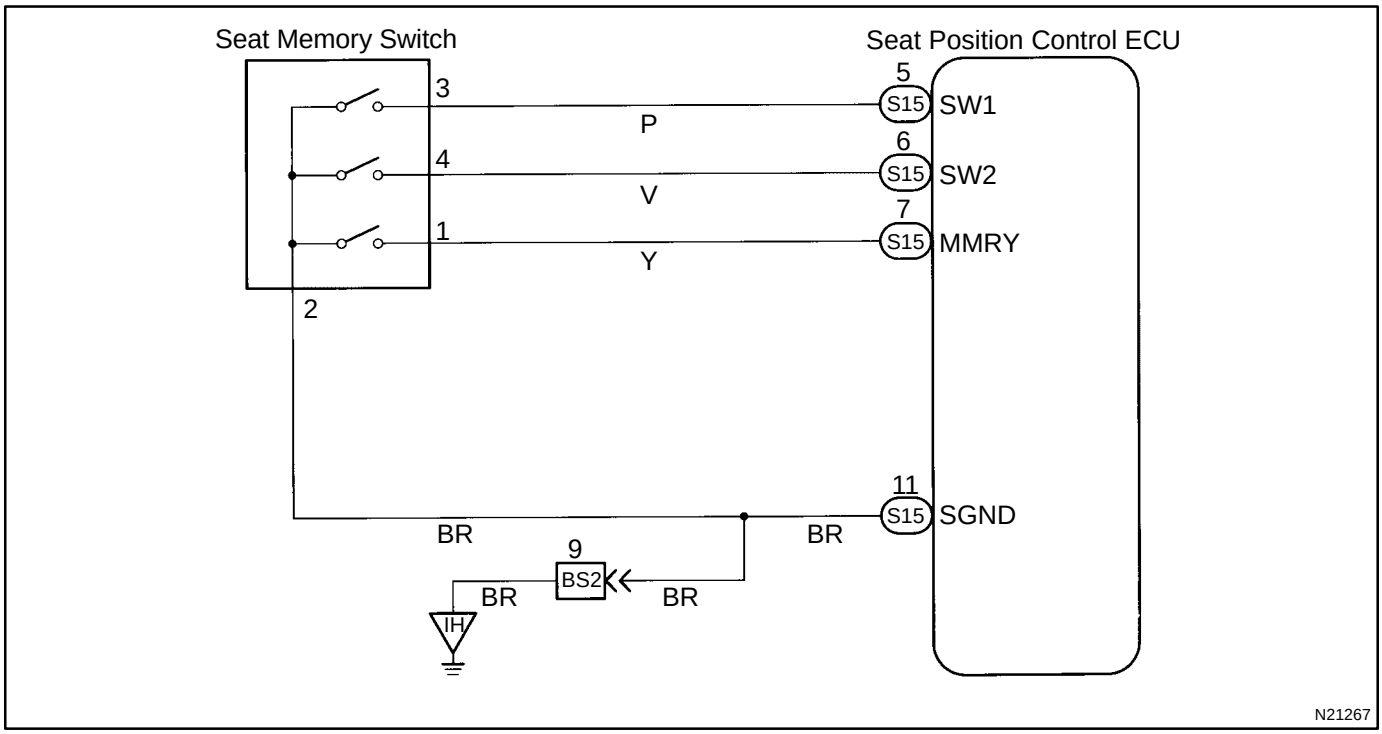
DI0GH–01

Seat Memory Switch

CIRCUIT DESCRIPTION

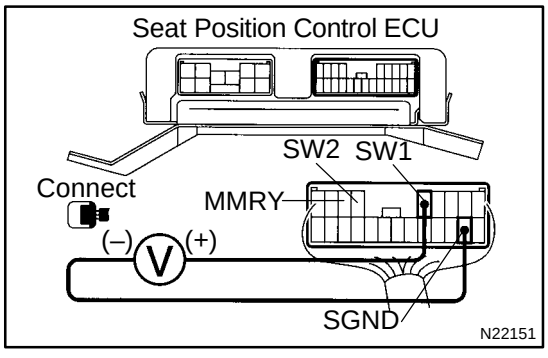
Seat memory switch send memory and return signals to the seat position control ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between each terminal of the seat memory switch and SGND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminal of the seat memory switch and SGND of Seat Position Control ECU connector.

(The illustration shows inspection of the Memory 1 as an example.)

OK:

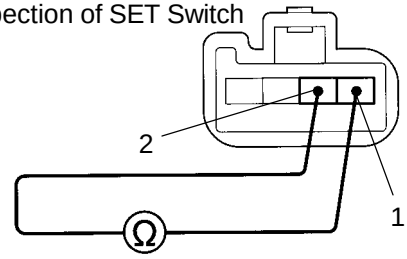
At each terminal with switch ON	0 V
At each terminal with switch OFF	10 ~ 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–374).**

NG

2	Check seat memory switch.

(Example)
Inspection of SET Switch



PREPARATION:
Disconnect seat memory switch connector.
CHECK:
Check continuity of each terminal.
OK:

Switch position	Terminal
SET switch ON	1 – 2
Memory switch 1	2 – 3
Memory switch 2	2 – 4

NG → Replace seat memory switch.

OK

3	Check harness and connectors between Seat Position Control ECU and seat memory switch (See page IN–27).

NG → Repair or replace harness or connector.

OK

Check and replace Seat Position Control ECU.

THEFT DETERRENT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI01P–01

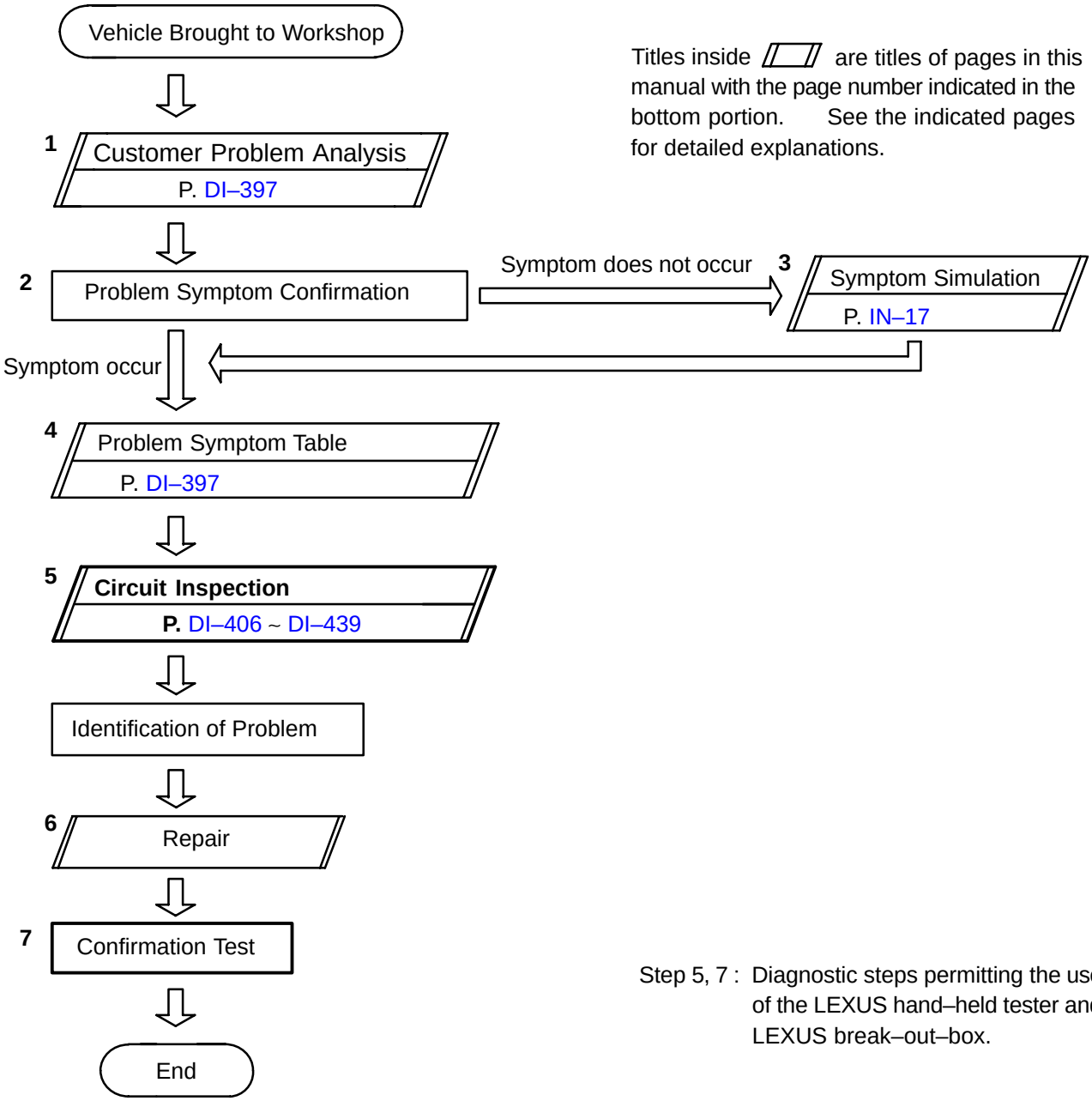
HINT:

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 using 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.



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.

Step 5, 7 : Diagnostic steps permitting the use of the LEXUS hand–held tester and LEXUS break–out–box.

DI01Q–01

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT 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 ● 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 ● Starter cut 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.		

DI01R–01

PRE–CHECK

1. SETTING THE THEFT DETERRENT MODE

The system will be automatically set to the theft deterrent mode about 30 seconds after the setting process listed below are performed.

Setting Processes: (do processes (a)~(c) in the order)

(a) Remove the ignition key from the key cylinder.

(b) Close all entry points (door, hood and luggage compartment door).

(c) Use any one of the following methods to lock all the doors depending on a given condition.

(1) Use the key to lock the driver–side door (as a result, all the doors will be locked), or

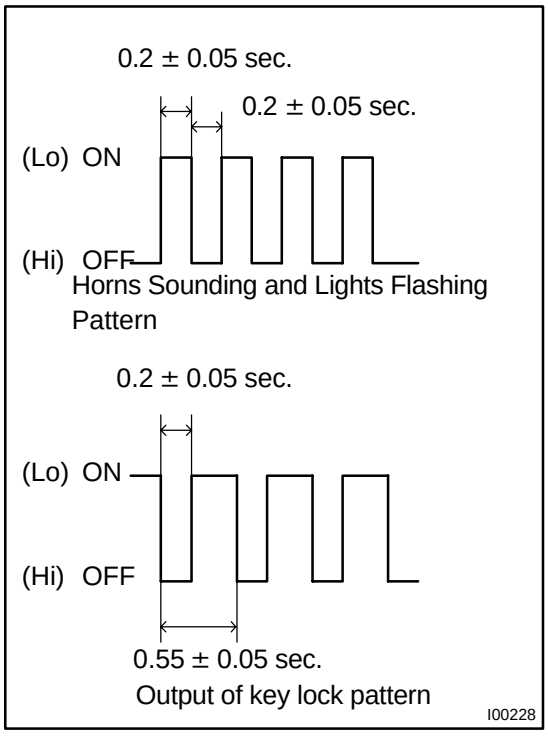
(2) Use the remoto control to lock any door (as a result, all the doors will be locked), or

(3) If the front right or left door is unlocked when both the rear doors are already locked, lock and close the remaining unlocked door by hand (as a result, all the doors will be locked).

(d) About 30 seconds after the above process (c), the theft deterrent mode will automatically start.

HINT:

The closing/locking of all the entry points (doors, hood and luggage) must remain unchanged for about 28 seconds after the above process (c) is completed and then in about another 2 seconds (which is called "DETECTION TIME"), the system will start the theft deterrent mode.



2. THEFT DETERRENT OPERATION

When the system is set to the theft deterrent mode and any of the following conditions are met, the system sounds the horns and flashes the headlights and the taillights for about 1 minute. At the same time, the system disconnects the starter motor circuit *1 and locks all doors (If all door are not locked at once, the system repeats door locking operation every 0.55 seconds during the one minute alarm time). The system continues to disconnect the starter motor circuit after the system is operated until the theft deterrent mode is cancelled.

Condition

(1) Any of the doors (Including the engine hood and luggage compartment door) is unlocked or opened without the key.

(2) The ignition switch is turned to the ACC or ON position without the ignition key.

(3) The battery terminal is disconnected and reconnected. *1

(4) The system receives panic signal from remote keyless entry. *2

*1: The theft deterrent mode is activated if the battery is reconnected after it is disconnected.

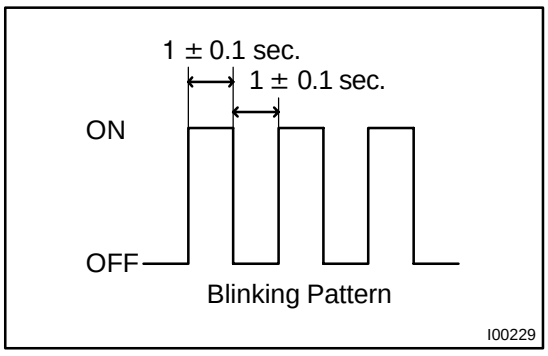
*2: When ignition key is not inserted in the key cylinder.

3. CANCELLATION OF THEFT DETERRENT OPERATION OR MODE

The theft deterrent operation of mode can be cancelled when any of the following conditions is met.

No.	Condition	Cancel of Operation	Cancel of Mode
1	Unlock front door with the key	Effective	Effective
2	Unlock doors with remote keyless entry	Effective	Effective
3	Insert key into ignition key cylinder and turn it to Acc or ON position	Effective *1	Effective *2
4	About 1 minute passes after theft deterrent operation begins	Automatic stop *3	–
5	Unlock the luggage compartment door with the key	Uneffective	Effective *4
6	If the system receives panic signal again when the system is activated by panic signal	Effective *3	Uneffective

*1: In this case, the starter cut is not cancelled.
*2: This applies only when the theft deterrent operation is never activated. If the theft deterrent operation is activated even once, the starter cut is not cancelled.
*3: The system is set to the theft deterrent mode again in about 2 seconds after the operation stops, if all doors are closed.
*4: The mode is cancelled only temporarily while the luggage compartment door is open. The system is set to the theft deterrent mode again in about 2 seconds after the luggage compartment door is closed.



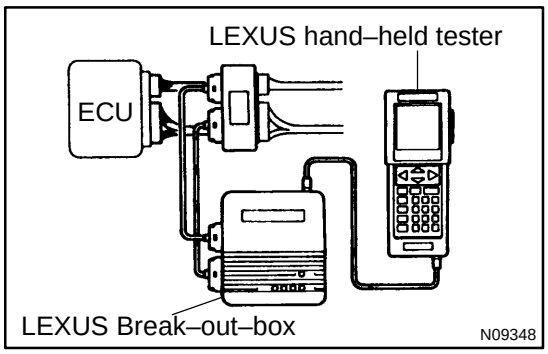
4. INDICATOR LIGHT (LED)

The indicator light functions as shown below according to the system condition in the theft deterrent mode. If remains off in the initial state.

System Condition	Indicator Light
During set preparation time	ON
When the mode is set	Blinks
When alarm is activated	ON
When is temporally cancelled	OFF

5. KEEPING POWER SUPPLY FUNCTION IN CASE OF DOME FUSE OPEN

Even if the dome fuse blows open on the theft deterrent mode, the system will keep warking on the theft deterrent mode.



6. ECU DATA MONITOR USING LEXUS HAND–HELD TESTER

(a) Hook up the LEXUS hand–held tester to the DLC2.

(b) Monitor the ECU data by following the prompts on the tester screen.

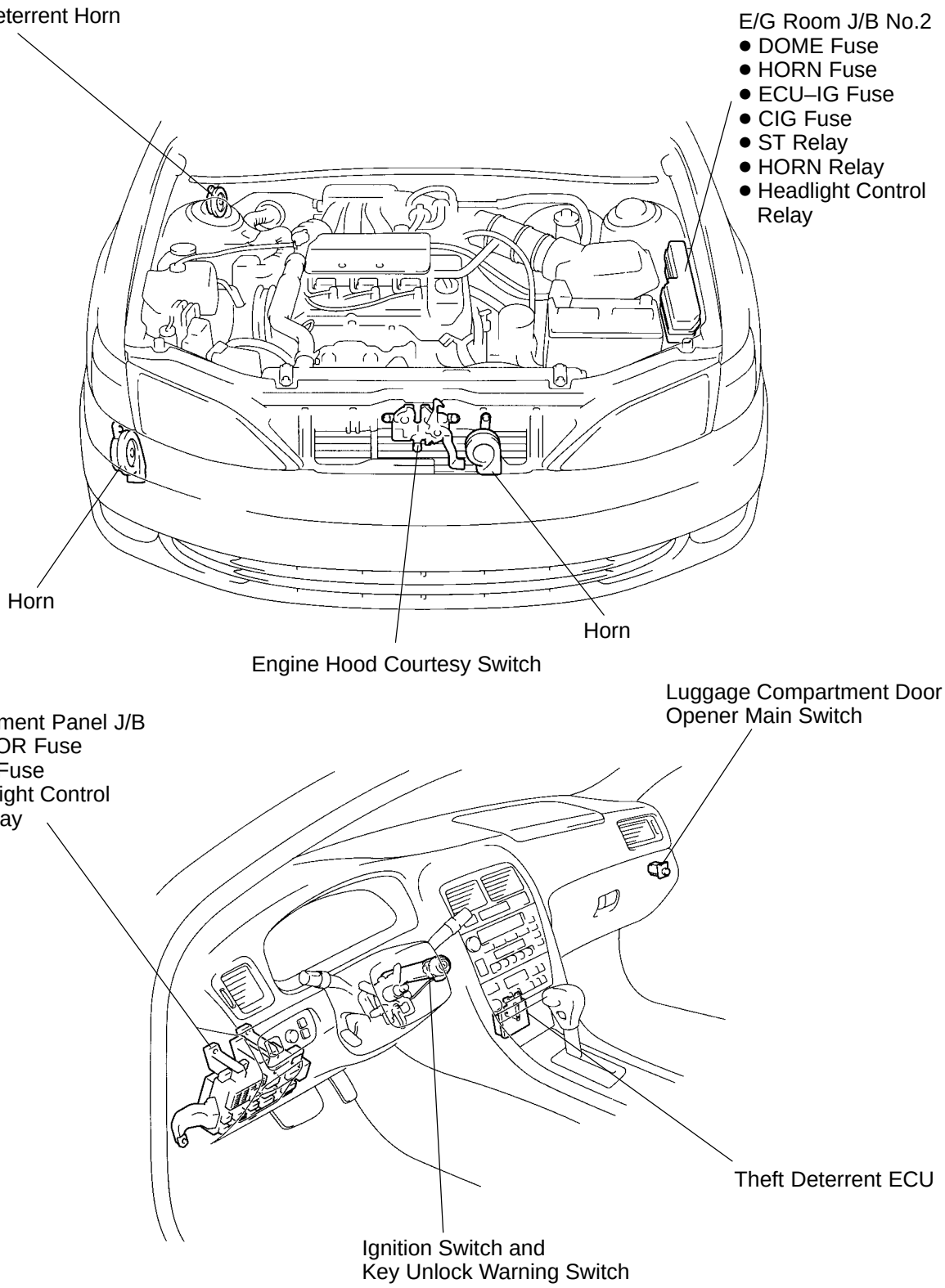
HINT:

LEXUS hand–held tester has a ”Snapshot” function which records the monitored data.

Please refer to the LEXUS hand–held tester operator’s manual for further datails.

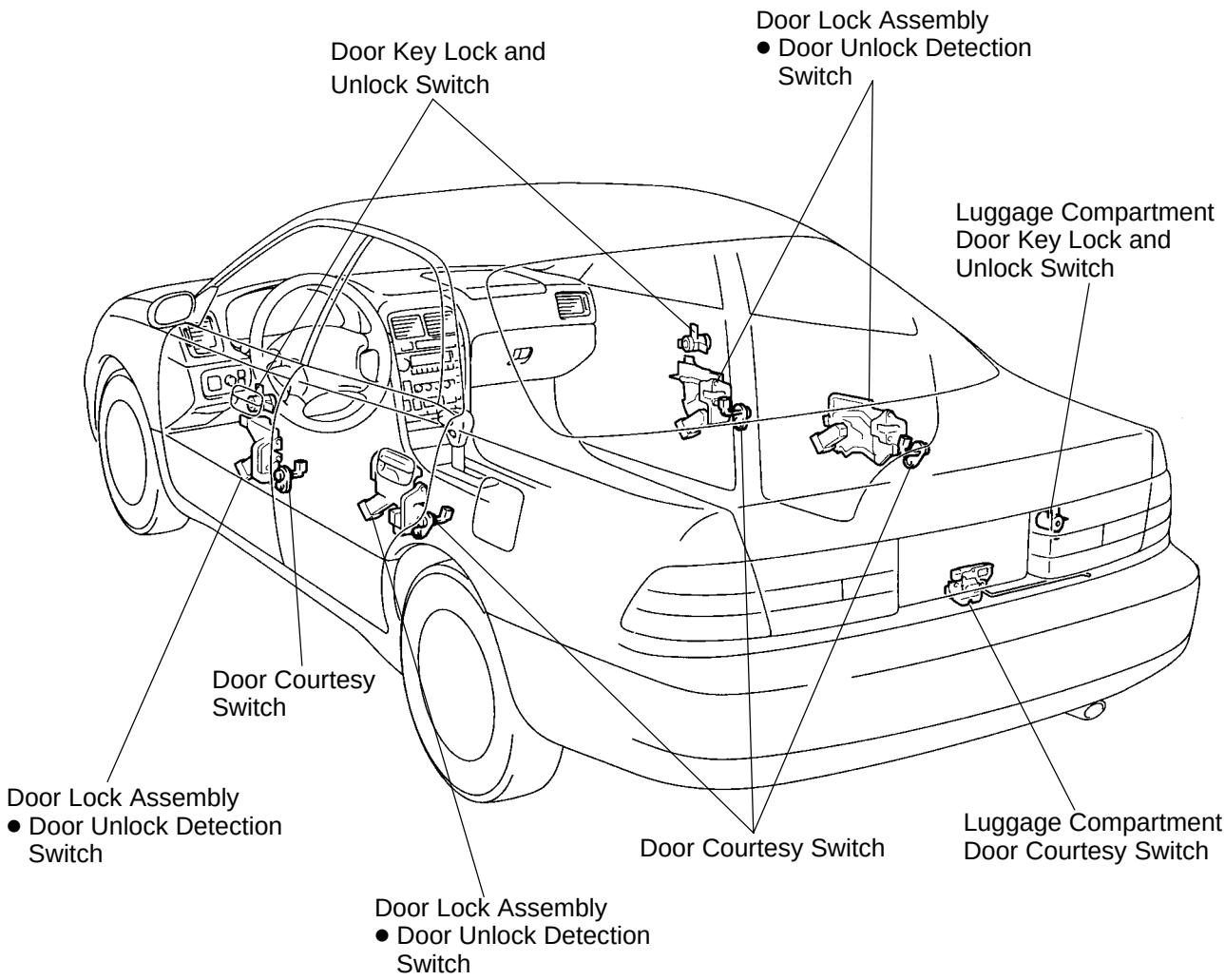
DI01S–01

PARTS LOCATION



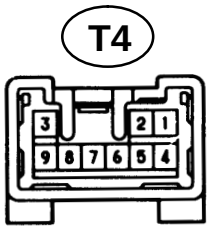
N22047
N22048

I00635

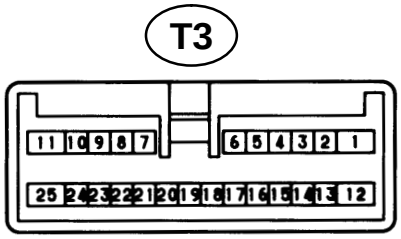

Door Key Lock and
Unlock Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Luggage Compartment
Door Key Lock and
Unlock Switch
Door Courtesy
Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Door Courtesy Switch
Luggage Compartment
Door Courtesy Switch
Door Lock Assembly
● Door Unlock Detection
Switch
N22049

DI01T–01

TERMINALS OF ECM



Connector ”B”



Connector ”A”

I00302 I00303 I00304

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
DSWP ↔ E (A1 ↔ B4)	R–G ↔ W–B	Door courtesy switch ”ON” (Passenger’s door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Passenger’s door closed)	1 MΩ or higher
DSWD ↔ E (A2 ↔ B4)	R–G ↔ W–B	Door courtesy switch ”ON” (Driver’s door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Driver’s door Closed)	1 MΩ or higher
CTY ↔ E (A3 ↔ B4)	R–W ↔ W–B	Door courtesy switch ”ON” (Rear door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Rear door closed)	1 MΩ or higher
DSWH ↔ E (A4 ↔ B4)	B ↔ W–B	Engine hood courtesy switch ”ON” (Engine hood opened)	Below 1 Ω
		Engine hood courtesy switch ”OFF” (Engine hood closed)	1 MΩ or higher
DSWL ↔ E (A5 ↔ B4)	R–Y ↔ W–B	Luggage compartment door courtesy switch ”ON” (Luggage compartment door opened)	Below 1 Ω
		Luggage compartment door courtesy switch ”OFF” (Luggage compartment door closed)	1 MΩ or higher
L2 ↔ E (A6 ↔ B4)	L–W ↔ W–B	Door key lock and unlock switch ”LOCK” (Driver’s and passenger’s door)	Below 1 Ω
		Door key lock and unlock switch ”UNLOCK” (Driver’s and passenger’s door)	1 MΩ or higher
UL3 ↔ E (A7 ↔ B4)	R–G ↔ W–B	Door key lock and unlock switch ”UNLOCK” (Driver’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (Driver’s door)	1 MΩ or higher
UL2 ↔ E (A8 ↔ B4)	L ↔ W–B	Door key lock and unlock switch ”UNLOCK” (passenger’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (passenger’s door)	1 MΩ or higher
LUG ↔ E (A9 ↔ B4)	G–W ↔ W–B	Luggage compartment door key lock and unlock switch ”ON”	Below 1 Ω
		Luggage compartment door key lock and unlock switch ”OFF”	1 MΩ or higher
IND ↔ E (A10 ↔ B4)	R–Y ↔ W–B	Always	Below 1 V
+B1 ↔ Body ground (A11 ↔ Body ground)	R ↔ W–B	Always	10 – 14 V

IG ↔ E (A12 ↔ B4)	B–R ↔ W–B	Ignition switch is turned to ”ON” position	10 – 14 V
ACC ↔ E (A13 ↔ B4)	P–L ↔ W–B	Ignition switch is turned to ”ACC” position	10 – 14 V
TSW ↔ E (A14 ↔ B4)	L–Y ↔ W–B	Luggage compartment door opener main switch ”ON” (Luggage compartment door opened)	Below 1 Ω
		Luggage compartment door opener main switch ”OFF” (Luggage compartment door closed)	1 MΩ or higher
KSW ↔ E (A15 ↔ B4)	L–B ↔ W–B	Key unlock warning switch ”ON” (Key inserted)	Below 1 Ω
		Key unlock warning switch ”OFF” (Key removed)	1 MΩ or higher
LSWD ↔ E (A16 ↔ B4)	L–R ↔ W–B	Door unlock detection switch ”ON” (Driver’s door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Driver’s door)	1 MΩ or higher
LSWP ↔ E (A17 ↔ B4)	Y ↔ W–B	Door unlock detection switch ”ON” (Passenger’s door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Passenger’s door)	1 MΩ or higher
LSWR ↔ E (A18 ↔ B4)	L–Y ↔ W–B	Door unlock detection switch ”ON” (Rear door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Rear door)	1 MΩ or higher
PANI ↔ E (A24 ↔ B4)	LG ↔ W–B	It is receiving panic signal from remote keyless entry	Below 1 Ω
		Except above mention	1 MΩ or higher
+B2 ↔ Body ground (B1 ↔ Body ground)	L–W ↔ Body ground	Always	10 – 14 V
TO ↔ E (B2 ↔ B4)	L ↔ W–B	Always	10 – 14 V
SH ↔ E (B3 ↔ B4)	W–L ↔ W–B	Always	10 – 14 V
E ↔ Body ground (B4 ↔ Body ground)	W–B ↔ Body ground	Always	10 – 14 V
HORN ↔ E (B6 ↔ B4)	G–B ↔ W–B	Horn switch ”OFF”	10 – 14 V
TAIL ↔ E (B7 ↔ B4)	G–R ↔ W–B	Light control switch ”TAIL” or ”HEAD”	10 – 14 V
HEAD ↔ E (B8 ↔ B4)	R–B ↔ W–B	Light control switch ”HEAD”	10 – 14 V
SRLY ↔ E (B9 ↔ B4)	W–B ↔ W–B	Ignition switch ”ST” and PNP switch ON (Shift to N or P position)	10 – 14 V

DI01U–01

PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and troubleshoot 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.

Details of Problem			Inspecting Circuit*1	See page
The theft deterrent system cannot be set			1. Indicator light circuit	DI–406
			2. ECU power source circuit	DI–408
			3. Key unlock warning switch circuit	DI–423
			4. Luggage compartment door key lock and unlock switch circuit	DI–425
			5. Luggage compartment door courtesy switch circuit	DI–427
			6. Door key lock and unlock switch circuit	DI–433
			7. Door courtesy switch circuit	DI–437
			8. Door unlock detection switch circuit	DI–435
			9. Luggage compartment door opener main switch and opener switch circuit	DI–431
			10. Engine hood courtesy switch circuit	DI–439
The indicator light does not blink when system is set			Indicator light circuit	DI–406
When the system is set	When the rear door is unlocked	The system does not operate	Door unlock detection switch circuit	DI–435
	When the luggage compartment door is opened by a method other than the key		1. Luggage compartment door opener main switch and opener switch circuit	DI–431
			2. Luggage compartment door opener motor circuit	DI–429
			3. Luggage compartment door courtesy switch circuit	DI–427
	When the engine hood is opened		Engine hood courtesy switch circuit	DI–439
While the system is in warning operation	Horns do not sound		Horn relay circuit	DI–415
	Theft deterrent horn does not sound		Theft deterrent horn circuit	DI–413
	Headlights do not flash		Headlight control relay circuit	DI–417
	Taillights do not flash		Taillight control relay circuit	DI–419
	The starter cut is not cut off		Starter relay circuit	DI–411
	The door lock is not locked in unlock condition		Door unlock detection switch circuit	DI–435
When the system is set	It is not canceled when the ignition key is turned to ACC or ON position		Ignition switch circuit	DI–421
	It still operates when the luggage compartment door is opened with the key		Luggage compartment door key lock and unlock switch circuit	DI–425
System is still set even when a rear door is open			Door courtesy switch circuit	DI–437
Even when the system is not set	Horns sound		Horn relay circuit	DI–415
	Theft deterrent horn sounds		Theft deterrent horn circuit	DI–413
	Headlights stay on		Headlight control relay circuit	DI–417
	Taillights stay on		Taillight control relay circuit	DI–419

*1: If numbers are given to the circuit proceed with troubleshooting in the order indicated by those numbers.

DI01V–01

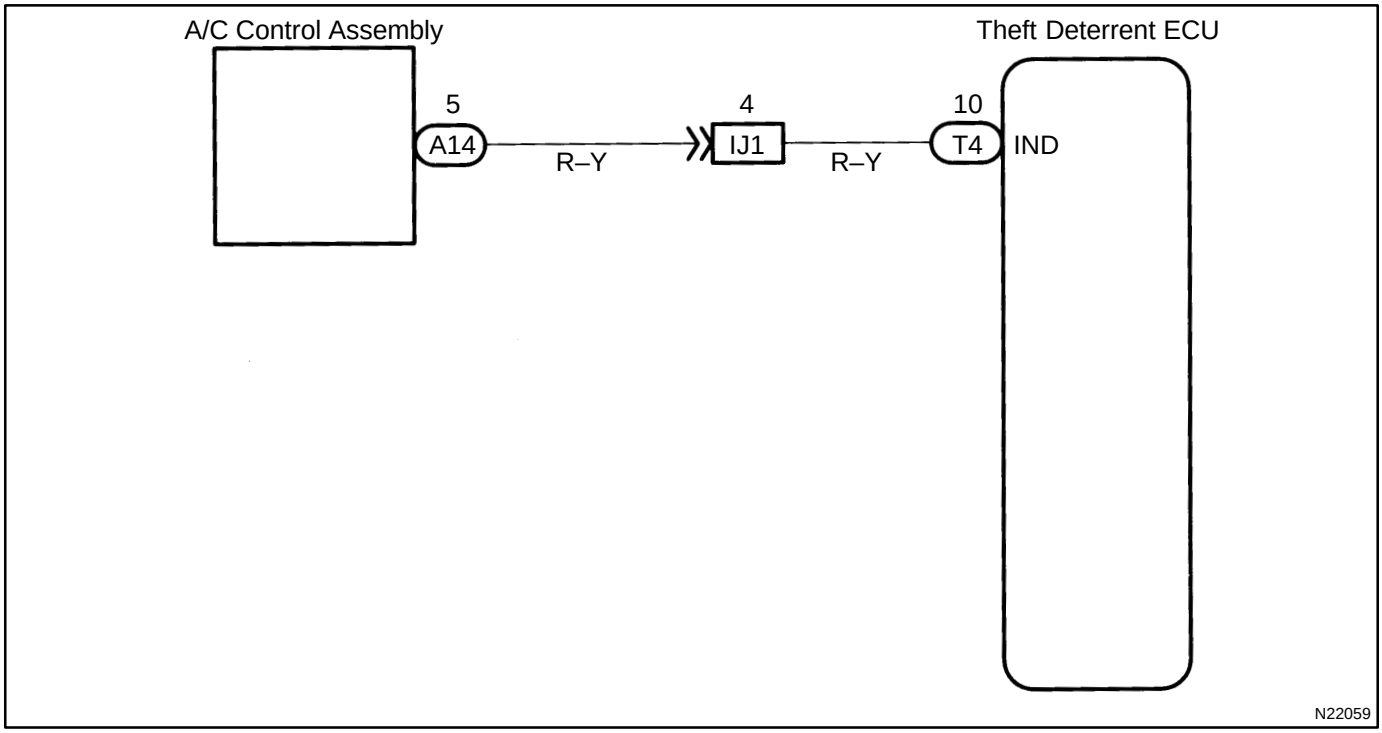
CIRCUIT INSPECTION

Indicator Light Circuit

CIRCUIT DESCRIPTION

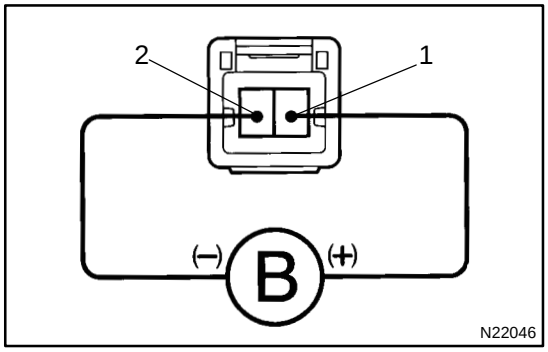
When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continually turns the indicator light on for 1 second and turns it off for 1 second, thus blinking the indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check indicator light.**



PREPARATION:

(a) Remove A/C control assembly.

(b) Disconnect indicator light connector.

CHECK:

Connect the positive (+) lead to terminal 1 and the negative (–) lead to terminal 2 of indicator light connector.

OK:

Indicator light comes on.

NG	**Replace indicator light.**

OK

2	**Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page IN–27).**

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 on matrix chart (See page DI–405).

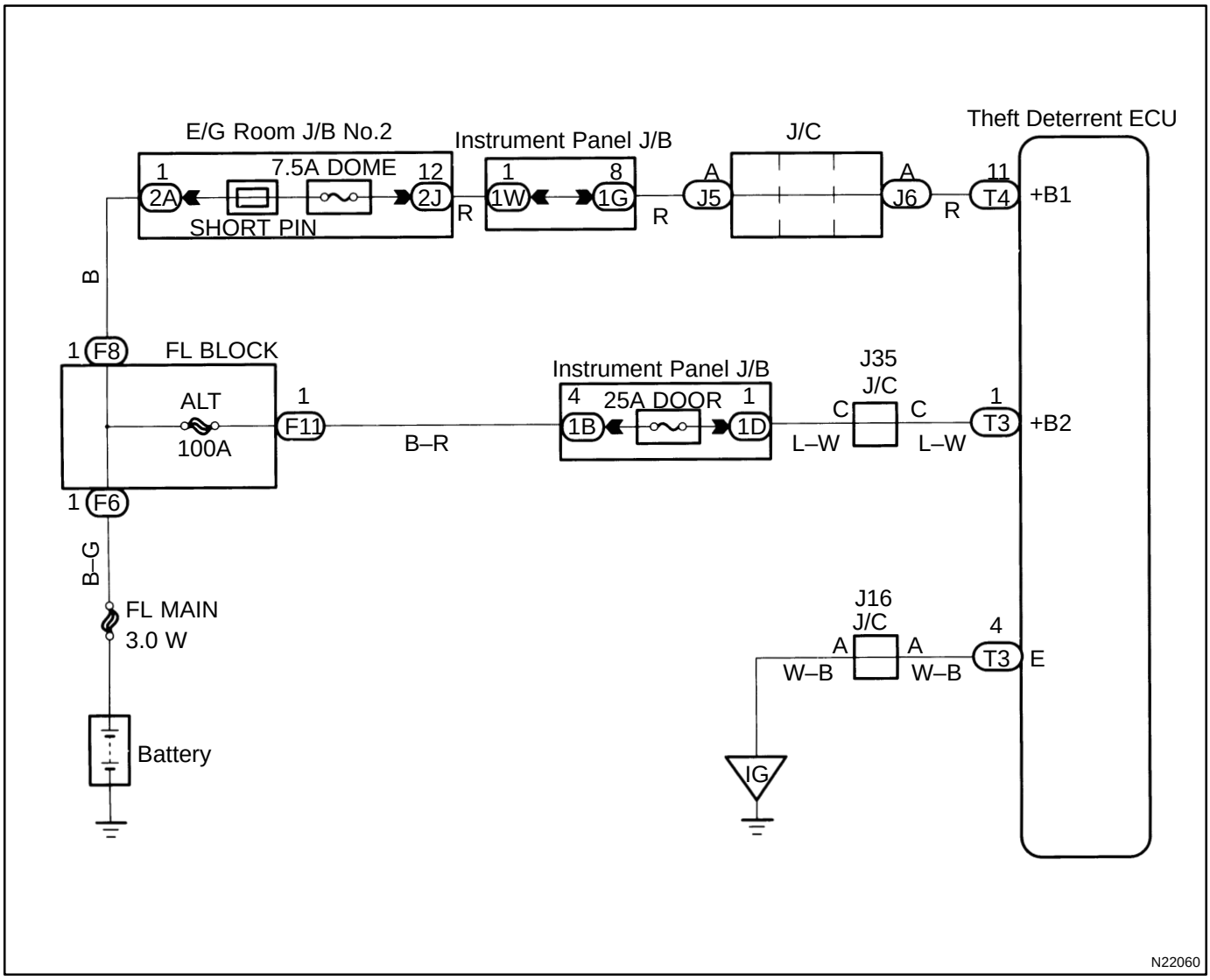
DI01W–01

ECU Power Source Circuit

CIRCUIT DESCRIPTION

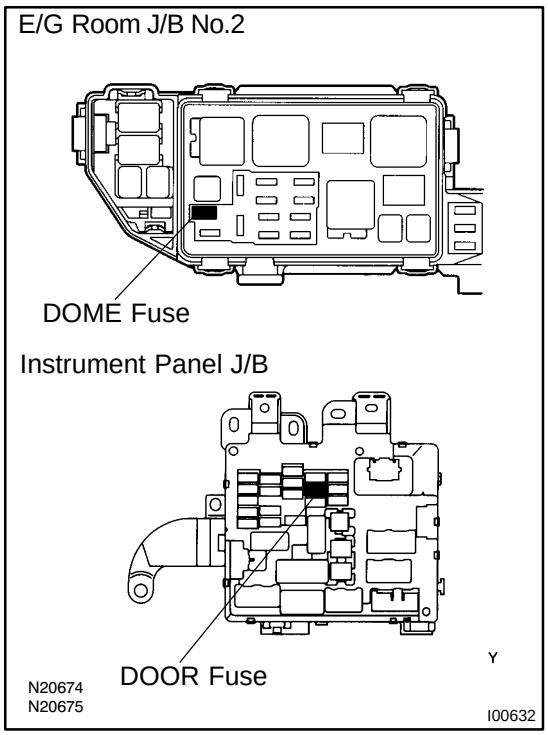
This circuit provides power to operate the theft deterrent ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check DOME and DOOR fuse.



PREPARATION:

(a) Remove DOME fuse from engine room junction block No.2.

(b) Remove DOOR fuse from instrument panel junction block No.1.

CHECK:

Check continuity of DOME and DOOR fuse.

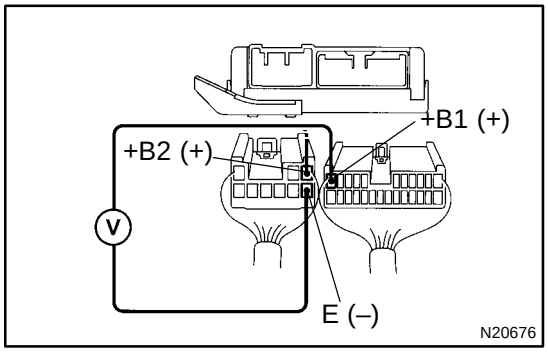
OK:

Continuity

NG → **Check for short in all the harness and components connected to the DOME and DOOR fuse (See attached wiring diagram).**

OK

2	Check voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.

OK:

Voltage: 10~14V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–405).**

NG

3	Check for open in harness and connector between ECU and body ground (See page IN–27).

NG → Repair or replace harness or connector.

OK

Check and repair harness and connector between ECU and battery.

DI01X–01

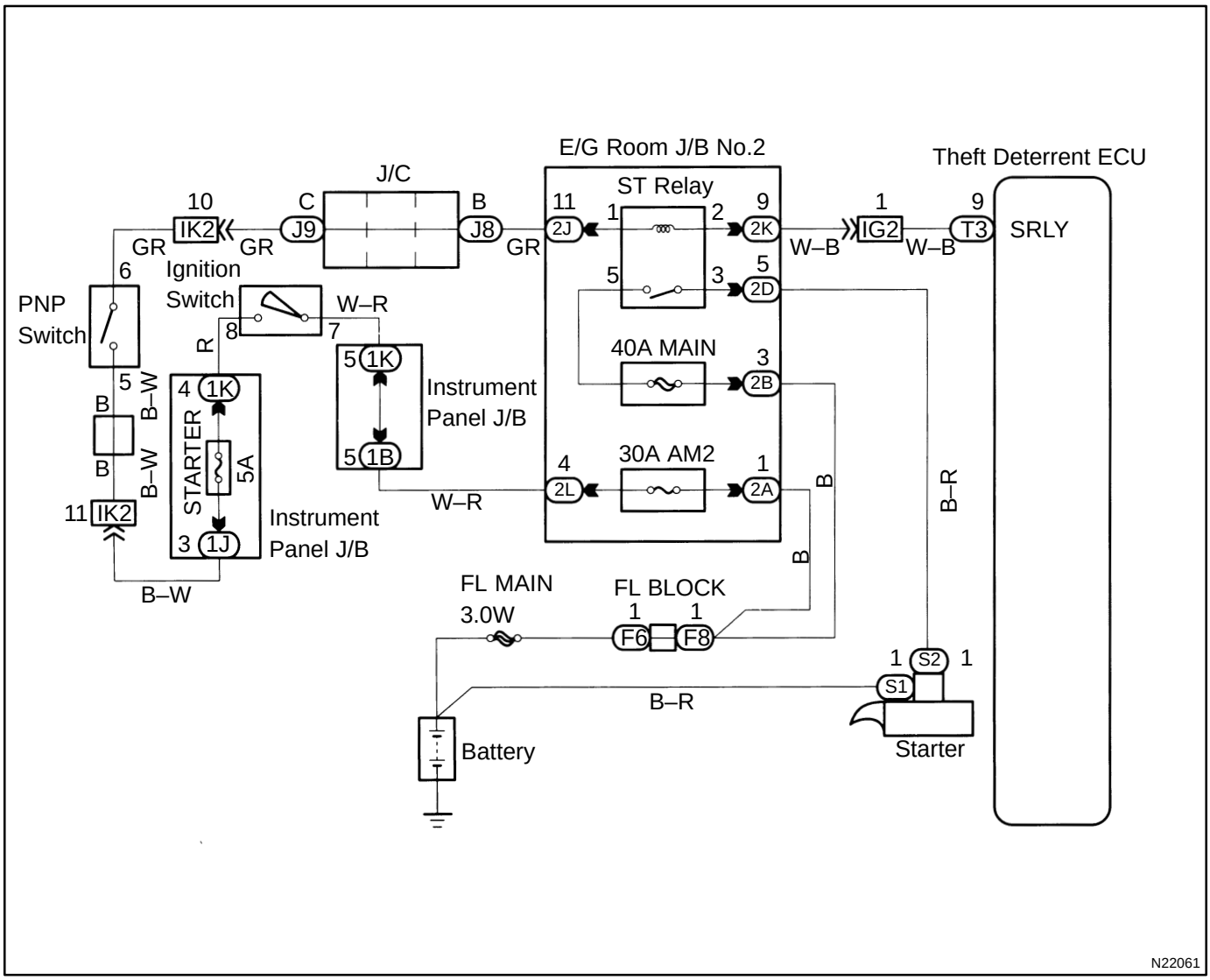
Starter Relay Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, contact (a) in the ECU becomes open, creating an open circuit in terminal SRLY circuit and making the starter inoperative (starter cut).
In this condition, if one of the following operations is done, the contact (a) in the ECU is grounded, thus canceling the starter cut:

(1) Unlock the front LH or RH door with key.
(2) Unlock the doors with the wireless door lock control system.

WIRING DIAGRAM



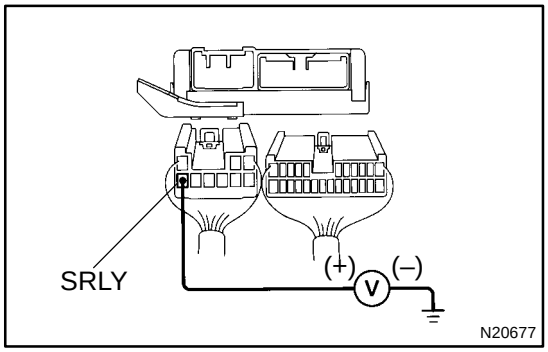
INSPECTION PROCEDURE

HINT:

This troubleshooting is based on the premise that engine cranking occurs.

If the engine does not crank, proceed to the engine troubleshooting on EG–Section.

1	**Check voltage between terminal SRLY of theft deterrent ECU connector and body ground.**



PREPARATION:

(a) Disconnect the theft deterrent ECU connector.

(b) PNP switch ON (Shift to N or P position).

CHECK:

Measure voltage between terminal SRLY of theft deterrent ECU connector and body ground, when ignition switch is turned to ST position.

OK:

Voltage: 10~14V

NG → **Check and repair harness and connector between starter and theft deterrent ECU (See page IN–17).**

OK

Check and repair theft deterrent ECU.

DI01Y–01

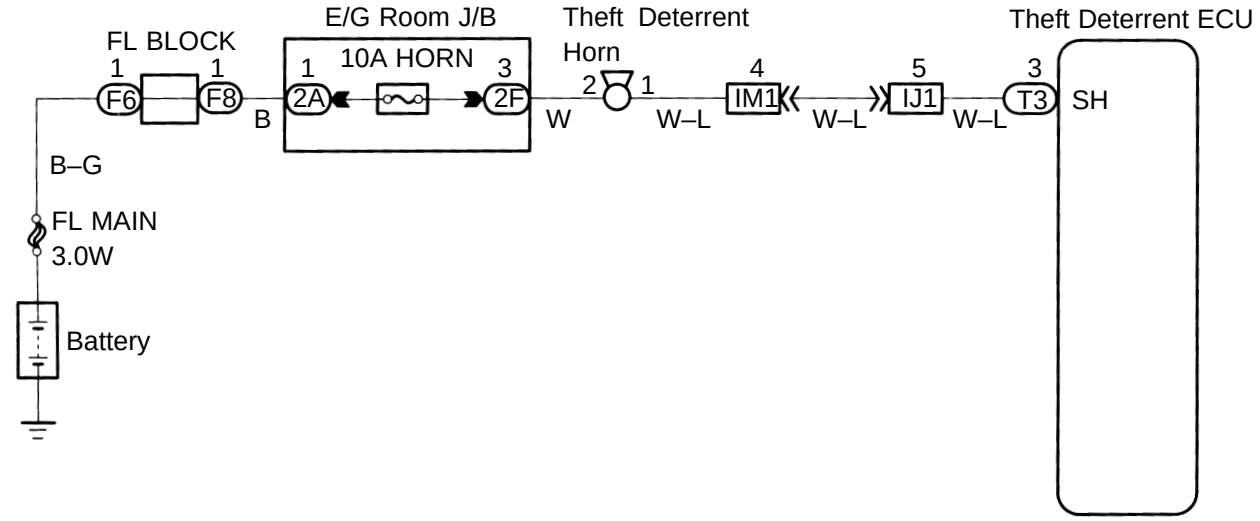
Theft Deterrent Horn Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, contact (a) and contact (b) in the ECU close alternately in cycles of approximately 0.2 sec., causing the theft deterrent horn to blow (See the wiring diagram below).
In this condition, if any of the following operations is done, the contact (a) in the ECU opens, thus stopping the theft deterrent horn from blowing:

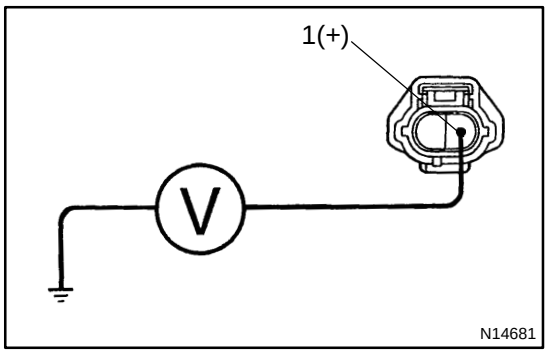
(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of theft deterrent horn connector and body ground.**

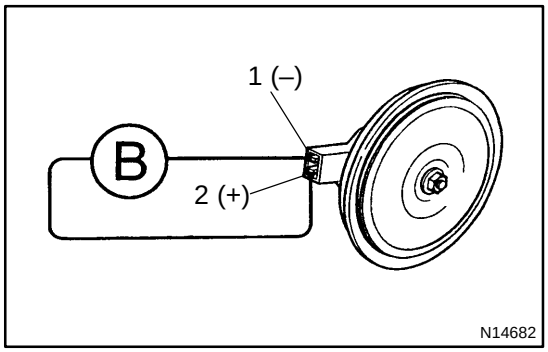


PREPARATION:
Remove the theft deterrent horn and disconnect the connector.
CHECK:
Measure voltage between terminal 1 of theft deterrent horn connector and body ground.
OK:
Voltage: 10~14V

NG → **Check and repair harness and connector between HORN fuse and theft deterrent horn.**

OK

2	**Check theft deterrent horn.**



CHECK:
Connect positive (+) lead to terminal 1 and negative (–) lead to terminal 2 to theft deterrent horn connector.

OK:

Theft deterrent horn blows.

NG → **Replace theft deterrent horn.**

OK

3	**Check harness and connector between theft deterrent ECU and theft deterrent horn (See page IN–27).**

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

OK

Check and replace theft deterrent ECU.

DI01Z–01

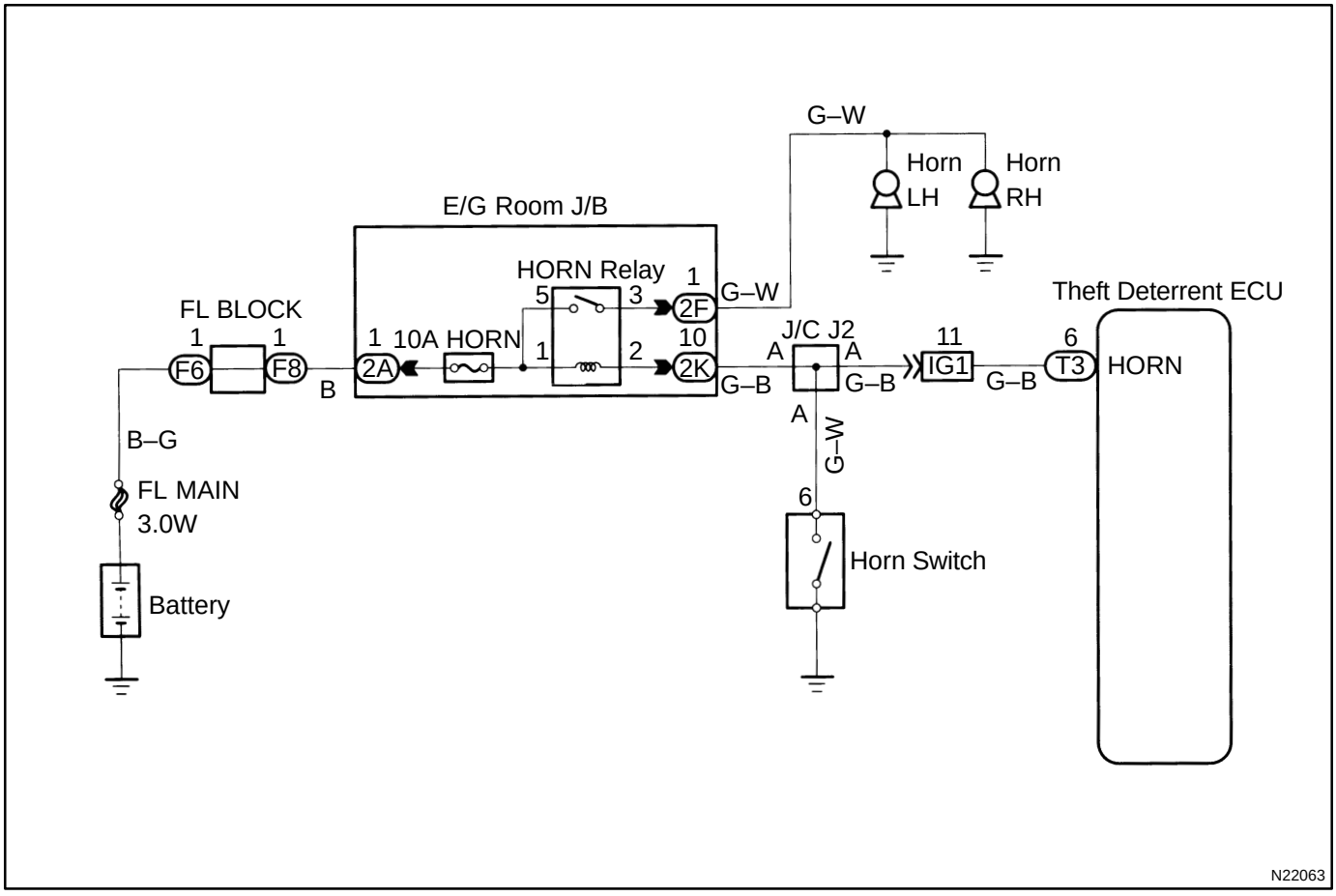
Horn Relay Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr 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 Tr 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.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

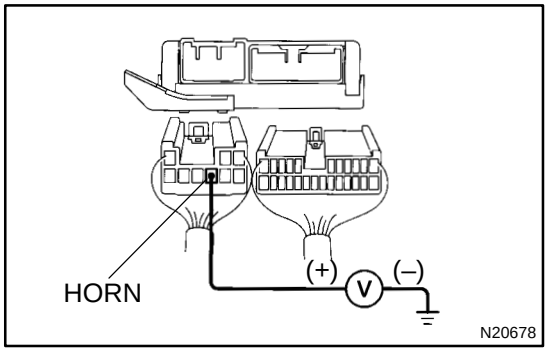
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
The flow chart below is based on the premise that the 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.**

OK

Check and replace theft deterrent ECU.

DI020–01

Headlight Control Relay Circuit

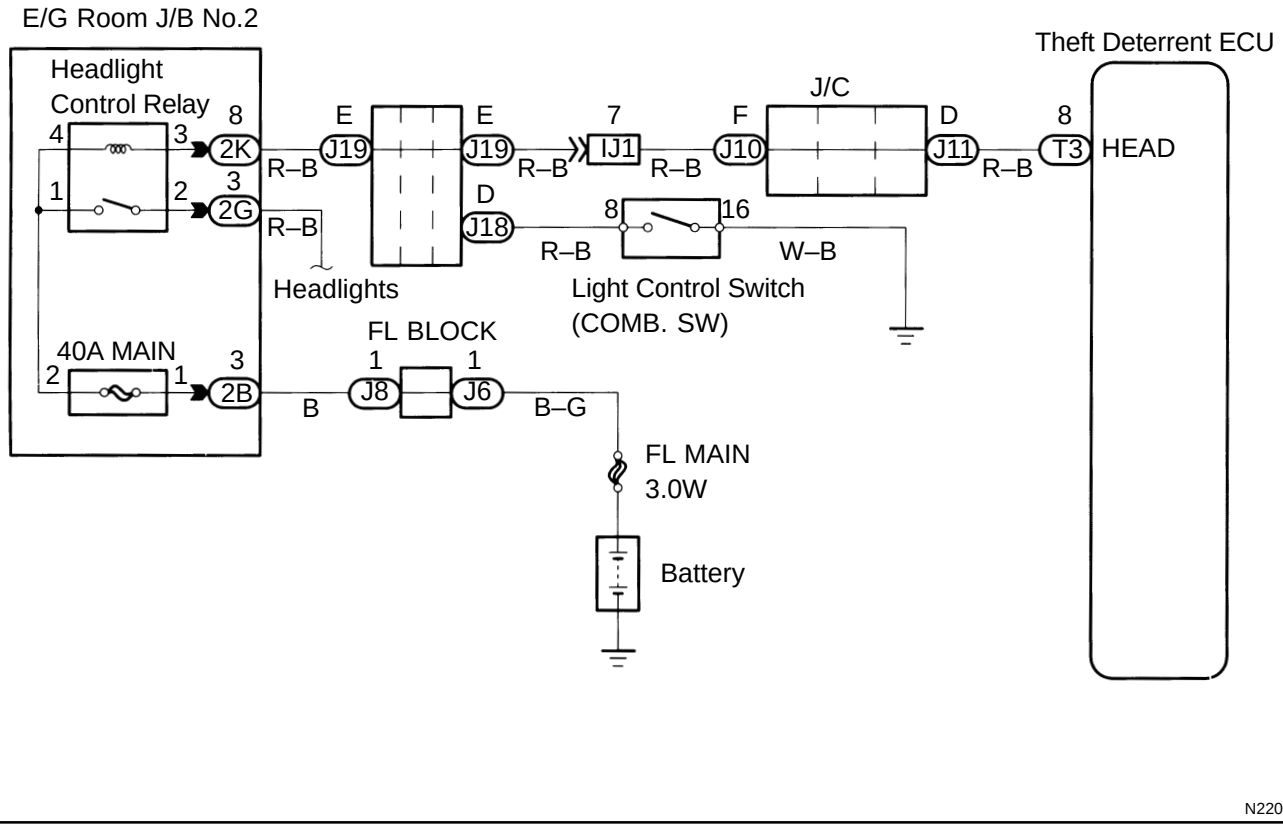
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr 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 Tr 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 key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

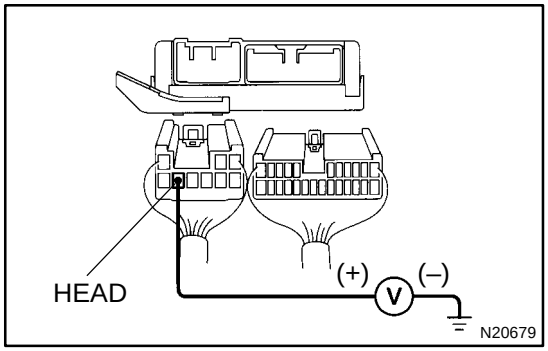


INSPECTION PROCEDURE

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.

1	**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–27).**

OK →

Check and replace theft deterrent ECU.

DI021–01

Taillight Control Relay Circuit

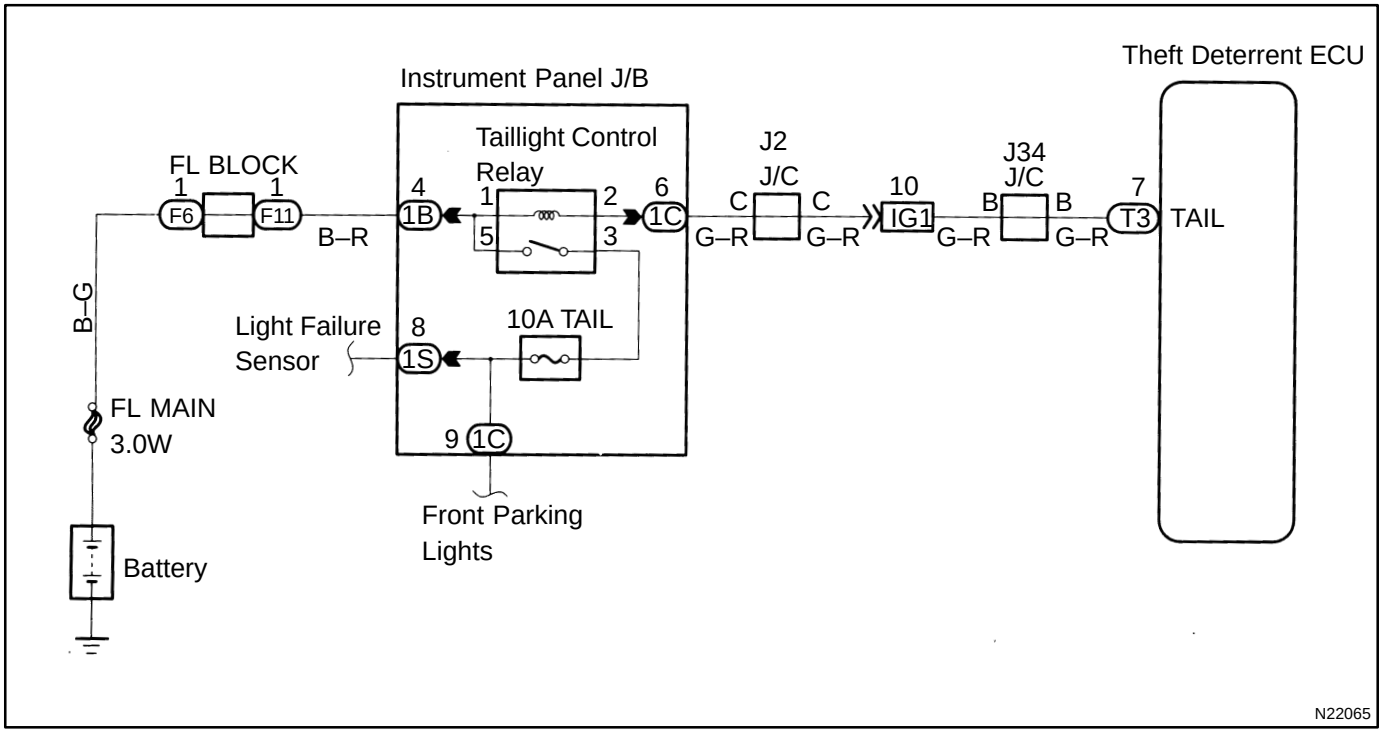
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr 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 Tr 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 key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

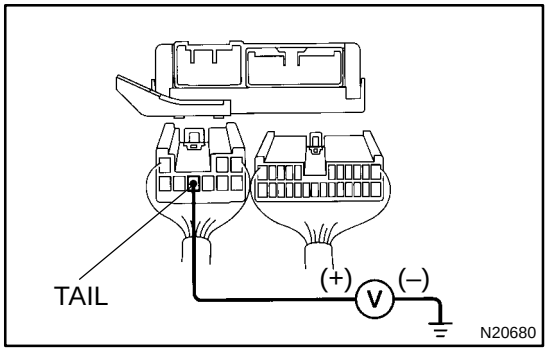


INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the 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.

1	**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–27).**

OK

Check and replace theft deterrent ECU.

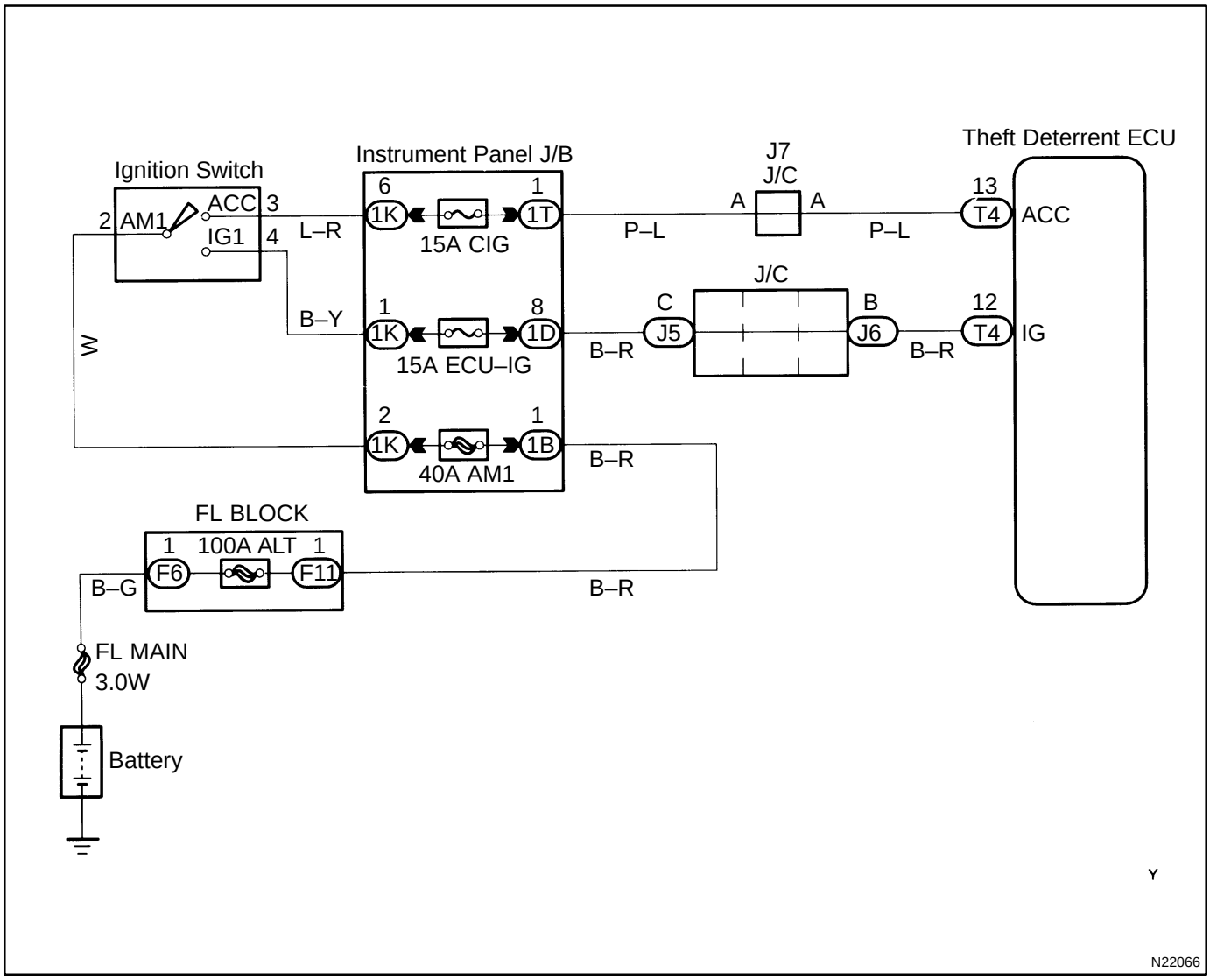
DI022–01

Ignition Switch Circuit

CIRCUIT DESCRIPTION

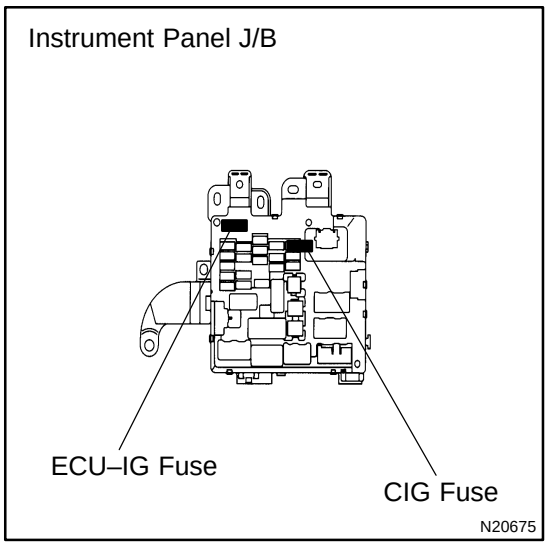
When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU. Also, if the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals ACC and IG of the ECU. When the battery positive voltage is applied to the terminal ACC of the ECU while the theft deterrent system is activated, the warning stops. Furthermore, power supplied from the terminals ACC and IG of the ECU is used as power for the door courtesy switch, and position switch, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check CIG and ECU–IG fuses.



PREPARATION:
(a) Remove the fuse box opening cover.
(b) Remove CIG and ECU–IG fuses from instrument panel junction block.

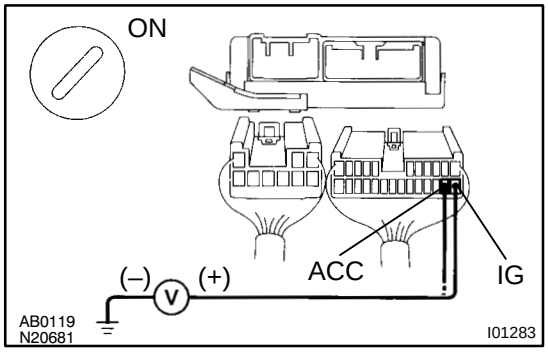
CHECK:
Check continuity of CIG and ECU–IG fuses.

OK:
Continuity

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

OK →

2	Check voltage between terminals IG and ACC 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 and ACC 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–27).**

OK →

Check and replace theft deterrent ECU.

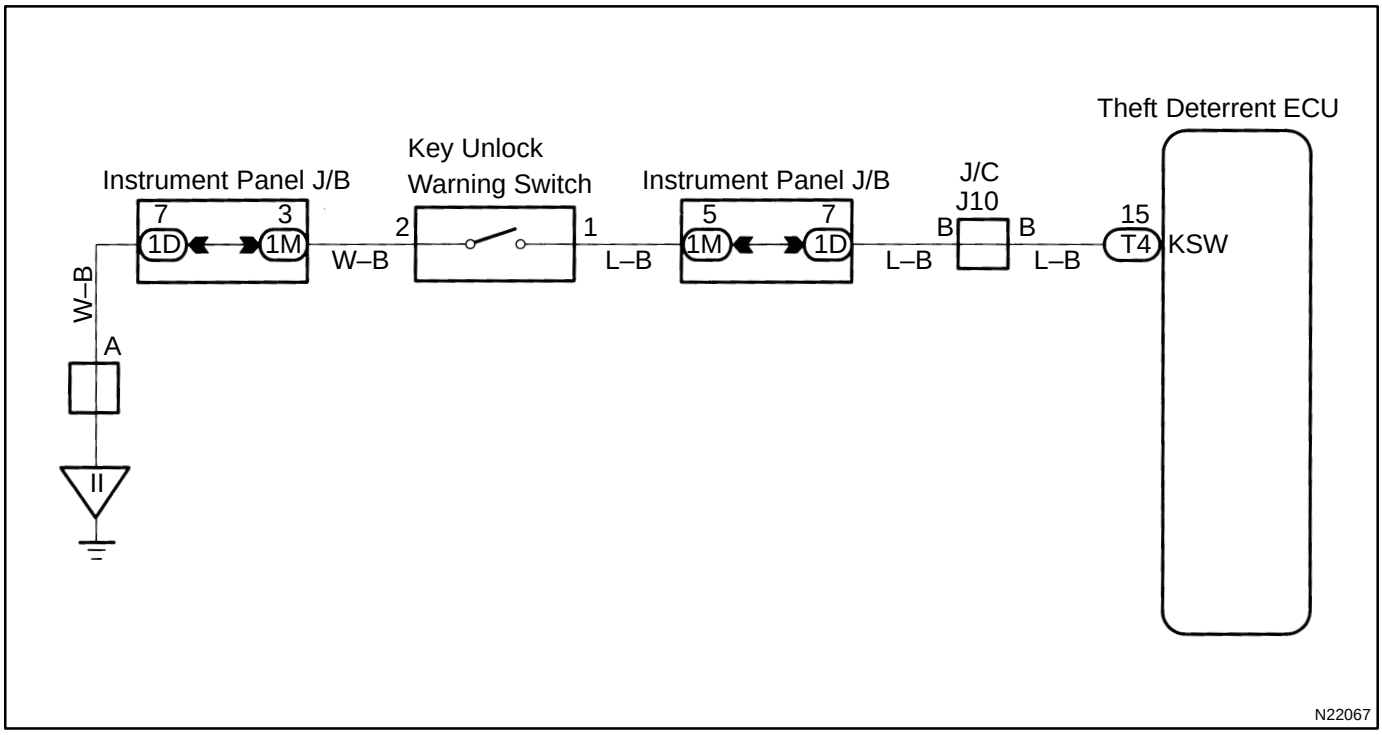
DI023–01

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

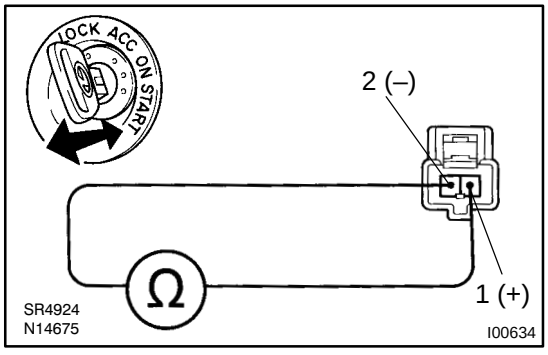
The key unlock warning switch goes on when the ignition key is inserted in the key cylinder and goes off when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is on.

WIRING DIAGRAM



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 to 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–27).**

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 on matrix chart (See page DI–405).

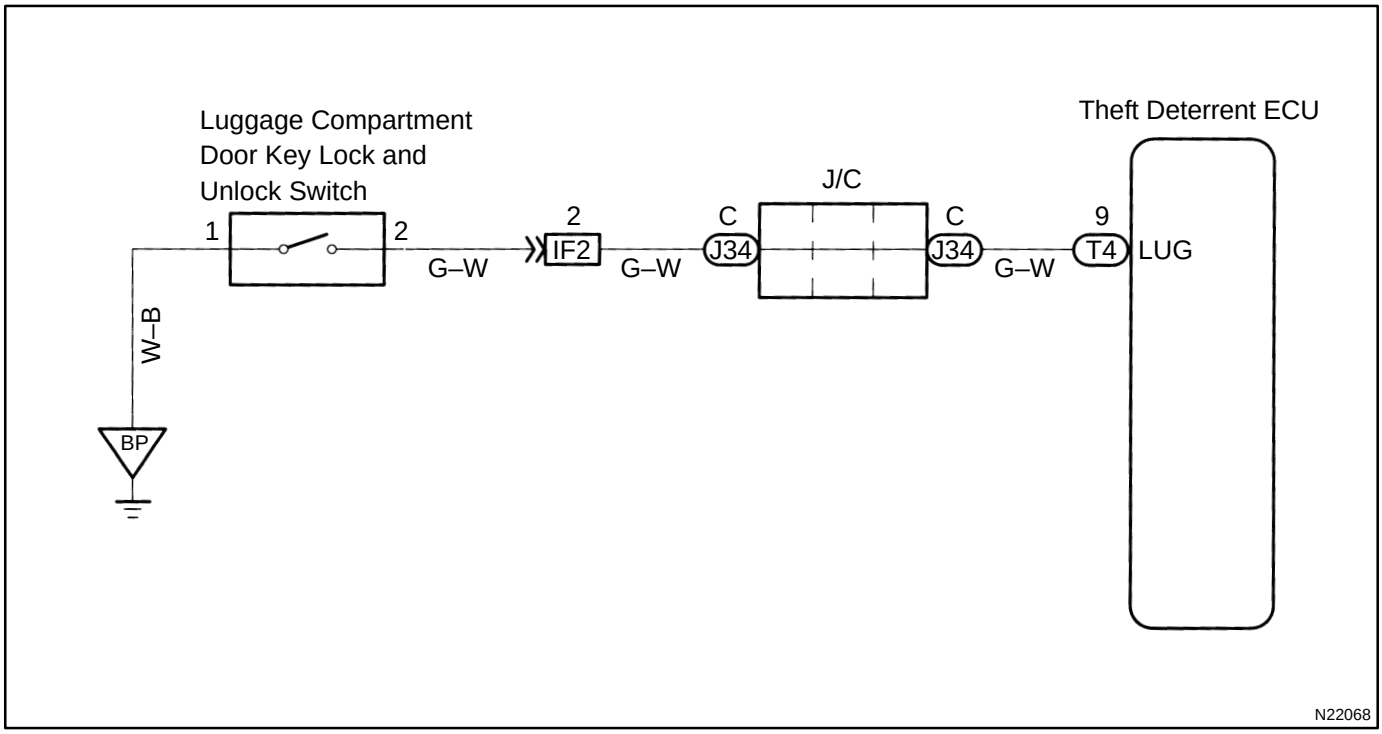
DI024–01

Luggage Compartment Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

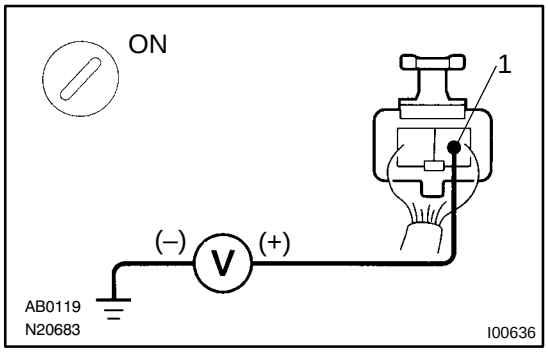
The luggage compartment door key lock and unlock switch goes on when the luggage compartment door key cylinder is turned to the unlock side with the key.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**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.

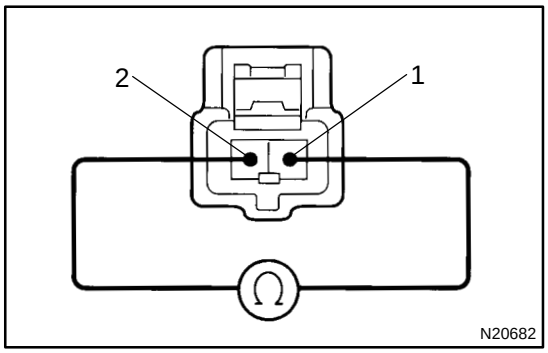
OK:

Key operation	Voltage
Turned to the unlock side	0 V
Not turned	Battery positive voltage

OK	**Check and replace theft deterrent ECU.*1**

NG

2	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

3	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–27).

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

OK

Check and replace theft deterrent ECU.

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on matrix chart (See page DI–405).

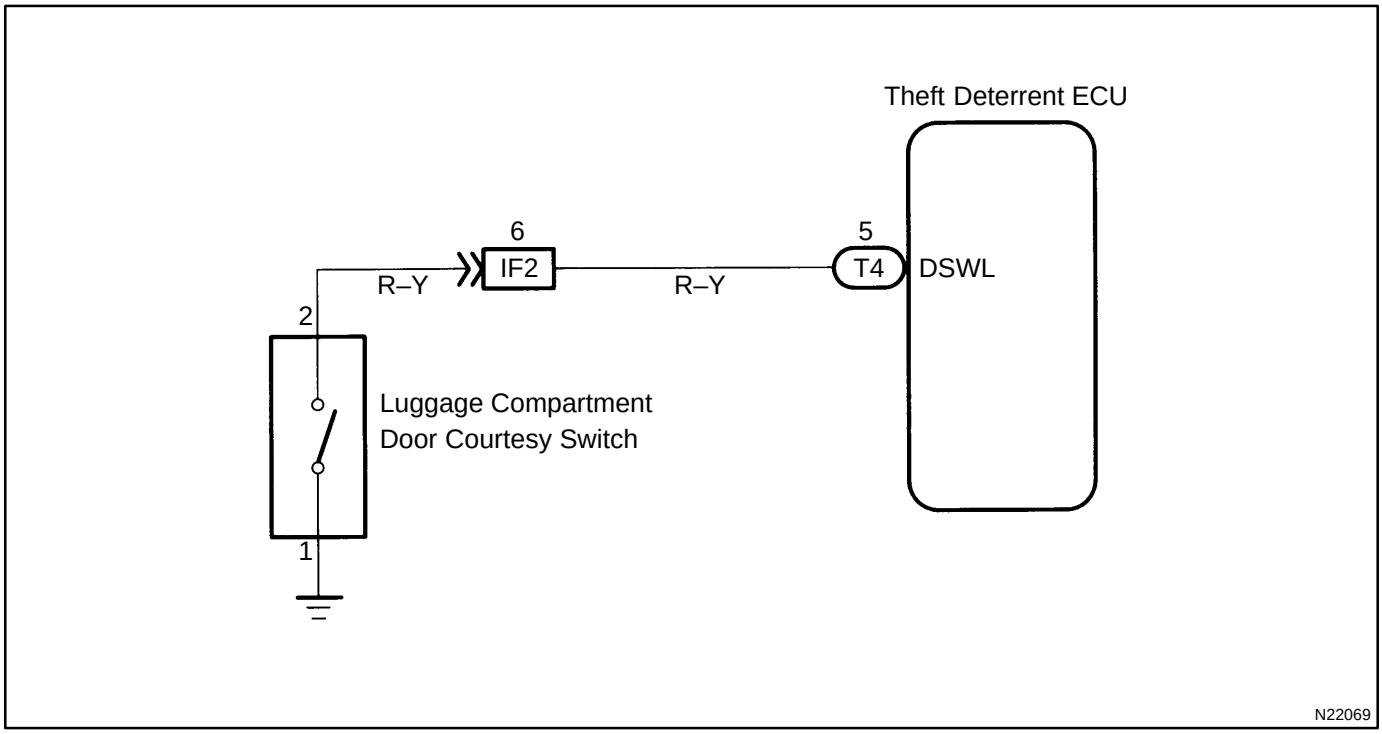
DI025–01

Luggage compartment Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The luggage compartment door courtesy switch goes on when luggage compartment door is opened and goes off when the luggage compartment door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of luggage compartment door courtesy light.**

CHECK:

Check that luggage compartment door courtesy light goes off when luggage compartment door courtesy switch is pushed, and comes on when switch is not pushed.

NG → **Check and repair luggage compartment door courtesy light circuit (See page BE–46).**

OK

2	**Check for open in harness and connector between theft deterrent ECU and luggage compartment door courtesy switch (See page IN–27).**

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

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 on matrix chart (See page DI–405).

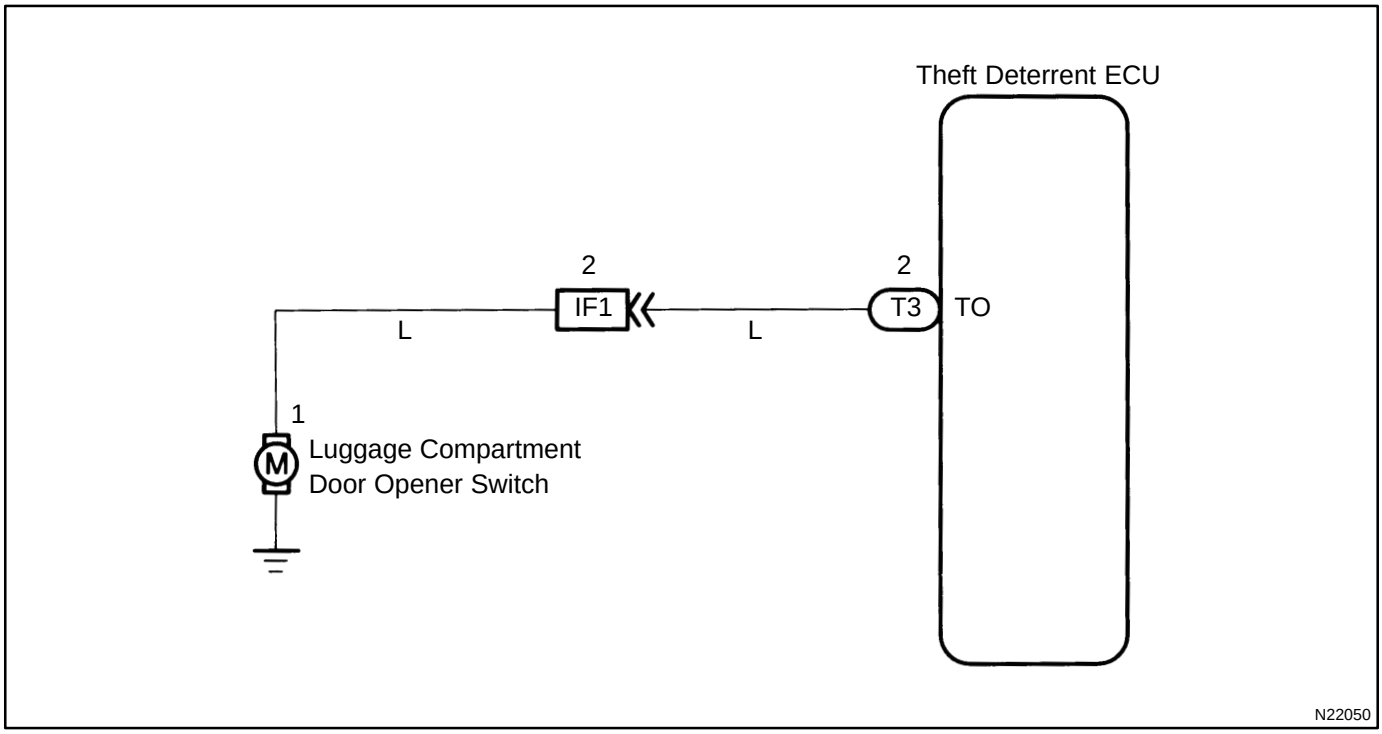
DI026–01

Luggage Compartment Door Opener Motor Circuit

CIRCUIT DESCRIPTION

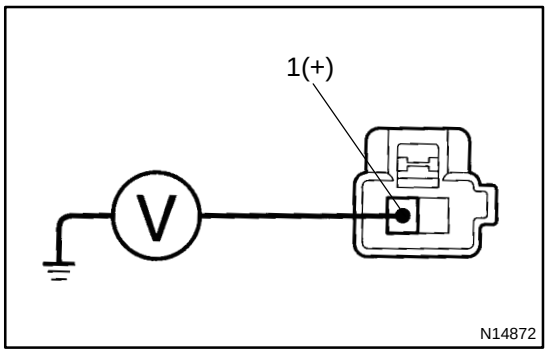
This circuit unlocks the luggage compartment door when the ECU sends signals to the luggage compartment door opener motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of luggage compartment door opener motor and body ground.**



PREPARATION:

Disconnect the courtesy switch and opener motor connector.

CHECK:

Measure voltage between terminal 1 of luggage compartment door opener motor and body ground, when opener switch is pulled and not pulled.

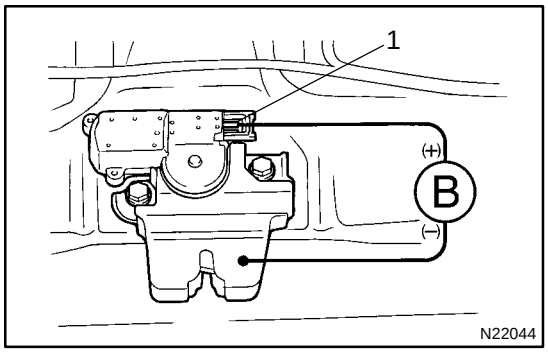
OK:

Opener switch	Voltage
Pulled	5 – 14 V
Not pulled	Below 1 V

NG	**Check harness and connectors between ECU and luggage compartment door opener motor (See page IN–27).**

OK

2	Check luggage compartment door opener motor.



PREPARATION:
Disconnect luggage compartment door courtesy switch and opener motor connector.
CHECK:
Connect positive (+) lead from the battery to terminal 1 and the negative (–) lead to the body ground.
OK:
Operated motor shaft and gear.
HINT:
Perform inspection in a short time (within 1 second).

NG → **Replace luggage compartment door opener motor.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–405).

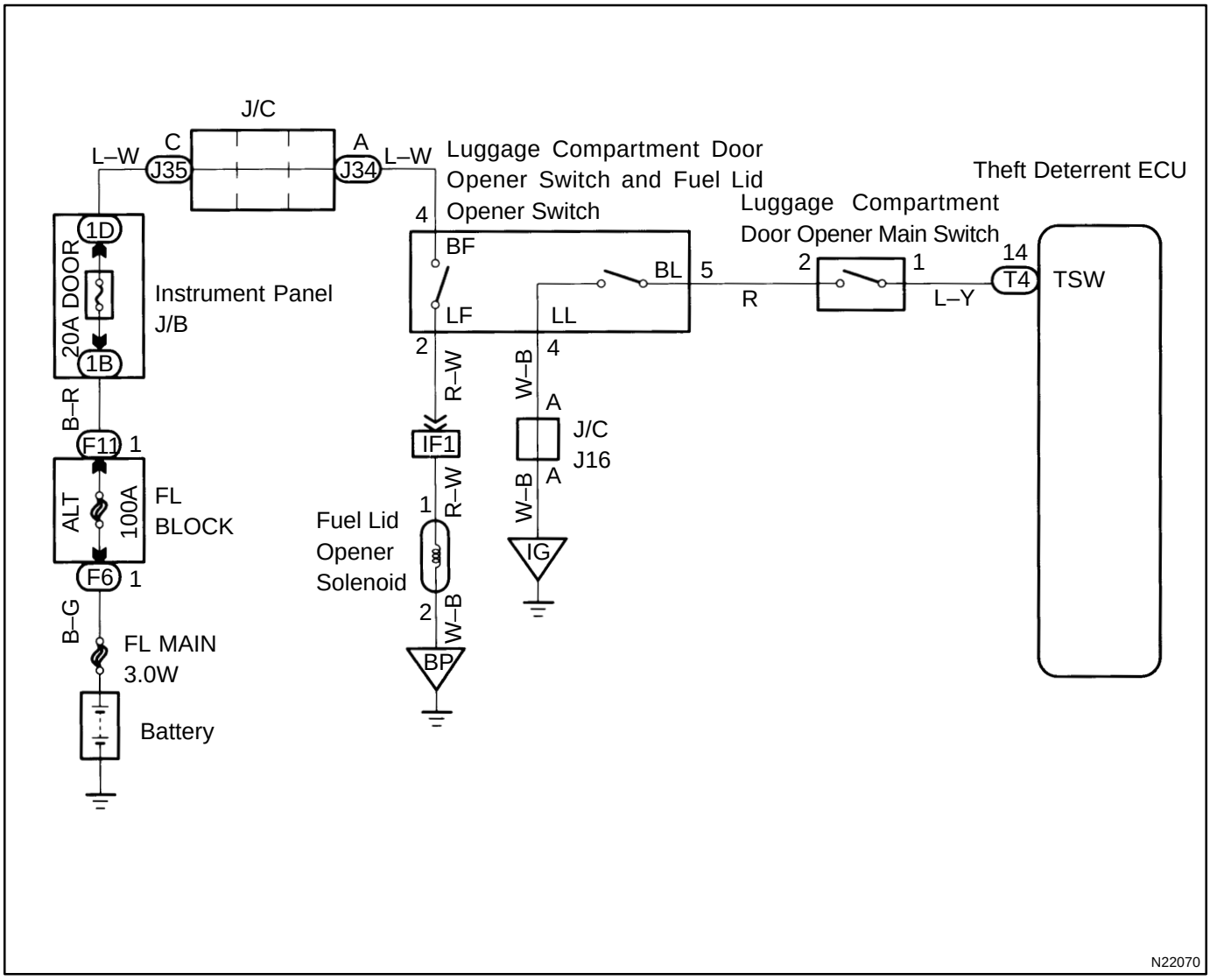
DI027–01

Luggage Compartment Door Opener Main Switch and Opener Switch Circuit

CIRCUIT DESCRIPTION

The luggage compartment door opener main switch is off when it is pushed in, and the luggage compartment door opener switch is on when it is pulled.
The ECU energizes the luggage compartment door opener solenoid only when the main switch and opener switch are together.

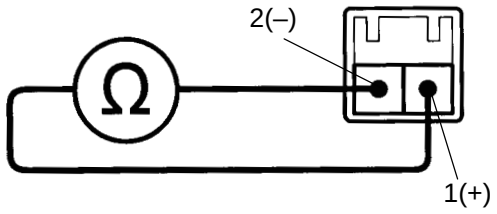
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check luggage compartment door opener main switch and opener switch.**

Luggage Compartment Door Opener Main Switch



PREPARATION:

Disconnect the luggage compartment door opener main switch and opener switch connector.

CHECK:

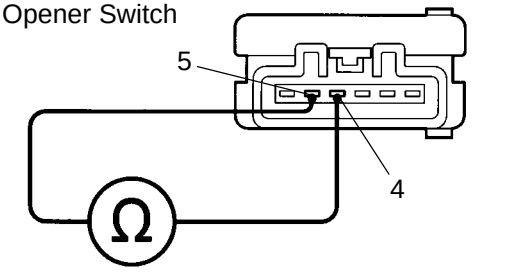
(a) Check luggage compartment door opener main switch.

(b) Check continuity between terminals of main switch connector.

OK:

Switch position	Tester connection	Specified condition
ON	1 – 2	Continuity
OFF	–	No continuity

Luggage Compartment Door Opener Switch



CHECK:

(a) Check luggage compartment door opener switch.

(b) Check continuity between terminals of main switch and opener switch connector.

OK:

Switch position	Tester connection	Specified condition
ON	4 – 5	Continuity
OFF	–	No continuity

NG → **Replace luggage compartment door opener main switch and/or opener switch.**

OK

2	**Check harness and connector between ECU and main switch, opener switch and body ground (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–405).

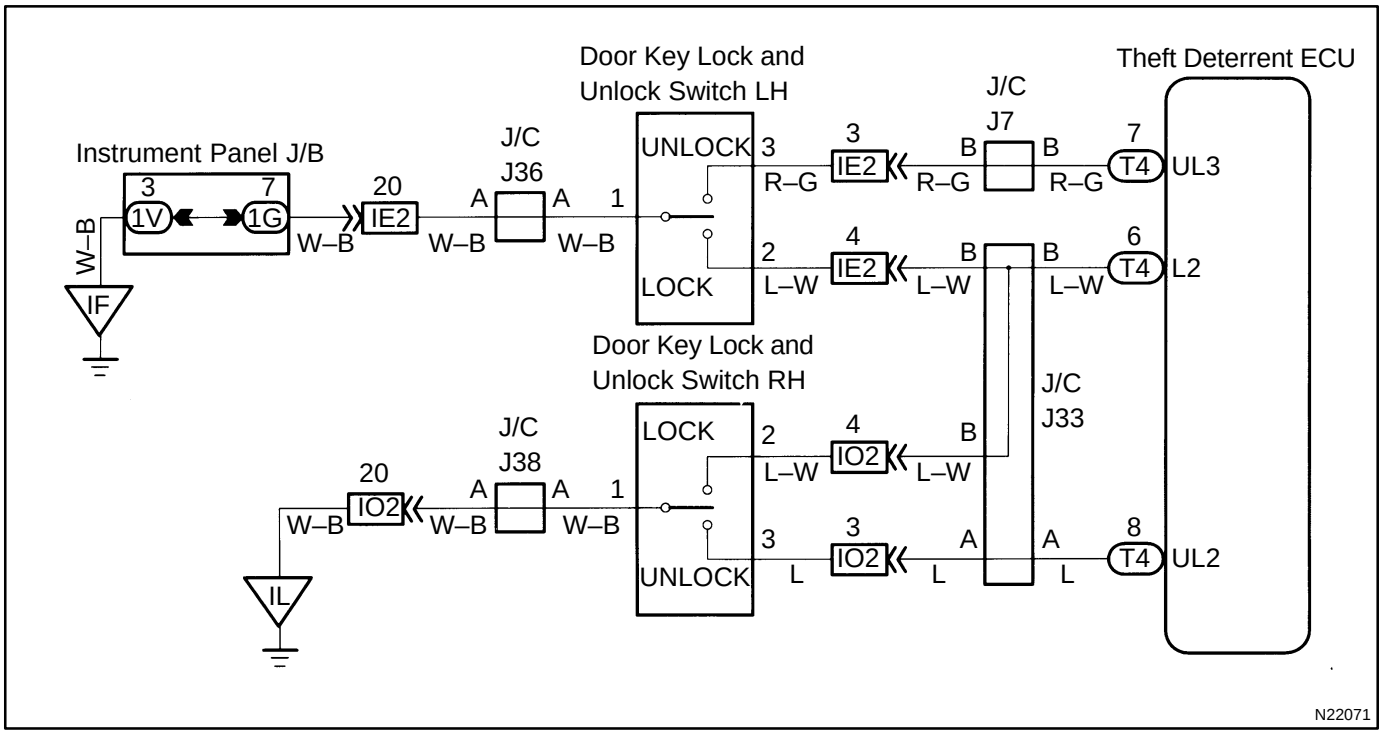
DI028–01

Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

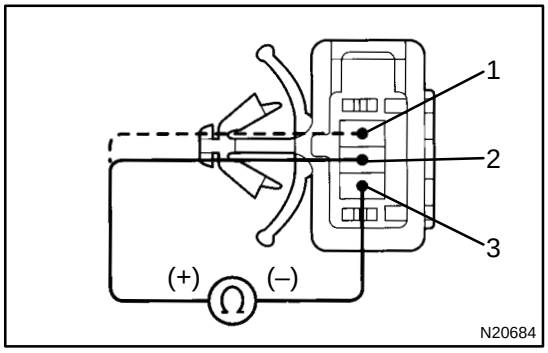
The door key lock and unlock switch is built in the door key cylinder. When the key is turned to the lock side, terminal 1 of the switch is grounded and when the key is turned to the unlock side, terminal 2 of the switch is grounded.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check door key lock and unlock switch.**



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect the door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1, 2 and 3 of door key lock and unlock switch connector, when door key lock and unlock switch is turned to the lock side, unlock side and not turned.

OK:

Switch position	Tester connection	Specified condition
Lock side	2 – 3	Continuity
Unlock side	1 – 3	Continuity
OFF	–	No continuity

NG → **Replace door key lock and unlock switch.**

OK

2	**Check harness and connectors between ECU and switch, switch and body ground (See page IN–27).**

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 on matrix chart (See page DI–405).

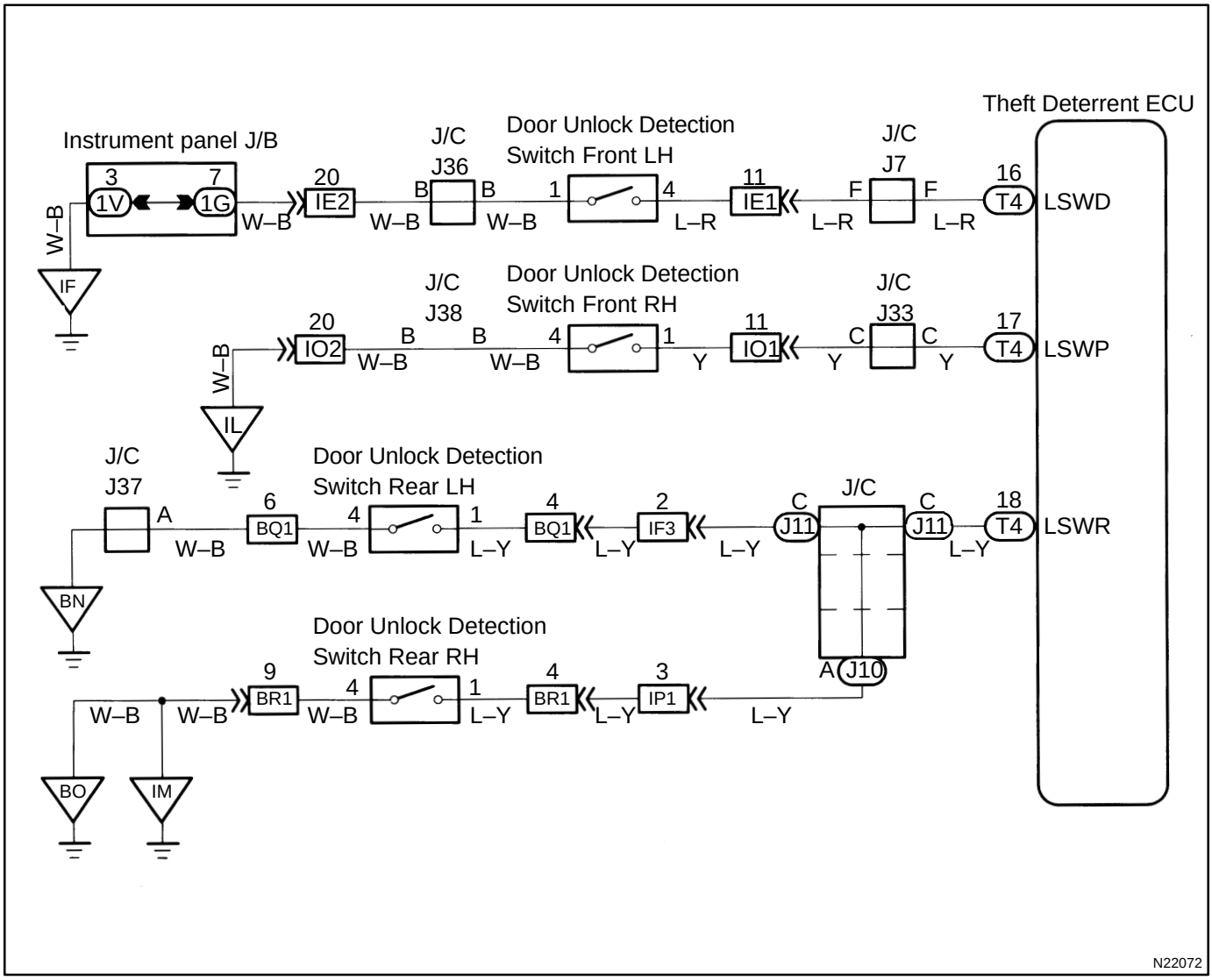
DI029–01

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

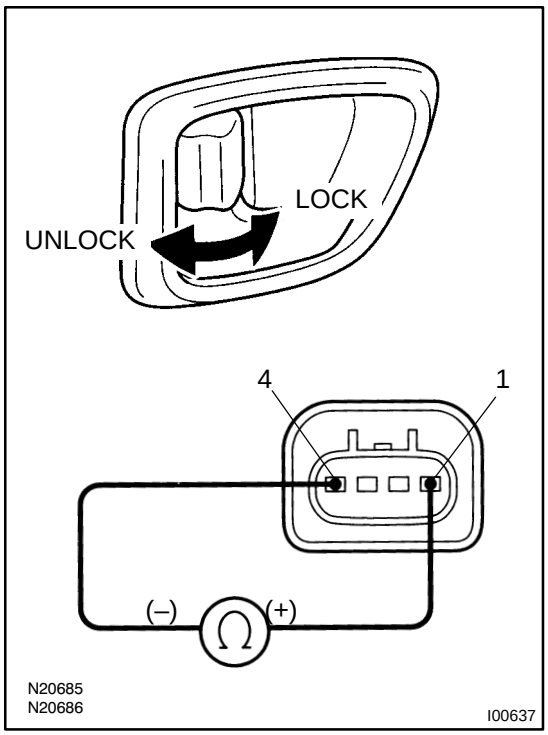
The door unlock detection switch is built in the door lock motor assembly. This switch is on when the door lock knob is in the unlock position and off when the lock knob is in the lock position. The ECU detects the door lock knob conditions is this circuit. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check Door Unlock Detection Switch.



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect door unlock detection switch connector.

CHECK:

Check continuity between terminals 1 and 4 of door unlock detection switch connector, when the door lock knob is operated to the lock side and unlock side.

OK:

Switch Condition	Tester connection	Specified condition
Door unlock	1 – 4	Continuity
Door lock	–	No continuity

NG → **Replace door unlock detection switch.**

OK ↓

2	Check harness and connectors between ECU and door unlock detection switch, door unlock detection switch and body ground (See page IN–27).

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 on matrix chart (See page DI–405).

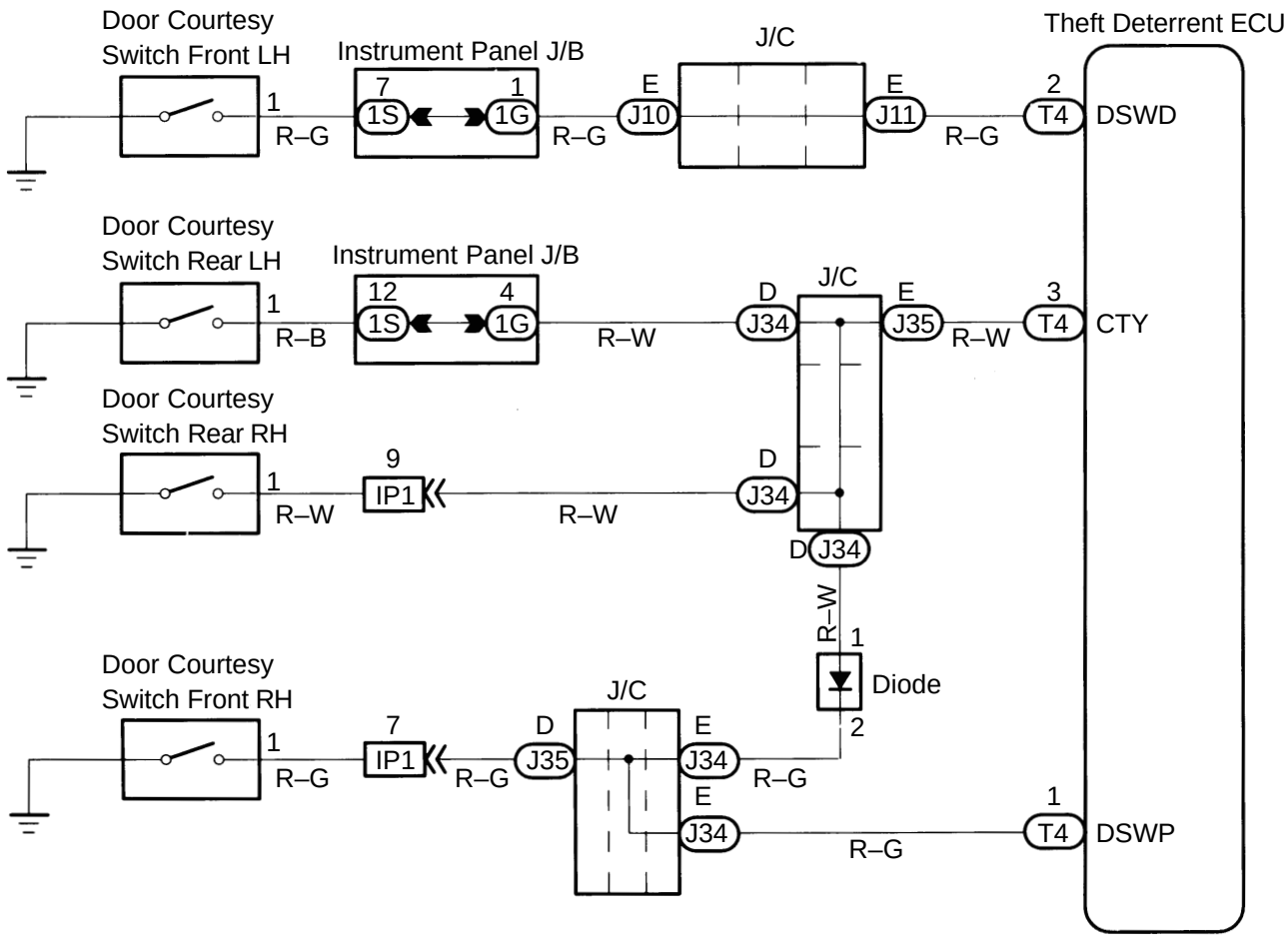
DI02A–01

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch goes on when the door is opened and goes off when the door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of open door warning light.**

CHECK:

Check that open door warning light comes on when each door is opened, and goes off when all doors are closed.

NG	**Check and repair open door warning light circuit.**

OK

2	**Check for open in harness and connector between theft deterrent ECU and door courtesy switch (See page IN–27).**

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 on matrix chart (See page DI–405).

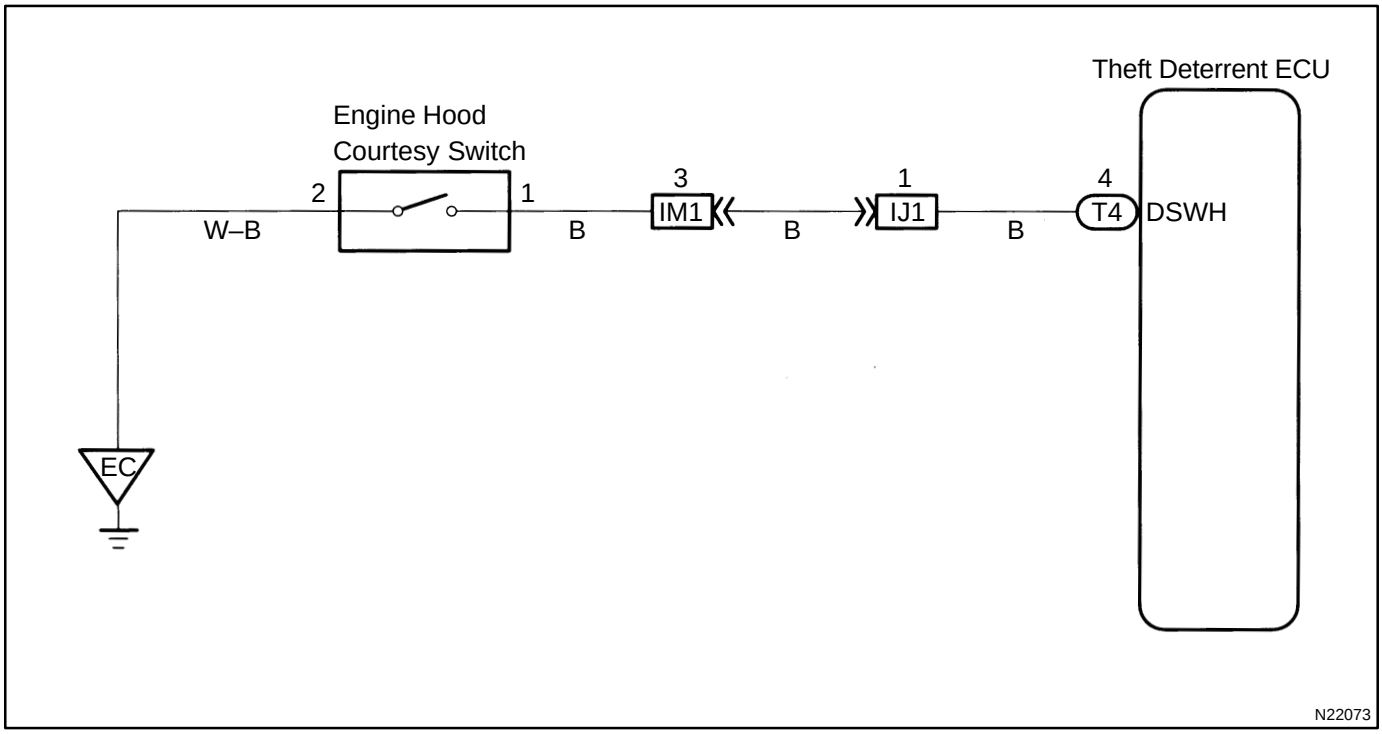
DI02B–01

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

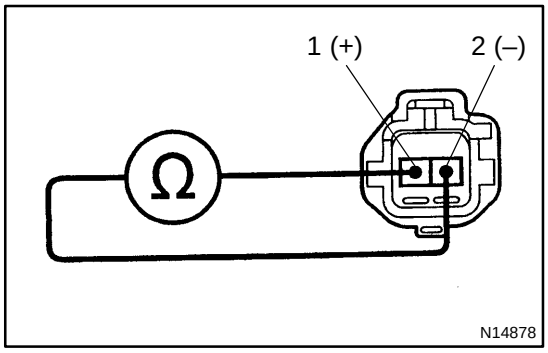
The engine hood courtesy switch is built into the engine hood lock assembly and goes on when the engine hood is opened and goes off when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**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

2	**Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page IN–27).**

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

OK

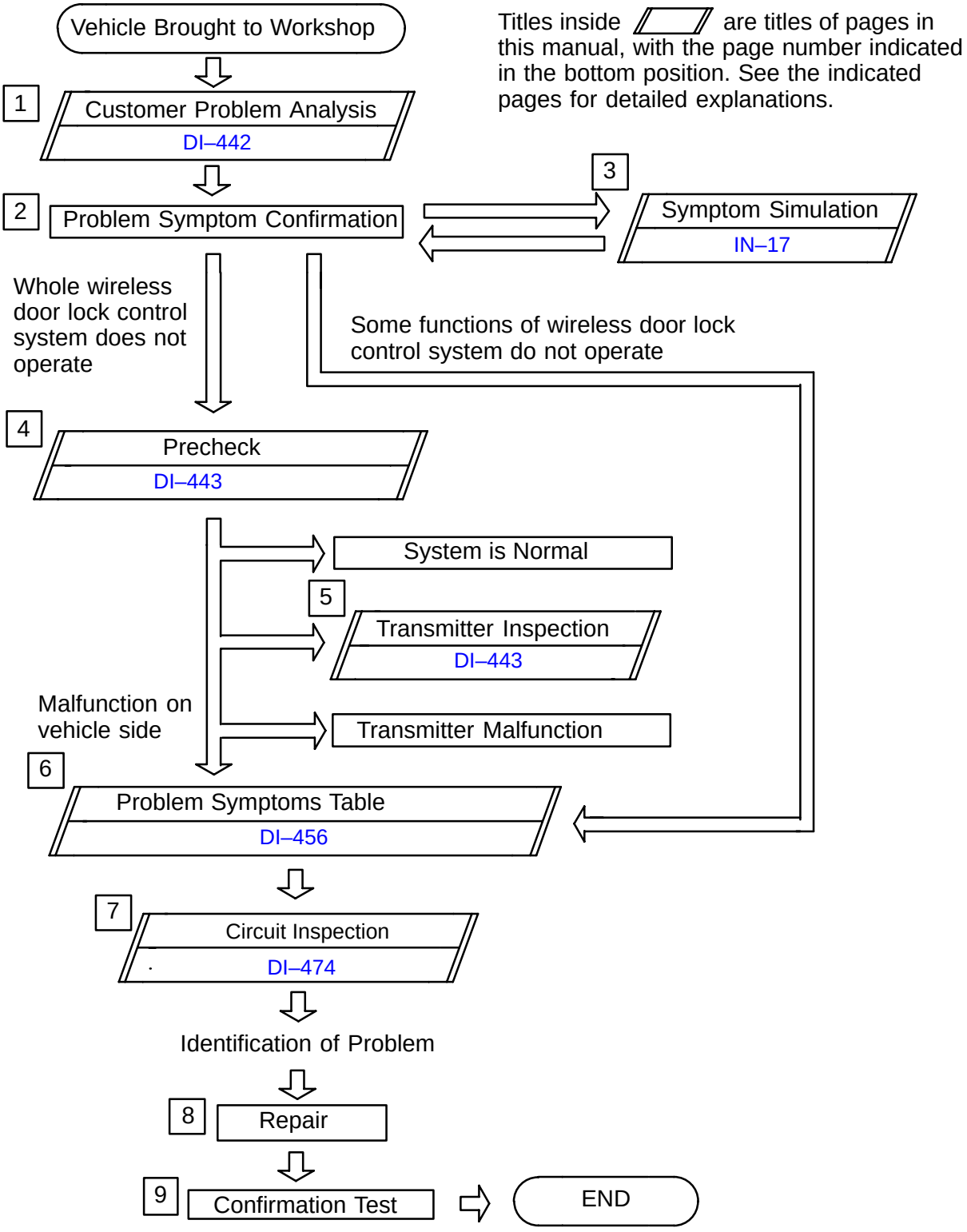
Check and replace theft deterrent ECU (See page IN–27).

WIRELESS DOOR LOCK CONTROL SYSTEM

DI0DQ–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.
Perform troubleshooting in accodnce with procedure on the following page.



DI0DR–01

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL 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 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))
	Place	☐ Everywhere ☐ Specific Locality( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptom	☐ Whole wireless door lock control system does not operate.	
	☐ Only door unlock operation is not possible.	
	☐ Only door lock operation is not possible.	
	☐ Only key confinement prevention function is not possible.	
	☐ Wireless door lock function operates even each door is opened.	
	☐ Wireless door lock function incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors unlock.)	☐ When RH door is unlocked ☐ When LH door is unlocked
	☐ Others	

DI0DS–01

PRE–CHECK

Wireless function (Remote control) will not operate.

To make the vehicle be in the initialized condition.
Initialized condition is the condition when the following conditions are satisfied.
(1) Key plate has not been inserted in the ignition key cylinder.
(2) All the doors are closed. (Door warning light is off.)
(3) All the doors are locked.
(4) The buzzer volume is maximum.

↓

Basic function check
With a standard operation, when repeating the operations of UNLOCK switch and LOCK switch three times or more alternately, check the operation of UNLOCK – LOCK from 3rd time onward.
□Following procedures are standard operation.
(1) Depart about 1 M to the right direction from the outside handle of a driver's seat.
(2) Point the transmitter toward the vehicle and press either of transmitter switch for about 1 sec.
<Reference>
As of the security function, even the wireless function is normal, there may be the case that only UNLOCK operation will not work.

No ↓

Yes ↓

Normal
<Reference>
□Operative distance may differ depends on the operator, the way of holding or the position.
□Because of the use of weak electric wave, in case of strong wave or noise in the frequency used, there may be the case that operative distance gets shorter.

No

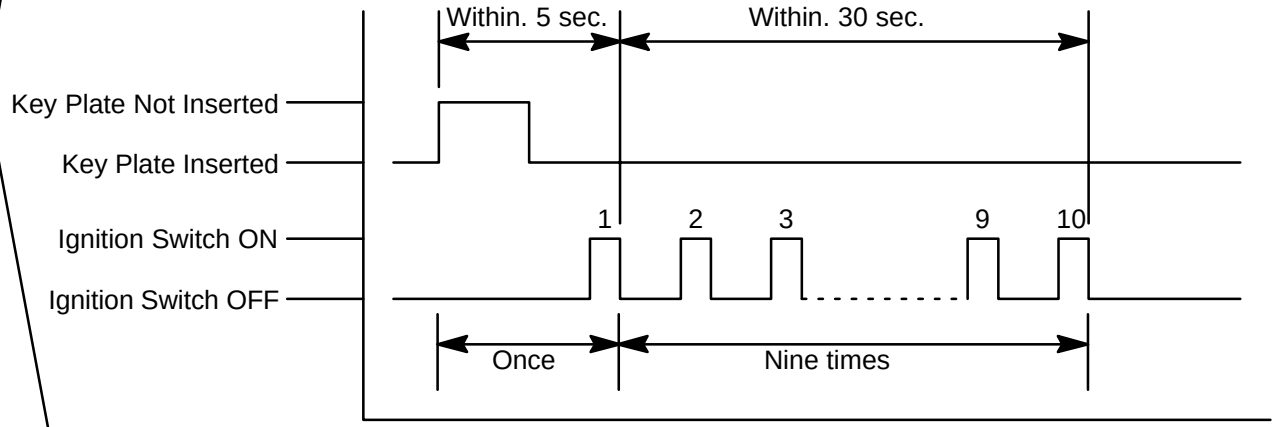
Transmitter battery check:
Charge the transmitter battery to a new or normal one, check UNLOCK operation of the transmitter with the standard operation.
<Reference>
☐New or normal battery is necessary.
☐Battery quality can be judged by checking the remnant volume of the battery.

Yes → Battery faulty.

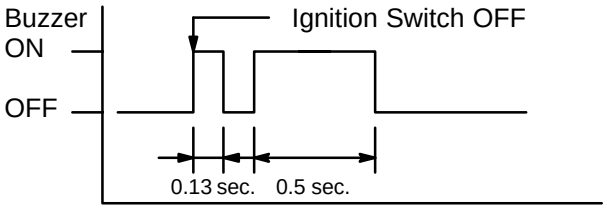
No

To make the vehicle be in the initialized condition.

Enter diagnostic mode:
If operation the wireless door lock ECU in the order of 1 through 2, the mode turns to diagnostic mode.
(1) Insert the key plate into the ignition key cylinder and pull out, then insert it again and turn the ignition switch OFF → ON → OFF 1 time.
(2) After completing the procedure (1) and within 30 seconds, turn the ignition switch OFF to ON to OFF nine times.
<Reference>
☐In the case that either one of (1) and (2) conditions is not satisfied, transfer to normal mode.



Diagnostic mode operation confirmation:
Check the buzzer output soon after the input operation of self diagnostic mode.



<Reference>
□Buzzer volume should be maximum despite the controller.

No

Is the method to input the diagnostic mode correct?

No

Not enter in diagnostic mode

Yes

Is the function of operation confirmation buzzer normal?

No

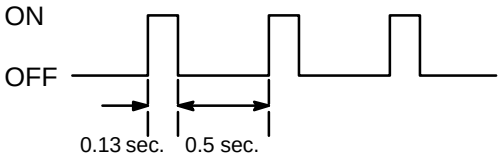
Buzzer faulty

Yes

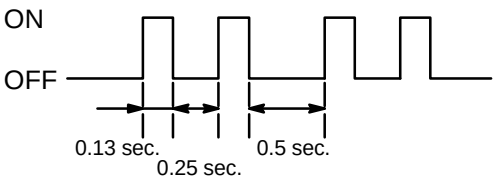
Yes

Confirmation of diagnostic mode:
Check buzzer output when pressing on each switch of transmitter.

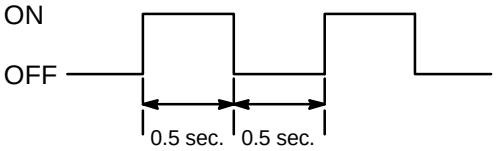
(1) Received normal wave of LOCK switch.



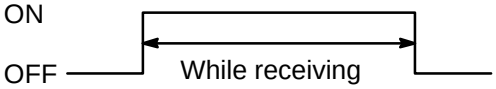
(2) Received normal wave of UNLOCK switch.



(3) Received normal wave of TRUNK switch.



(4) Compatibility of the recognition code or out from synchronization of rolling code.*.

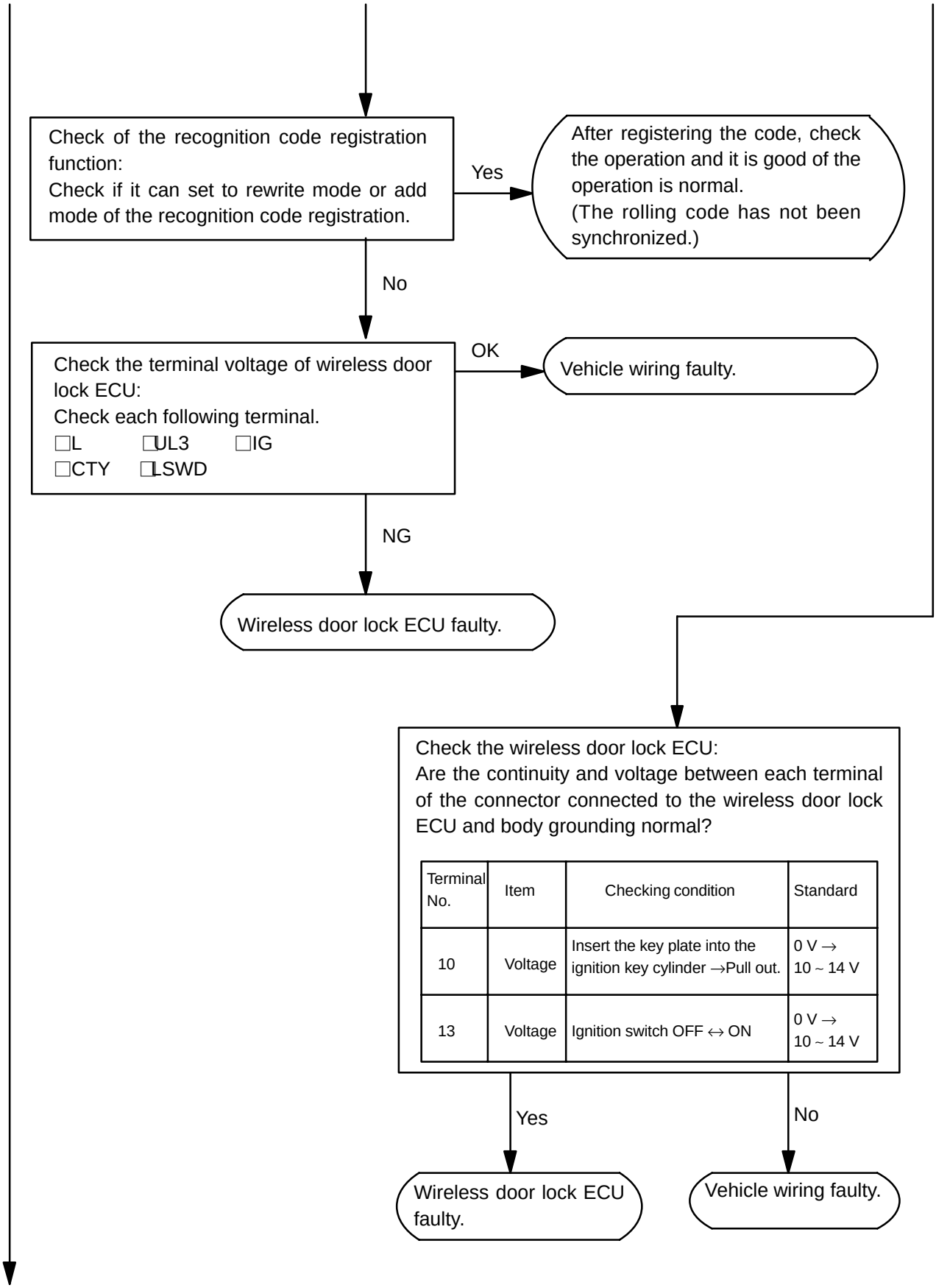


No response

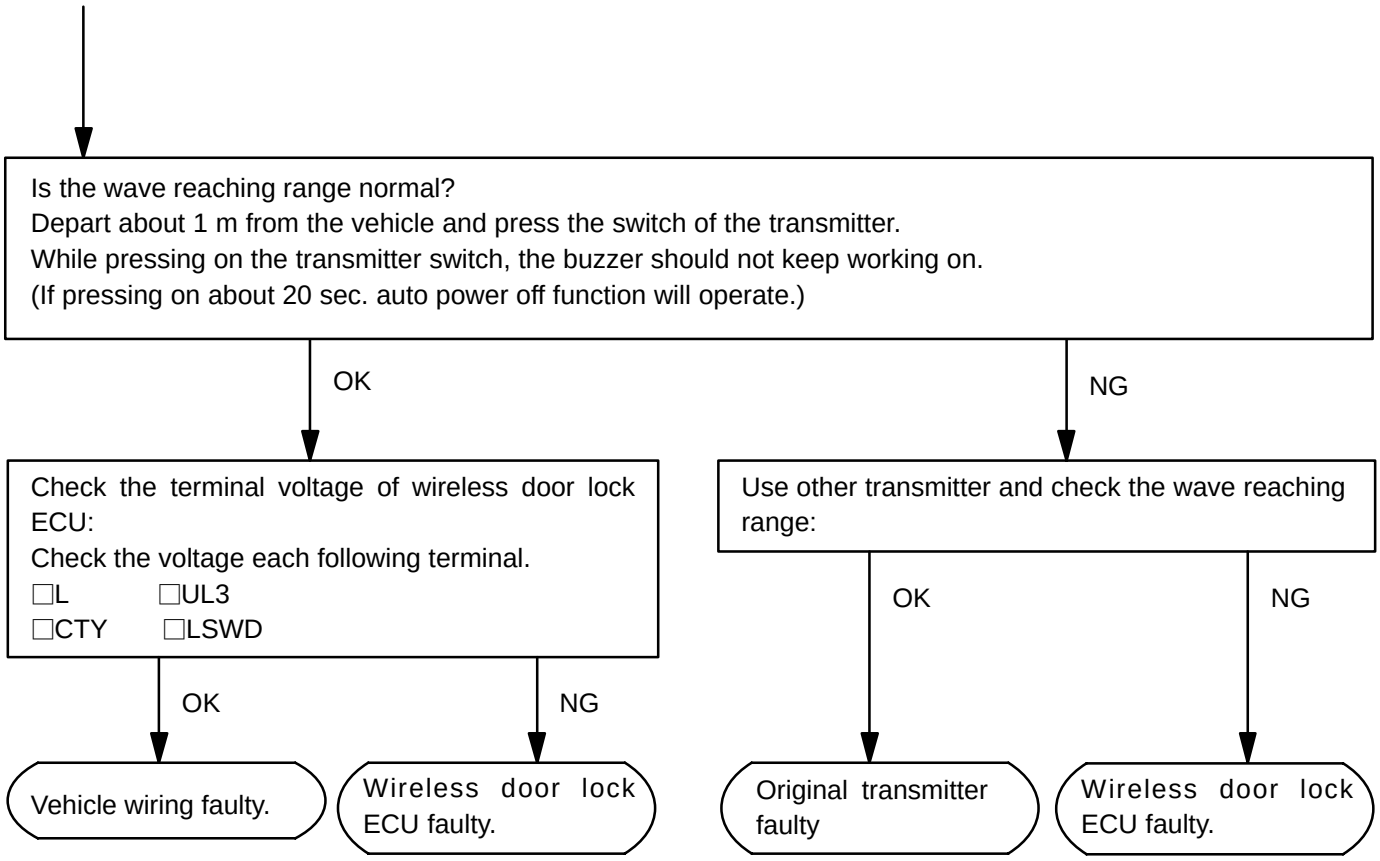
Transmitter faulty or wireless door lock ECU faulty.
<Reference>
□Use other (normal) transmitter and check with the diagnostic mode and in the case that the check result shows the transmitter faulty, it can be judged that wireless door lock ECU is normal.

In case of buzzer outputs from (1) ~ (3)

In case of buzzer outputs of (4)



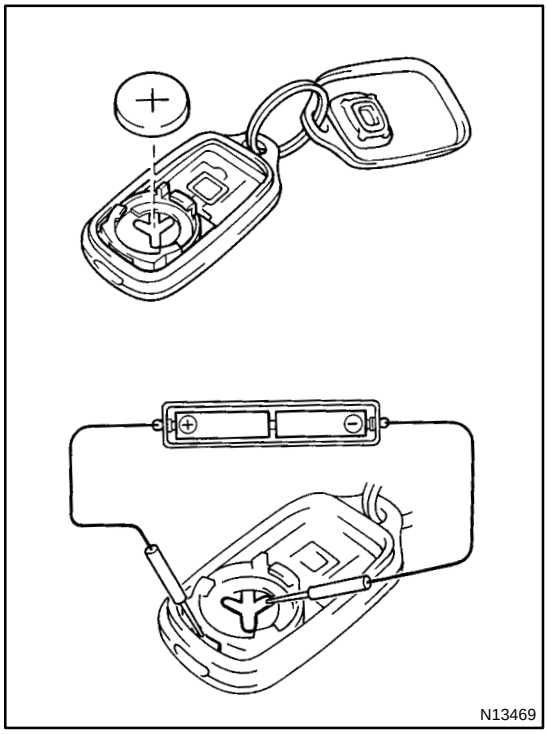
Terminal No.	Item	Checking condition	Standard
10	Voltage	Insert the key plate into the ignition key cylinder →Pull out.	0 V → 10 ~ 14 V
13	Voltage	Ignition switch OFF ↔ ON	0 V → 10 ~ 14 V



HINT: The rolling code is the code changing at each time when the wave is transmitted from the transmitter and is changing synchronized between transmitter side and ECU side.
When the rolling code is not synchronized between the transmitter and ECU, a symptom of ”Only LOCK operation is available.”appears.
In this case, it goes back to normal by synchronizing the rolling code.
(The method to synchronize it is the same as of the registration of the recognition code.)

1. TRANSMITTER INSPECTION

1	**Check the transmitter operation.**



HINT:
This inspection is not directly for the purpose of checking the capacity of the transmitter battery, but is performed when remote control operation becomes difficult or impossible, in order to ascertain if this is caused by low battery capacity.

PREPARATION:

(a) Using a screwdriver, pry outward the cover.
(b) Remove the battery.

CHECK:

(a) Connect 4 new 1.5 V dry–cell batteries in series. Connect the battery ~ terminal to the battery receptacle side terminal and the battery ⊖ terminal to the bottom terminal to provide 6 V to the transmitter.
(b) Push the wireless door lock remote control switch on the side of the transmitter body and operate the door lock by remote control.

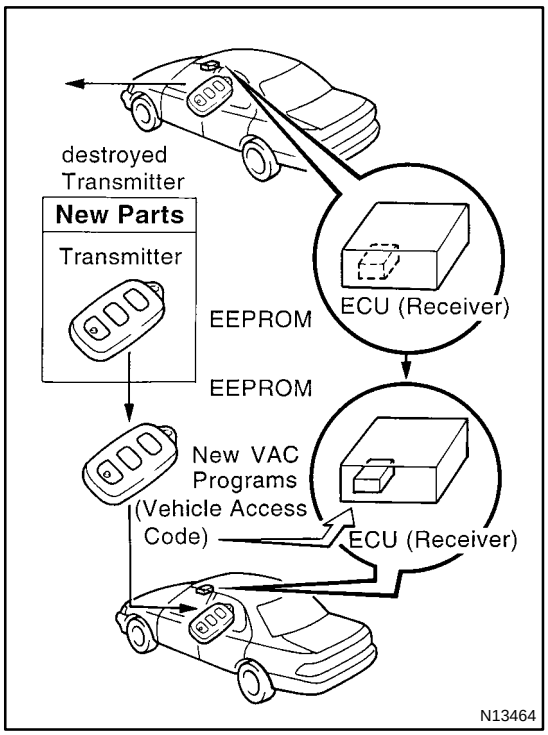
OK:

Remote control operation possible.

OK → **Replace the battery for transmitter (See page DI–443).**

NG

Replace transmitter and registration of recognition code (See page DI–443).



2. WIRELESS DOOR LOCK ECU AND TRANSMITTER REPLACEMENT

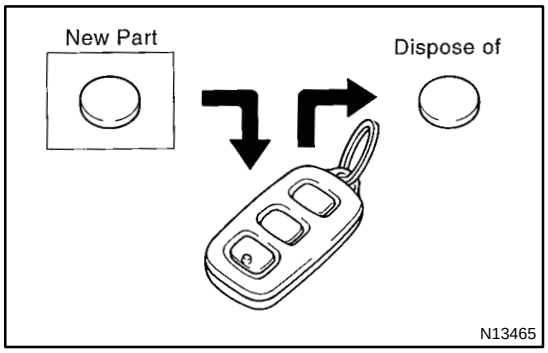
Disassembly and assembly of the transmitter includes details of spare parts and replacement procedure for detective parts found through troubleshooting.

Each part is a precision electronic component so handle with care.

(a) SPARE PARTS AND REPLACEMENT PROCEDURE FOR MALFUNCTIONING PARTS:

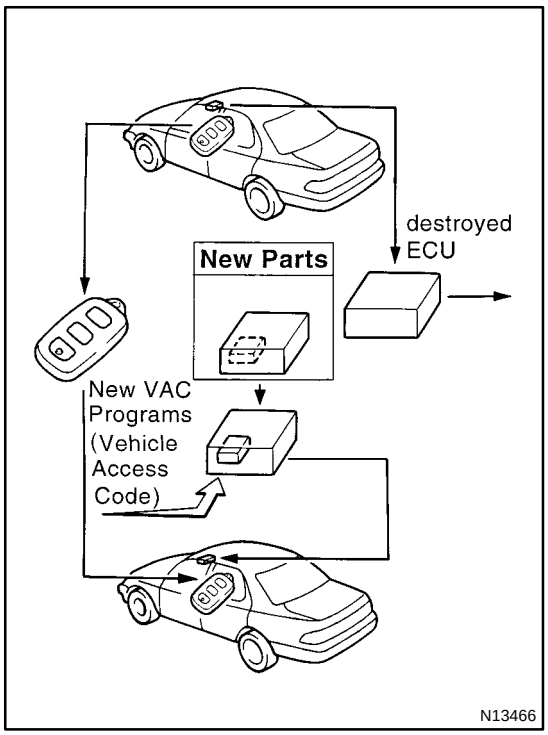
○ **For malfunctioning transmitter:**

(1) Prepare a new transmitter.
(2) Registration of recognition code.
(3) Check that door lock remote control operation works.



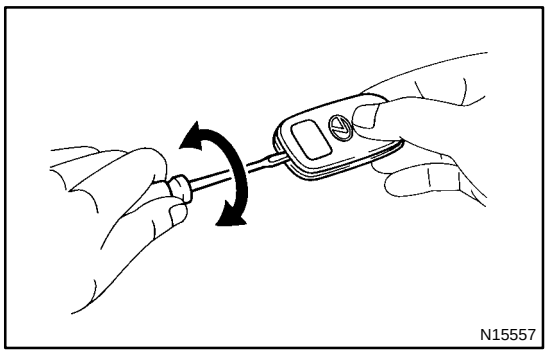
○ **For malfunctioning battery:**

(1) Prepare a new battery.
(2) Remove the battery from transmitter.
(3) Install a new battery into transmitter.

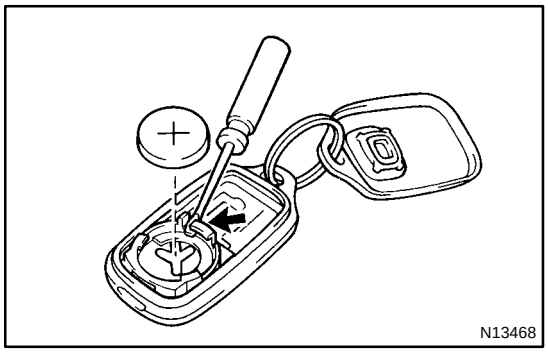


○ **For malfunctioning ECU:**

(1) Prepare a new ECU.
(2) Remove the ECU from the vehicle.
(3) Install a new ECU in the vehicle.
(4) Registration of recognition code.



(b) REPLACE BATTERY FOR TRANSMITTER
(1) Using a screwdriver, pry outward the cover.



(2) Remove the battery.
(3) Set a new battery into the transmitter.
(4) Install the cover to the transmitter.

3. REGISTRATION OF RECOGNITION CODE

Follow the flow chart on the following page to register the transmitter recognition code with the wireless door lock ECU.
HINT:

- If the prescribed conditions are not entered while registering the transmitter code, the wireless door lock ECU returns to normal operation.
- There are 4 modes: add mode, rewrite mode, confirmation mode and erase mode; the mode to use is decided after the recognition code is registered.
- If maximum of 4 recognition codes can be registered.

REFERENCE:

- The add mode is used to retain codes already registered while you register new recognition codes.
  However, if the number of registered codes exceeds 4 codes, previous registered codes are correspondingly erased in order, starting from the first registered code.
- The rewrite mode is used to erased all previous registered codes before registering new recognition codes. This mode before registering new transmitter or wireless door lock ECU.
- The confirmation mode is for confirming how many recognition codes are already registered before you register additioned recognition codes.
- The erase mode is used to erase all registered modes and cancels the wireless door lock operates. Use this mode when the transmitter is lost.

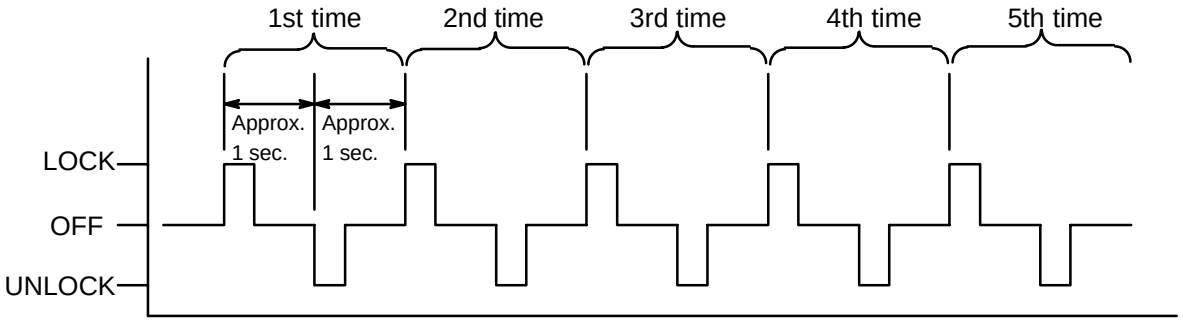
Start registration of recognition code

The vehicle should be as follows.
☐The key is not inserted in the ignition key cylinder.
☐Driver's door is OPEN. (Other doors are CLOSED)
☐Driver's door is UNLOCKED.

Insert the key into the ignition key cylinder, then remove it.

Within 40 secs.

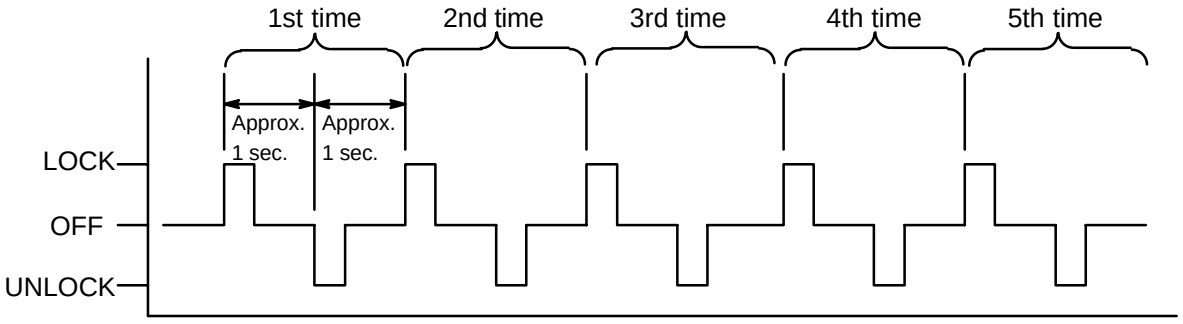
Using the door control switch (for manual operation) move the switch 5 times to LOCK/UNLOCK at approx. 1 sec. intervals.



Close the driver's door, then open it.

Within 40 secs.

Again using the door control switch (for manual operation), move the switch 5 times to LOCK/UNLOCK at approx. 1 sec. intervals.

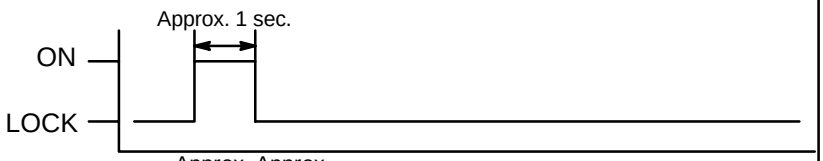


Insert the key into the ignition key cylinder.

Turn the ignition switch from ON to LOCK at approx. 1 sec. intervals for 1 to 5 times according to the desired mode.

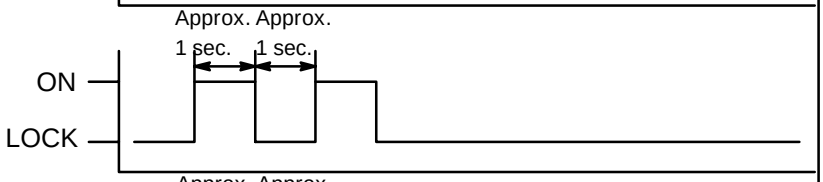
Add mode

ON – LOCK change occurs 1 time



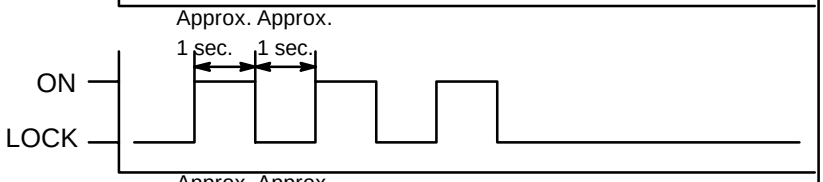
Rewrite mode

ON – LOCK change occurs 2 times



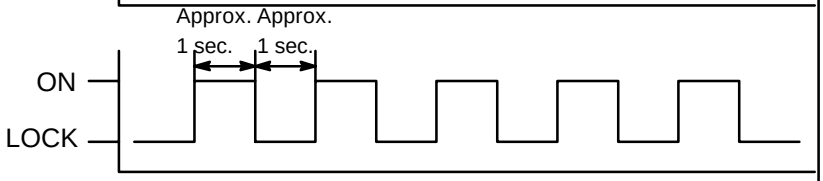
Confirmation mode

ON – LOCK change occurs 3 times



Erase mode

ON – LOCK change occurs 5 times



Remove the key from the ignition key cylinder.

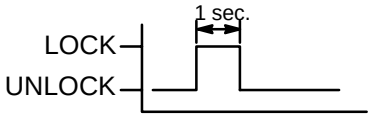
Within 20 secs.

When add mode, rewrite mode or erase mode been selected.

The receiver automatically performs the LOCK–UNLOCK operation once, twice or 5 times at 1 sec. intervals to inform the technician whether the add mode, rewrite mode or erase mode has been selected.

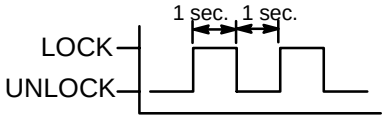
LOCK–UNLOCK occurs once

Indicates that add mode has been selected.



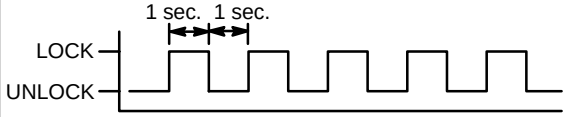
LOCK–UNLOCK occurs twice

Indicates that rewrite mode has been selected.



LOCK–UNLOCK occurs 5 times

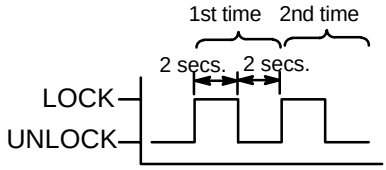
Indicates that erase mode has been selected.



When confirmation mode is selected.

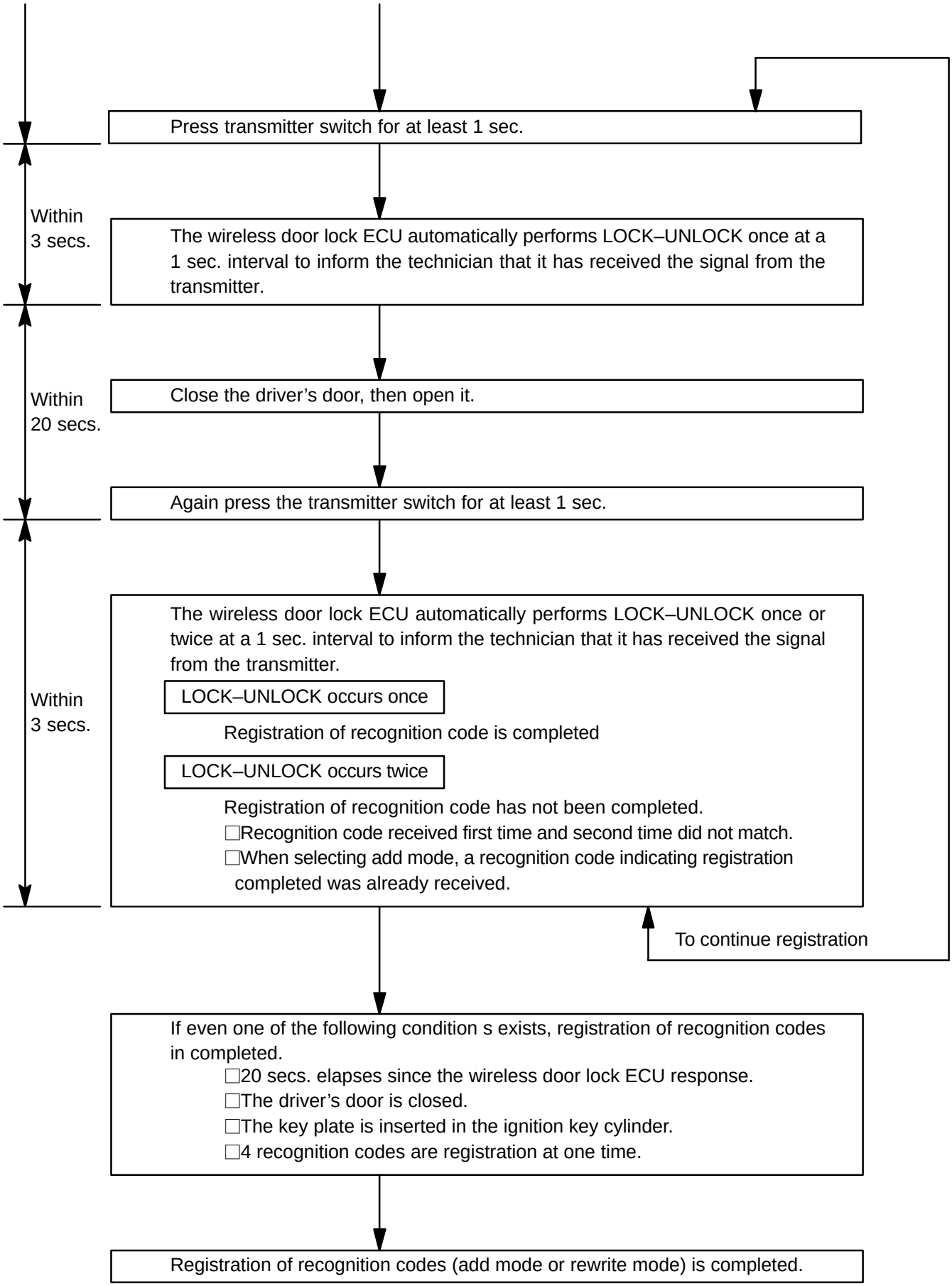
The receiver automatically performs the LOCK–UNLOCK operation 0 to 4 times at 2 sec. intervals to inform the technician of the number of registered codes.

Example:
LOCK–UNLOCK occurs twice:
2 recognition codes are registered.



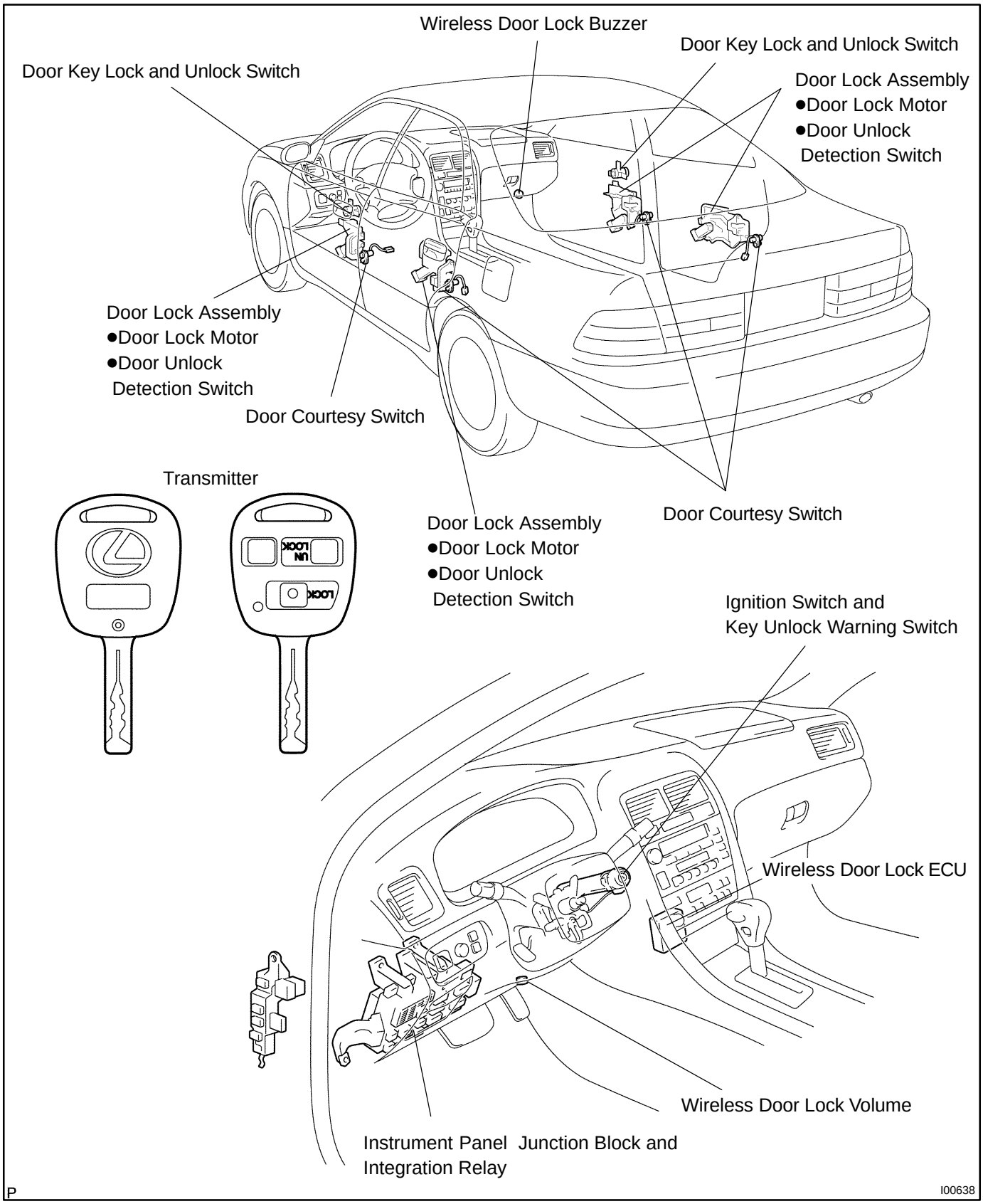
Erase Mode

Registration of recognition code (Confirmation mode) and erase mode completed.


Press transmitter switch for at least 1 sec.
Within 3 secs.
The wireless door lock ECU automatically performs LOCK–UNLOCK once at a 1 sec. interval to inform the technician that it has received the signal from the transmitter.
Within 20 secs.
Close the driver's door, then open it.
Again press the transmitter switch for at least 1 sec.
Within 3 secs.
The wireless door lock ECU automatically performs LOCK–UNLOCK once or twice at a 1 sec. interval to inform the technician that it has received the signal from the transmitter.
LOCK–UNLOCK occurs once
Registration of recognition code is completed
LOCK–UNLOCK occurs twice
Registration of recognition code has not been completed.
□Recognition code received first time and second time did not match.
□When selecting add mode, a recognition code indicating registration completed was already received.
To continue registration
If even one of the following condition s exists, registration of recognition codes in completed.
□20 secs. elapses since the wireless door lock ECU response.
□The driver's door is closed.
□The key plate is inserted in the ignition key cylinder.
□4 recognition codes are registration at one time.
Registration of recognition codes (add mode or rewrite mode) is completed.

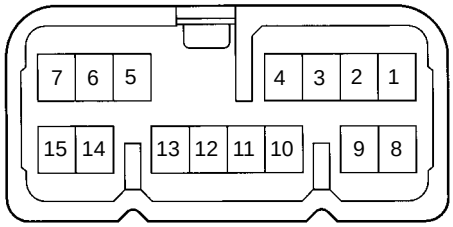
DI0DT–03

PARTS LOCATION



DI0DU–01

TERMINALS OF ECM



I00227

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
2 – 3 (BZR2 – BZR)	Y – B	Buzzer does not sound.	Below 1 V
		Buzzer sounds.	8 – 10 V
4 – Ground (TRLY – Ground)	G – R	Taillight does not light up.	Below 1 V
		Taillight light up.	8 – 10 V
5 – Ground (T – Ground)	G – W	Luggage compartment door key operated switch ”ON”.	Below 1 Ω
		Luggage compartment door key operated switch ”OFF”.	1MΩ or higher
7 – Ground (UL3 – Ground)	R – G	Door key lock and unlock switch ”UNLOCK”. (Driver’s Door)	Below 1.5 V
		Door key lock and unlock switch ”LOCK”. (Driver’s Door)	8 – 10 V
8 – Ground (+B – Ground)	R	Always.	10 – 14 V
10 – Ground (KSW – Ground)	L– B	Key unlock warning switch ”ON”. (Ignition key is inserted into key cylinder)	Below 1 V
		Key unlock warning switch ”OFF”. (Ignition key pull out key cylinder)	10 – 14 V
11 – Ground (LSWD – Ground)	L – R	Door unlock detection switch ”ON”.	Below 1 V
		Door unlock detection switch ”OFF”.	10 – 14 V
13 – Ground (IG – Ground)	B – R	Turn the ignition switch ”OFF” or ”ACC”.	Below 1 V
		Turn the ignition switch ”ON”.	10 – 14 V
14 – Ground (CTY – Ground)	R – W	Door courtesy switch ”ON”.	Below 1 V
		Door courtesy switch ”OFF”.	10 – 14 V
15 – Ground (L – Ground)	L – W	Door key lock and unlock switch ”LOCK”.	Below 1 V
		Door key lock and unlock switch does not”OFF” or ”UNLOCK”.	8 – 10 V

DI0DV–01

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuit for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

- Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system and theft deterrent system are operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system and theft deterrent system are operating normally.
- 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 reappears even through there are no abnormalities in any of the other circuits, check and replace the Wireless Door Lock ECU as the last step.

Symptom	Suspect Area	See page
All function of wireless door lock control system do no operate.	1. ECU Power Source Circuit. 2. Ignition Switch Circuit. 3. Door Courtesy Switch Circuit. 4. Door Key Lock and Unlock Switch Circuit. (Unlock Side) 5. Door Key Lock and Unlock Switch Circuit. (Lock Side) 6. Key Unlock Warning Switch Circuit. 7. Wireless Door Lock ECU.	DI–457 DI–459 DI–469 DI–463 DI–465 DI–467 IN–27
Only door unlock operation is not possible (Lock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Unlock Side) 2. Door Unlock Detection Switch Circuit 3. Wireless Door Lock ECU.	DI–463 DI–461 IN–27
Only door lock operation is not possible (Unlock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Lock Side) 2. Wireless Door Lock ECU	DI–465 IN–27
Only transmitter misoperation prevention function is not possible.	1. Key Unlock Warning Switch Circuit 2. Wireless Door Lock ECU	DI–465 IN–27
Wireless door lock function operates even when each door is opened.	1. Door Courtesy Switch Circuit 2. Wireless Door Lock ECU	DI–469 IN–27
Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors unlock.)	1. Door Unlock Detection Switch Circuit 2. Wireless Door Lock ECU	DI–461 IN–27
Wireless door lock operates, but the buzzer does not sound.	1. Wireless Door Lock Buzzer Circuit 2. Wireless Door Lock ECU	DI–471 IN–27
Wireless door lock operates, but the taillight does not respond.	1. Taillight Relay Circuit 2. Wireless Door Lock ECU	DI–457 IN–27

DI0DW–01

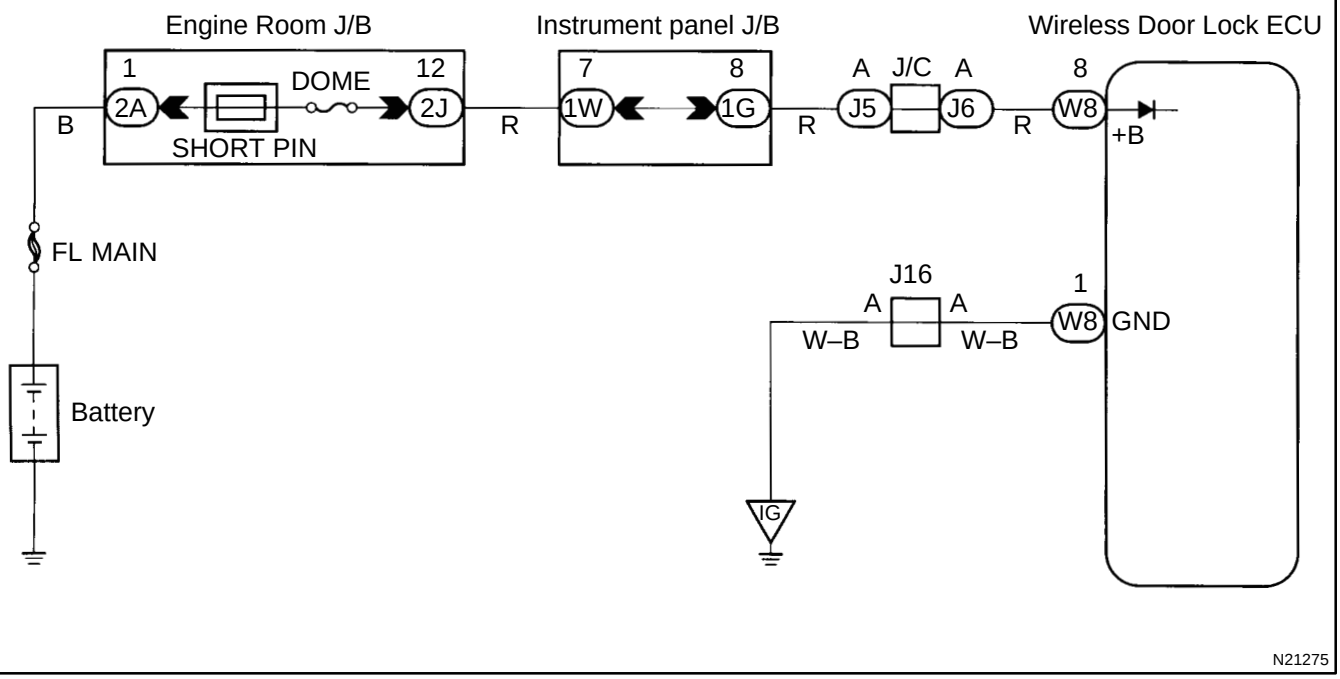
CIRCUIT INSPECTION

ECU Power Source Circuit

CIRCUIT DESCRIPTION

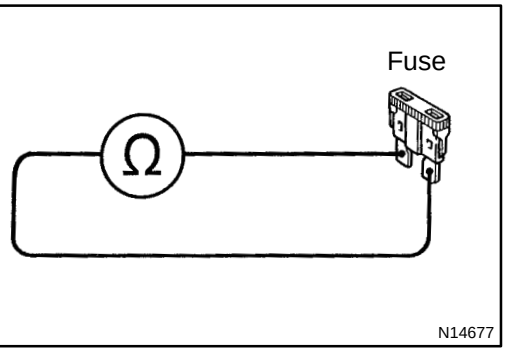
Battery positive voltage is always applied the terminal +B of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check DOME fuse.**



PREPARATION:

Remove DOME fuse from engine room junction block.

CHECK:

Check continuity of DOME fuse.

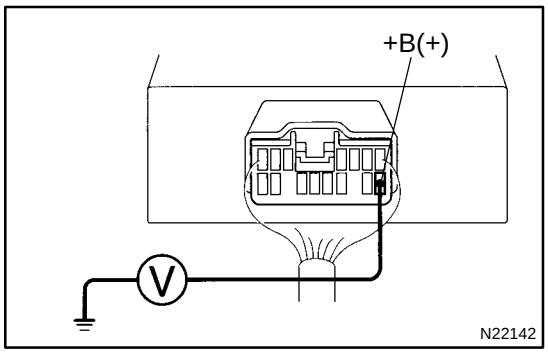
OK:

Below 1.0 Ω or continuity

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

OK

2	**Check voltage between terminals +B and ECU connector.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminals +B of ECU connector.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

3	**Check for open in harness and connector between terminal GND of ECU and body ground (See page IN–27).**

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

OK

Check and repair harness and connector between ECU and battery.

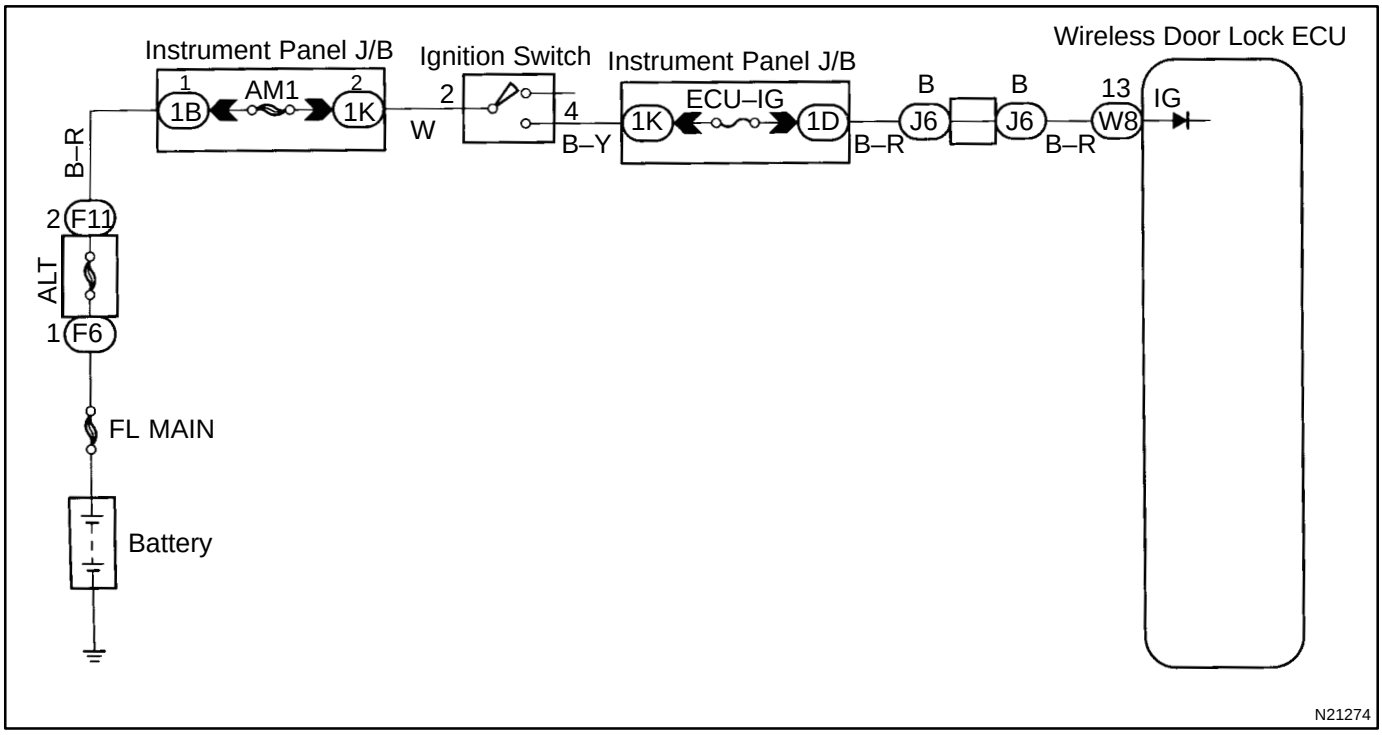
DI0DX–01

Ignition Switch Circuit

CIRCUIT DESCRIPTION

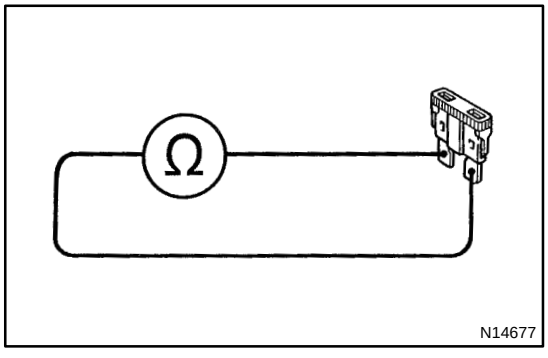
When the ignition switch is turned to the ON position, battery positive voltage is applied to the terminal IG of the ECU. Furthermore, power supplied from the terminal IG of the ECU is used as power for the wireless door lock buzzer.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:

(a) Remove front lower panel.

(b) Remove ECU–IG fuse from instrument panel junction block.

CHECK:

Check continuity of ECU–IG fuse.

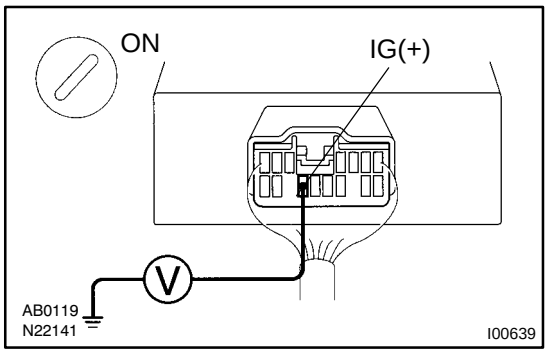
OK:

Continuity

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

OK

2	Check voltage between terminal IG of ECU and body ground.



PREPARATION:

(a) Disconnect the ECU connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals IG of ECU connector and body ground.

OK:

Voltage: 10 ~ 14 V

OK → **Check and replace ECU.**

NG

Check and repair harness and connector between ECU and battery (See page IN–27).

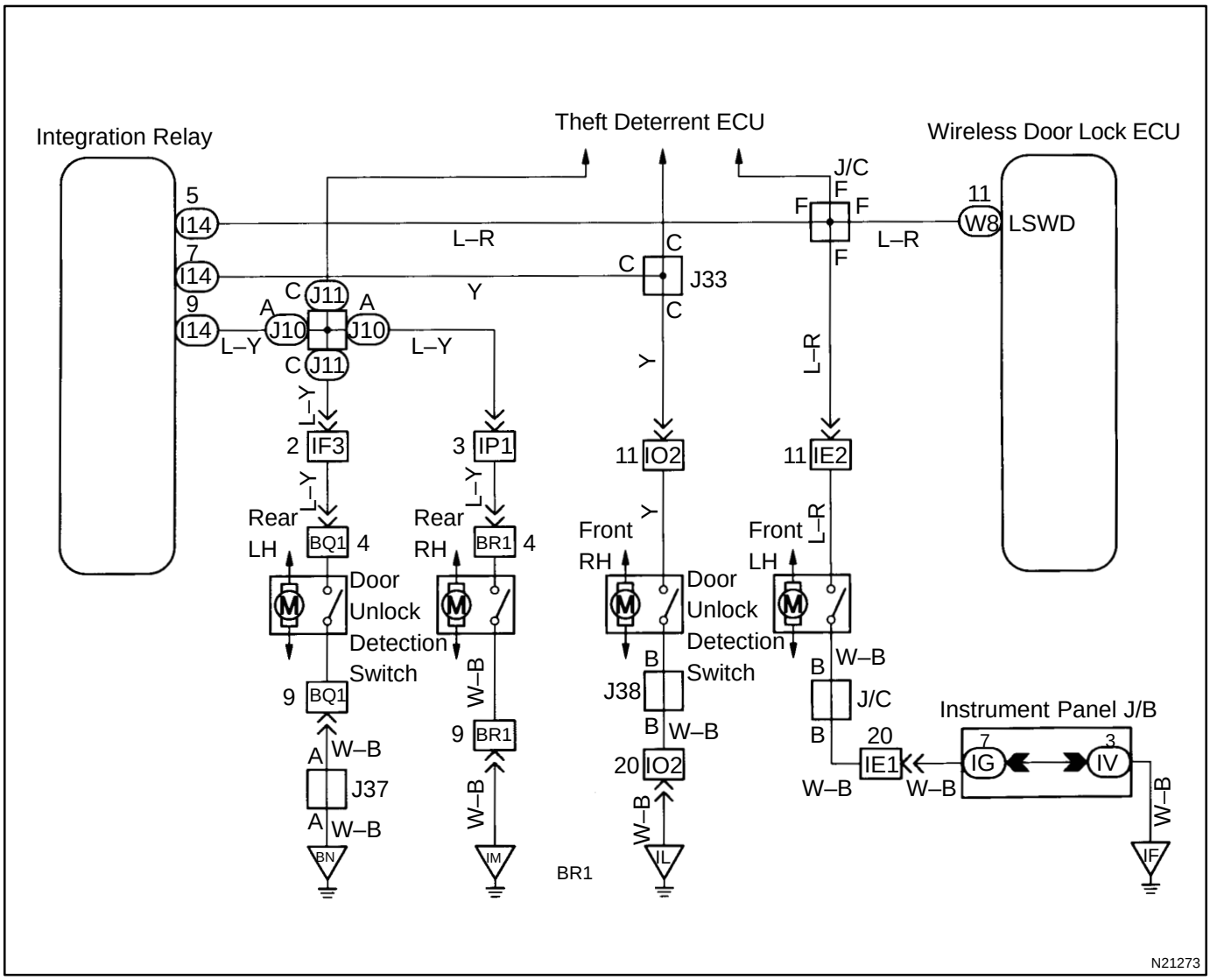
DI0E0–01

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

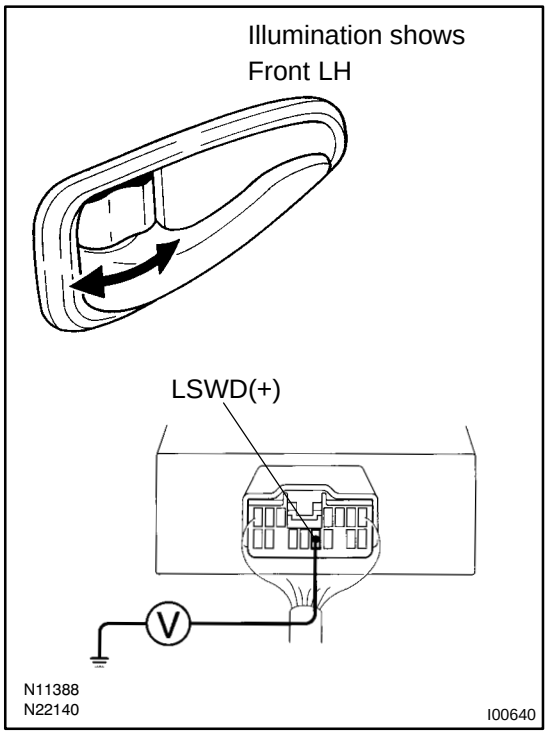
The door unlock detection switch is built into the door lock motor assembly. The switch is OFF when the door lock knob is in Lock Position, and is ON When the Knob is in Unlock position.
Furthermore, the door unlock detection switch circuit has terminal +B connected inside the theft deterrent ECU, when the door unlock detection switch is OFF, batter positive voltage is applied to the terminal of the door unlock detection switch circuit of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground, when the respective door lock knob involved is pushed to the lock side.

OK:

Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door unlock detection switch.

DI0E2–01

Door Key Lock and Unlock Switch Circuit (Unlock Side)

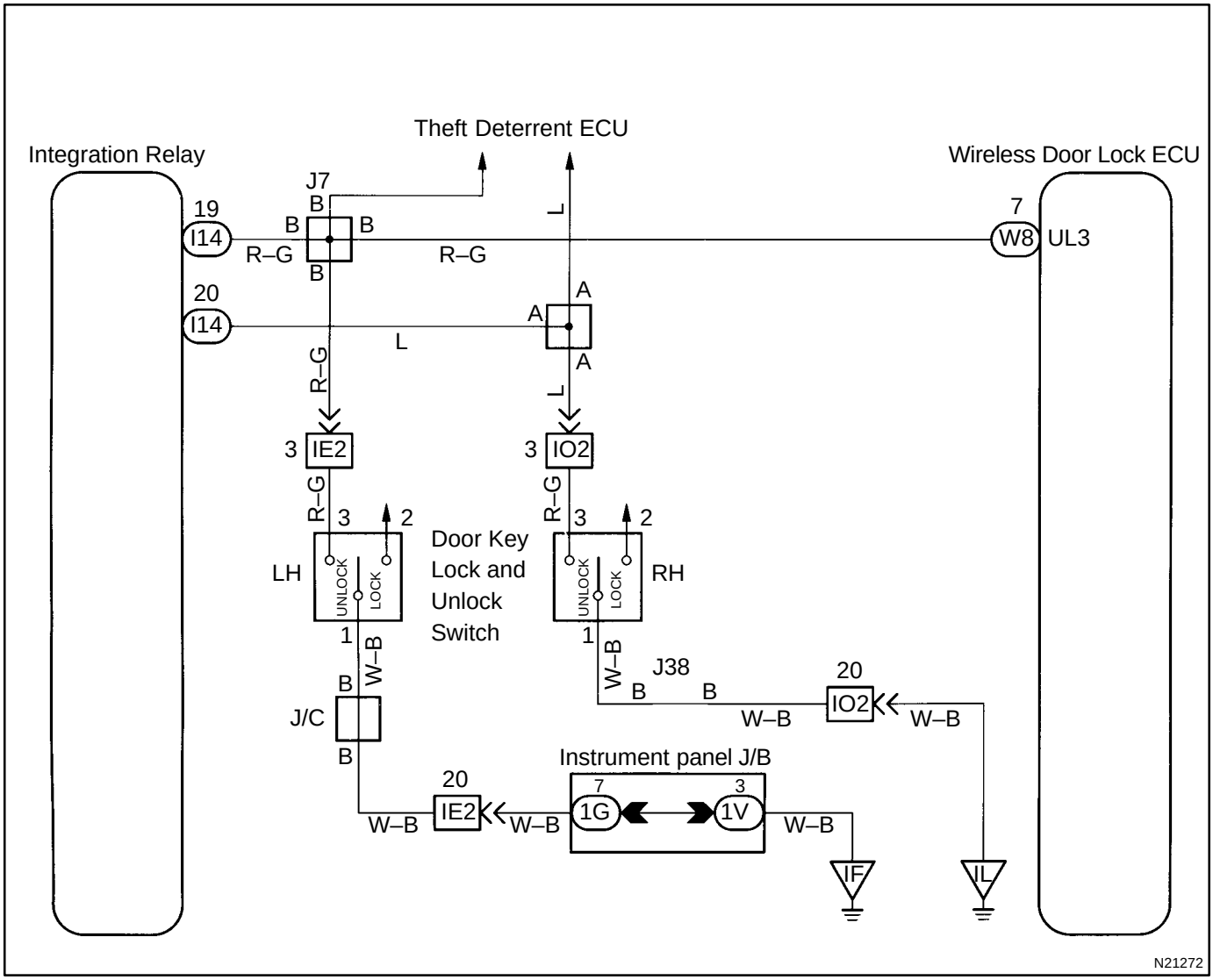
CIRCUIT DESCRIPTION

The key operated switch is built into the door key cylinder. When the key is turned to the lock side, the lock terminal of the switch is grounded, and when the key is turned to the unlock side the unlock terminal is grounded.

Furthermore, the door key lock and unlock switch circuit has terminal +B connected inside the theft deterrent ECU, when neither the lock or unlock terminal of the key lock and unlock switch are grounded, battery positive voltage is applied to the door key lock and unlock switch circuit of the wireless door lock ECU.

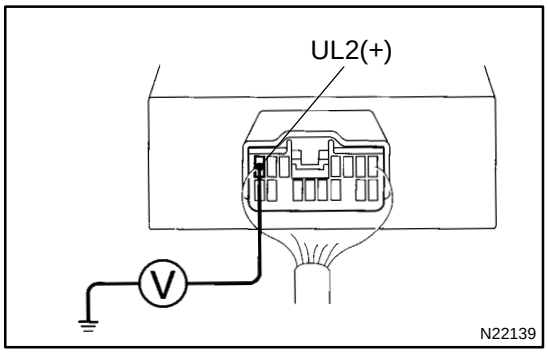
(Tr inside the ECU coming ON causes the wireless door lock ECU to output a signal to unlock all the doors.)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals UL2 of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal UL2 of wireless door lock ECU connector and body ground.

OK:

Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

DI0E5–01

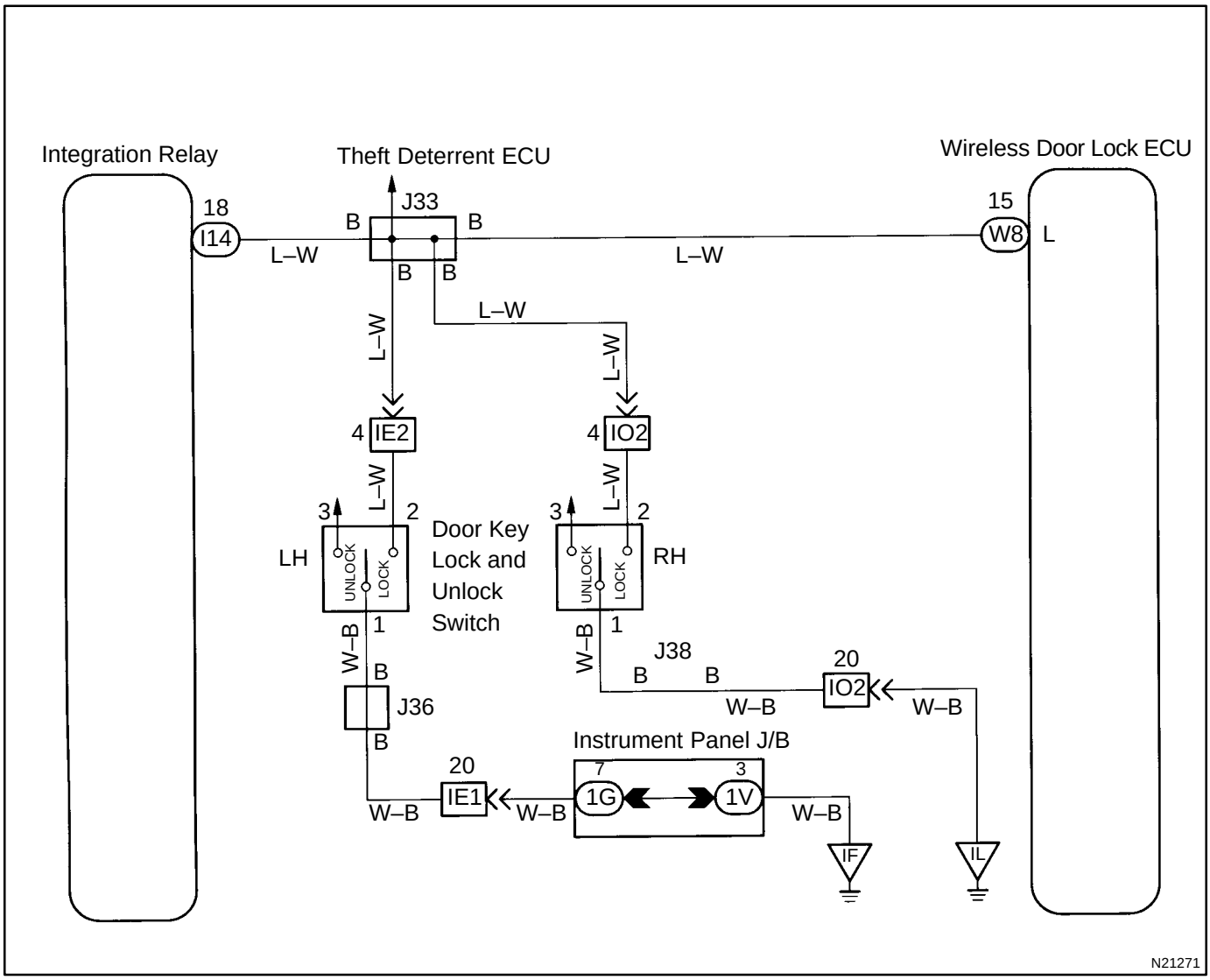
Door Key Lock and Unlock Switch Circuit (Lock Side)

CIRCUIT DESCRIPTION

Refer to page DI–463.

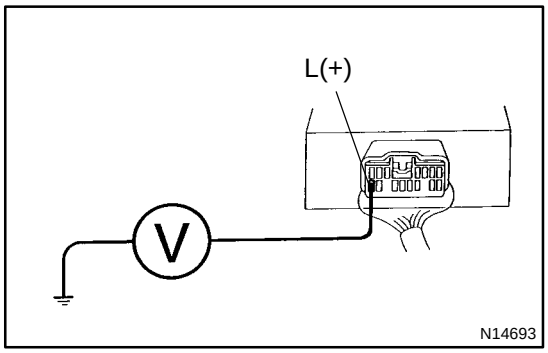
Tr inside the wireless door lock ECU coming ON causes the theft deterrent ECU to output a signal to lock all the doors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal L of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal L of wireless door lock ECU connector and body ground.

OK:

Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

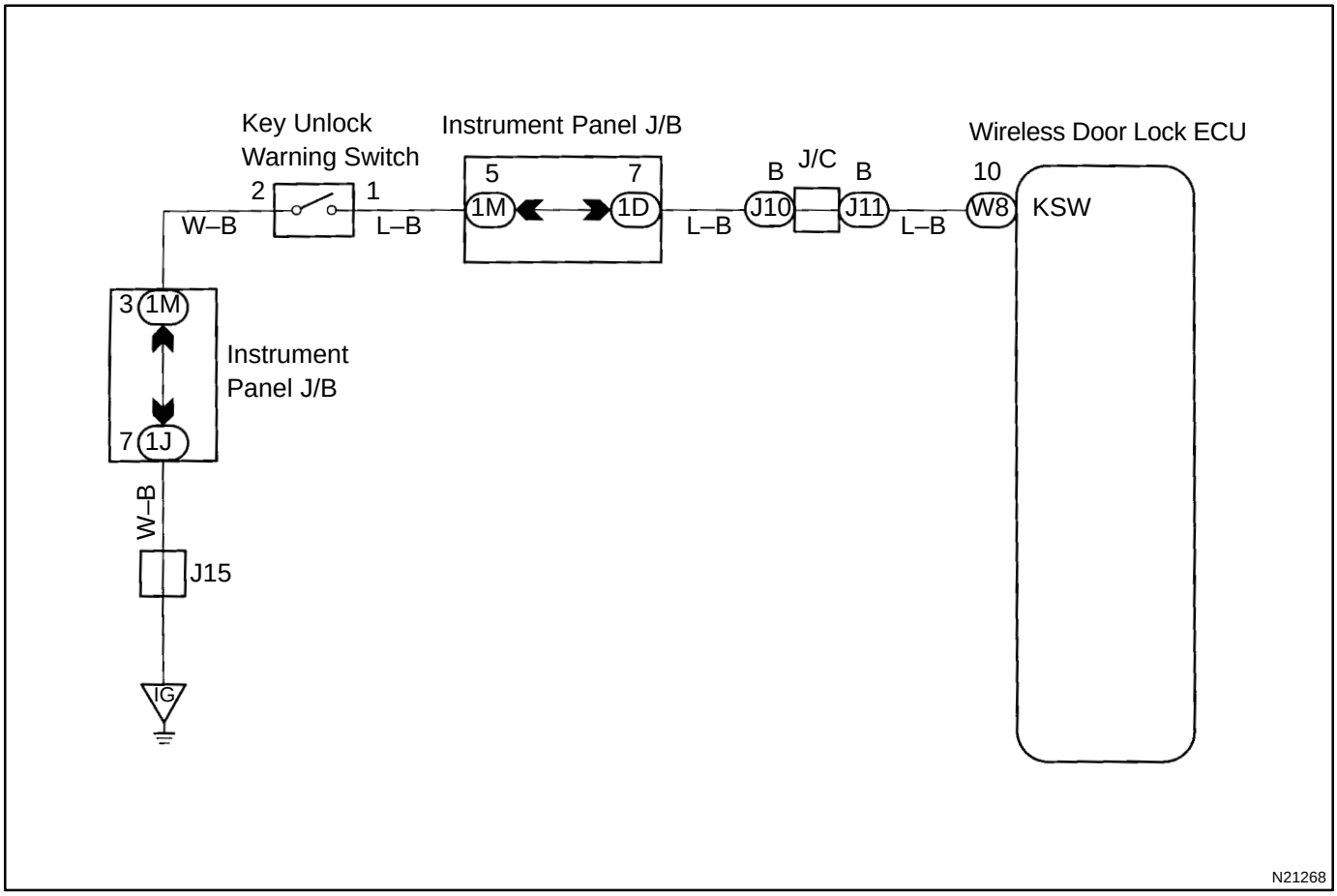
DI0E7–01

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

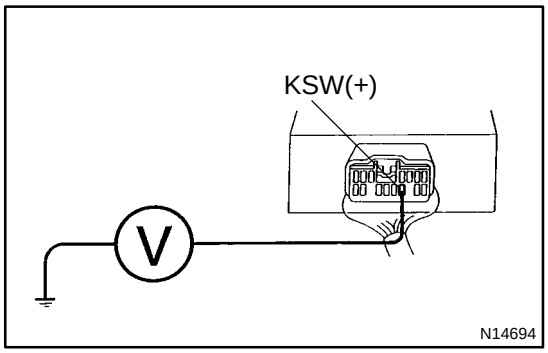
When the key is inserted in the ignition key cylinder, the key unlock warning switch comes ON, and when the key is not inserted the switch is OFF.
When the key unlock warning switch is ON, the ECU operates the transmitter misoperation prevention function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal KSW of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal KSW of wireless door lock ECU connector and body ground, when key plate is not inserted in the key cylinder.

OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and key unlock warning switch.

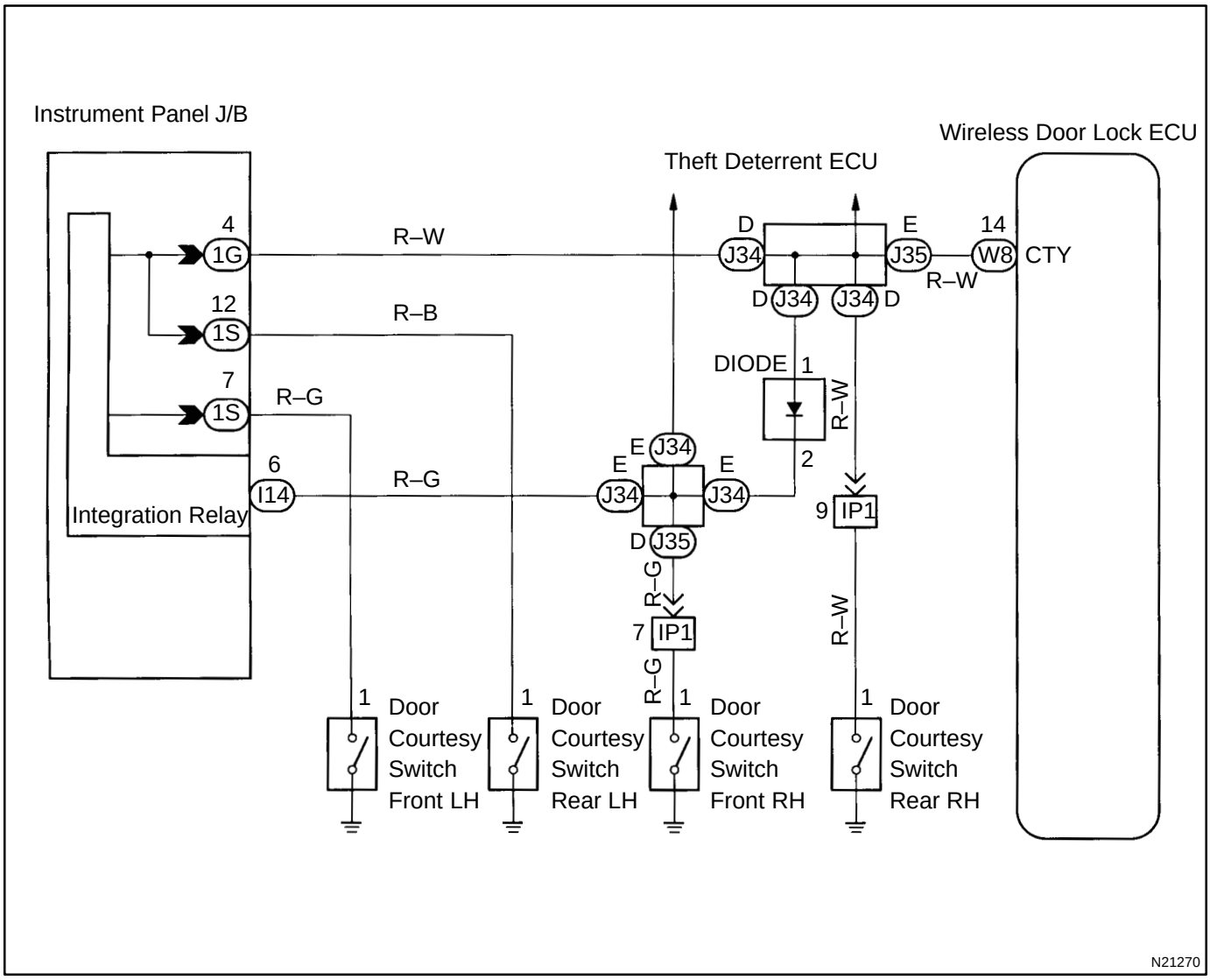
DI0E9–01

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch comes ON when the door is opened and goes OFF when door is closed. Furthermore. the door courtesy switch circuit has terminal +B connected inside the theft deterrent ECU . Battery positive voltage is applied to terminal DSWD of the theft deterrent ECU when all doors are closed, i.e., when the door courtesy switch of all doors are OFF.

WIRING DIAGRAM



INSPECTION PROCEDURE

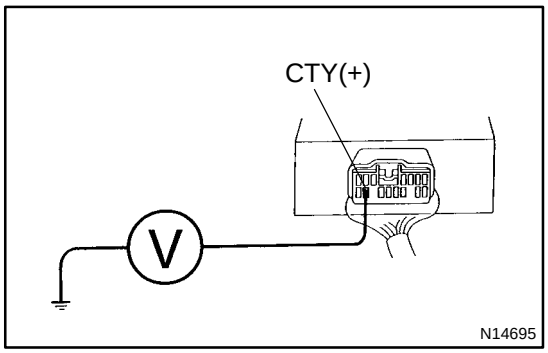
1	**Check operation of open door warning light.**

CHECK:
Check that open door warning light comes on when each door is opened, and goes off when all doors are closed.

NG → **Check open door warning light circuit**

OK

2	**Check voltage between terminal CTY of wireless door lock ECU connector and body ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminal CTY of wireless door lock ECU connector and body ground, when all doors are closed.
OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–456).**

NG

Check and repair harness and connector between wireless door lock ECU and door courtesy switch.

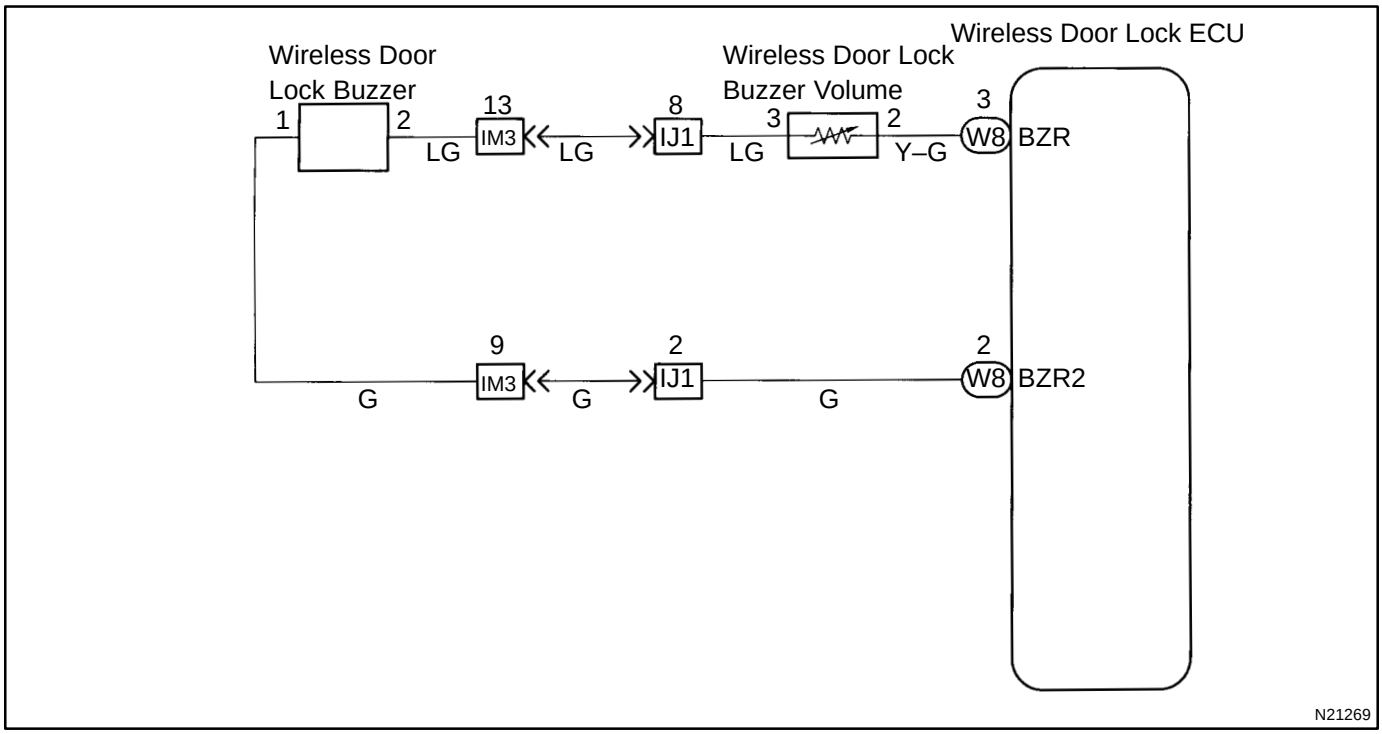
DI0EA–01

Wireless Door Lock Buzzer Circuit

CIRCUIT DESCRIPTION

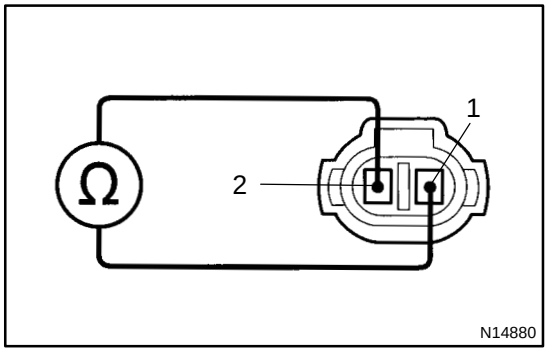
The volume of the buzzer can be controlled or turned off by the volume switch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check wireless door lock buzzer.**

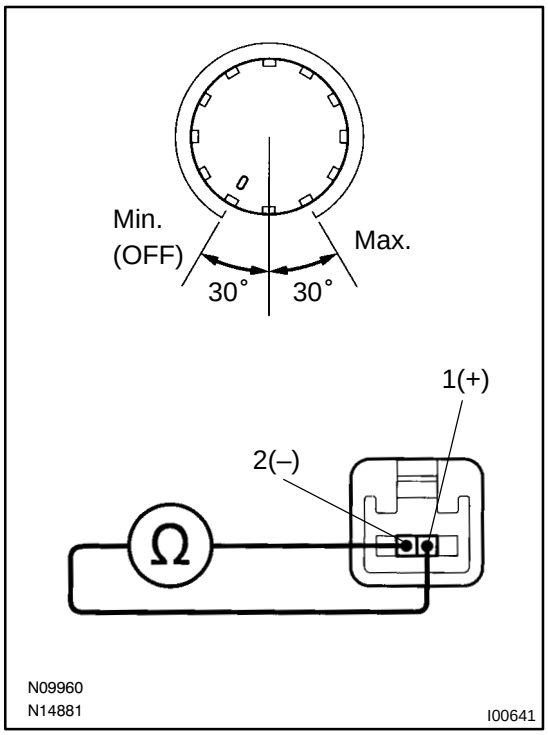


PREPARATION:
Remove wireless door lock buzzer.
CHECK:
Measure resistance between terminals.
OK:
Approx. : 1 kΩ

NG → **Replace wireless door lock volume.**

OK

2	Check wireless door lock volume.



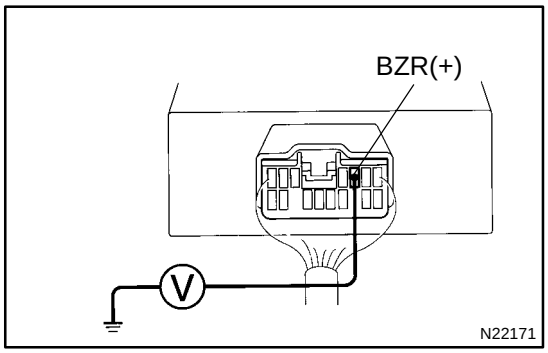
PREPARATION:
Remove wireless door lock volume.
CHECK:
Measure resistance between terminals.
OK:

OFF position: ∞ Ω
Min. position: 10 kΩ
Max. position: 0

NG → **Replace wireless door lock volume.**

OK

3	Check voltage between terminal BZR of wireless door lock ECU connector and body ground.



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure signal between terminal BZR and body ground, when transmitter is ON and OFF.
OK:

Door Lock position	Lock	Unlock
Signal	0.13 sec. Once signal	0.13 sec. Twice signal, 0.25 sec.

NG → **Replace wireless door lock ECU.**

OK →

Check and repair harness and connector between ECU and volume, volume and buzzer, buzzer and ECU.

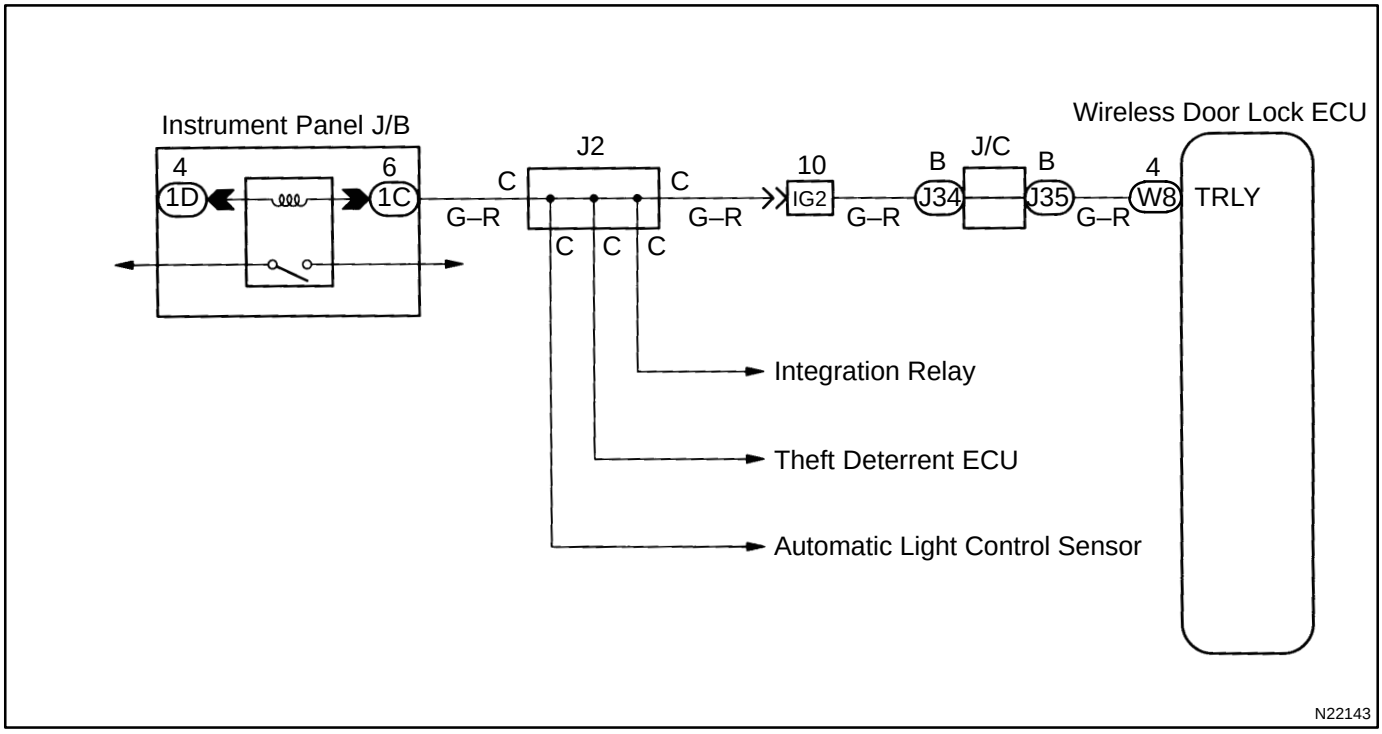
DI0EB–01

Taillight Relay Circuit

CIRCUIT DESCRIPTION

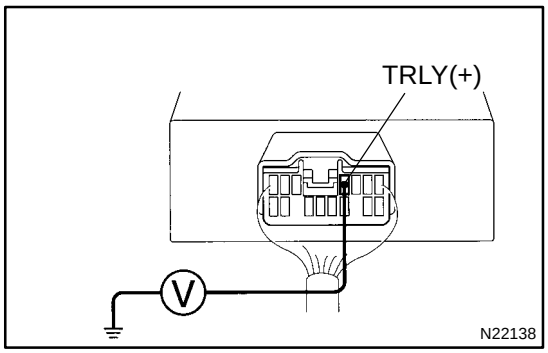
TRLY terminal outputs the signal once when pressing the LOCK switch of the transmitter and twice when pressing the UNLOCK switch and then makes the taillight come to light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal TRLY of wireless door lock ECU connector and body ground.**



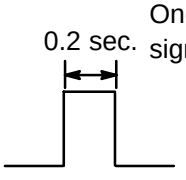
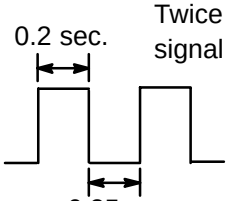
PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure signal between terminal TRLY and body ground, when transmitter is ON and OFF.

OK:

Door Lock position	Lock	Unlock
Signal		

NG → **Replace wireless door lock ECU.**

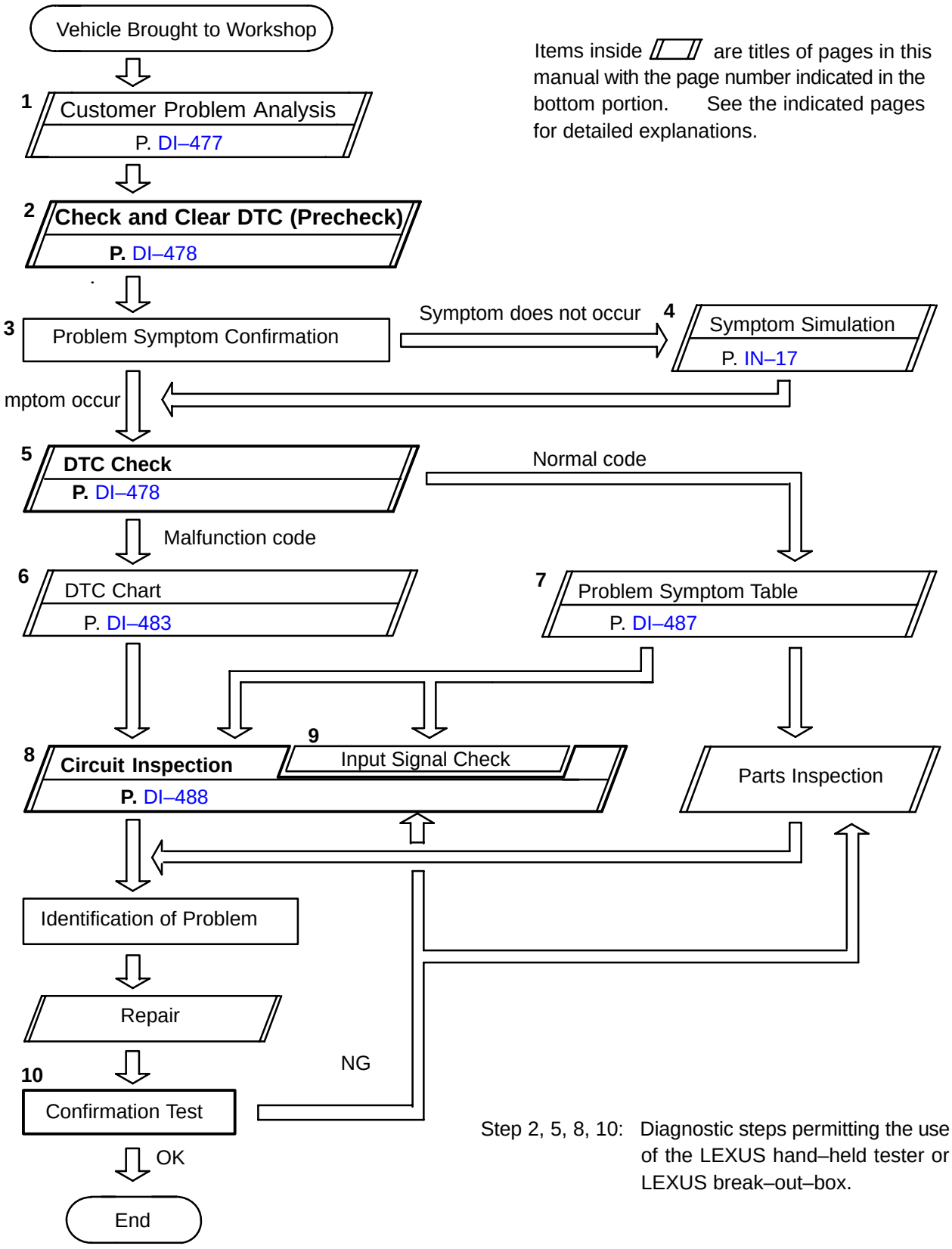
OK

Check and repair harness and connector between wireless door lock ECU and taillight relay circuit.

CRUISE CONTROL SYSTEM

DI0EF–01

HOW TO PROCEED WITH TROUBLESHOOTING



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.

Step 2, 5, 8, 10: Diagnostic steps permitting the use of the LEXUS hand–held tester or LEXUS break–out–box.

DI0EH–01

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

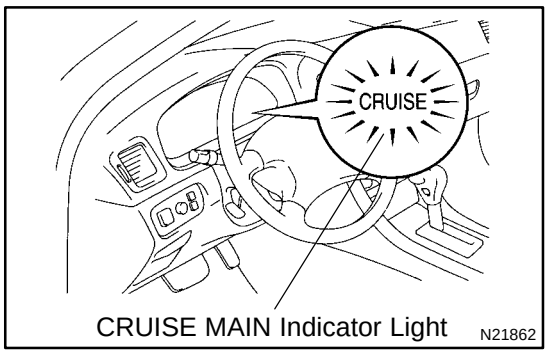
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	How Often does Problem Occur?	☑ 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 ☐ At 40 km/h (25 mph) or less ☐ 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
	☐	☐ Remains ON ☐ Does not light up ☐ Blinking

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

DI0EI–01



PRE–CHECK

1. DIAGNOSIS SYSTEM

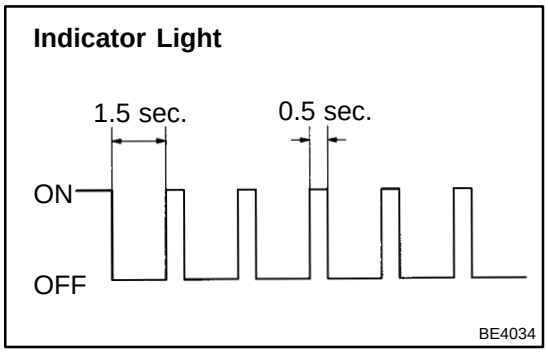
(a) INDICATOR CHECK

(1) Turn the ignition switch to ON.

(2) Check that the CRUISE MAIN indicator light comes on when the cruise control main switch is turned on, and that the indicator light goes off when the main switch is turned OFF.

HINT:

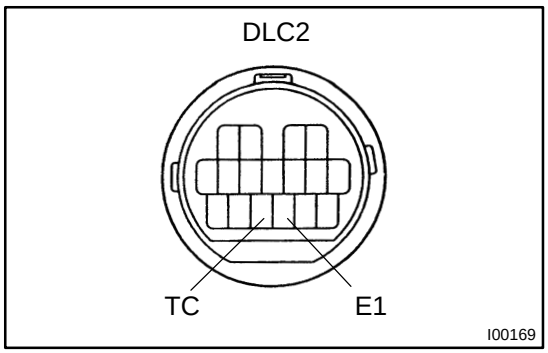
If the indicator check result is not normal, proceed to trouble-shooting (See page BE–2) for the combination meter section.



(b) DTC CHECK

HINT:

If a malfunction occurs in the No. 1 vehicle speed sensors or actuator, etc. during cruise control driving, the ECU actuates AUTO CANCEL of the cruise control and turns on and off the CRUISE MAIN indicator light to inform the driver of a malfunction. At the same time, the malfunction is stopped in memory as a diagnostic trouble code.



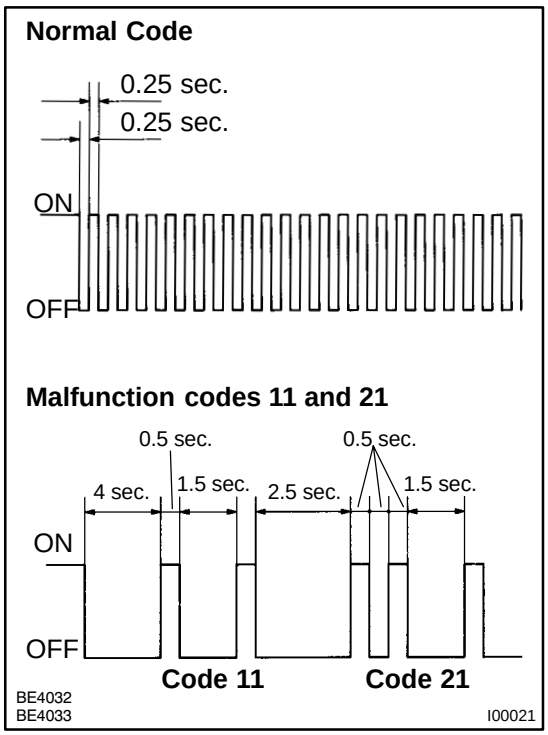
(c) OUTPUT OF DTC USING DIAGNOSIS CHECK WIRE

(1) Turn the ignition switch ON.

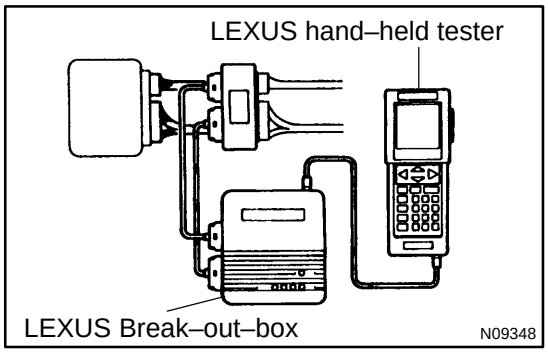
(2) Using SST, connect terminals Tc and E_1 of DLC2.

SST 09843–18020

(3) Read the DTC on the CRUISE MAIN indicator light.

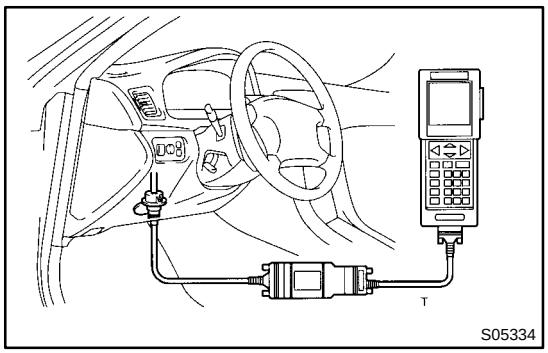


HINT:
If the DTC is not output, inspect the diagnosis circuit (See page DI–523).
As an example, the blinking patterns for codes; normal, 11 and 21 are shown in the illustration.



2. ECU TERMINAL VALUES MEASUREMENT BY USING LEXUS BREAK–OUT–BOX AND LEXUS HAND–HELD TESTER

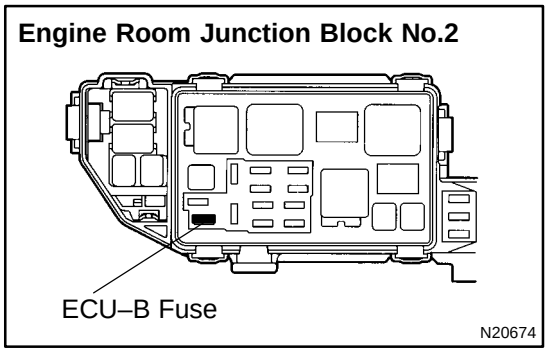
(a) Hook up the break–out–box and LEXUS hand–held tester to the vehicle.
(b) Read the ECU input/output values by following the prompts on the tester screen.
(c) Please refer to the LEXUS hand–held tester has a ”Snapshot” function. This records the measured data and is effective in the diagnosis of intermittent problems.



3. USING LEXUS HAND–HELD TESTER

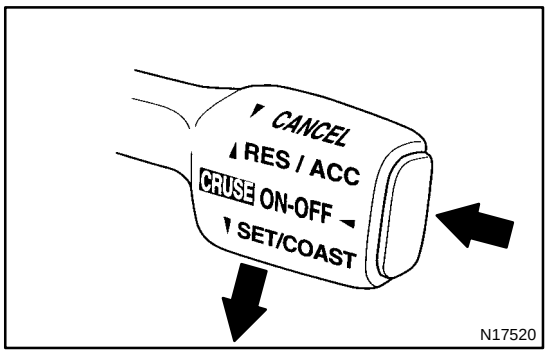
(a) Hook up the LEXUS hand–held tester to the DLC2.
(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:LEXUS hand–held tester has a ”Snapshot” function which records the monitored data.
Please refer to the LEXUS hand–held tester operator’s manual for further details.



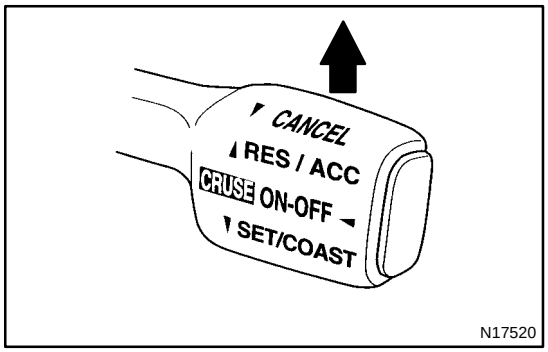
4. DTC CLEARANCE

(a) After completing repairs, the DTC retained in memory can be cleared by removing the ECU–B fuse for 10 seconds or more, with the ignition switch off.
(b) Check that the normal code is displayed after connecting the fuse.

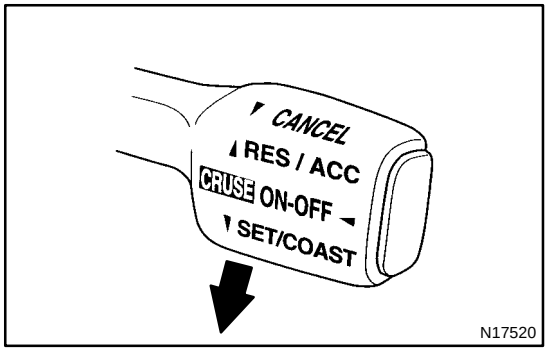


5. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)

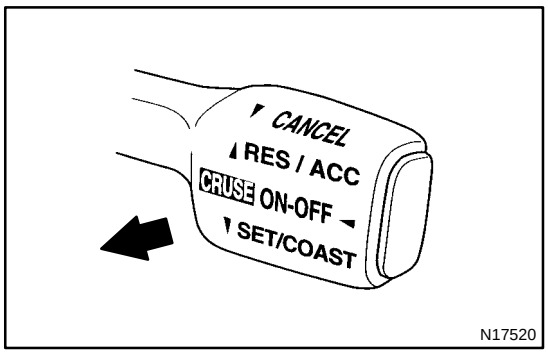
(a) SET INSPECTION
- (1) Push the main switch ON.
- (2) Drive at a desired speed (40 km/h (25 mph) or higher).
- (3) Press the control switch to the SET/COAST.
- (4) After releasing the switch, check that the vehicle cruises at the desired speed.



(b) ACCEL INSPECTION
- (1) Push the main switch ON.
- (2) Drive at a desired speed (40 km/h (25 mph) or higher).
- (3) Check that the vehicle speed is increased while the control switch turned to RES/ACC, and that the vehicle cruises at the set speed when the switch is released.
- (4) Momentarily press the control switch upward in the RES/ACC and then immediately release it. Check that the vehicle speed increases by about 1.5 km/h (Tap–up function).



(c) COAST INSPECTION
- (1) Push the main switch ON.
- (2) Drive at a desired speed (40 km/h (25 mph) or higher).
- (3) Check that the vehicle speed is decreased while the control switch is turned to SET/COAST, and the vehicle cruise at the set speed when the switch is released.
- (4) Momentarily press the control switch is turned to SET/COAST, and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap–down function).



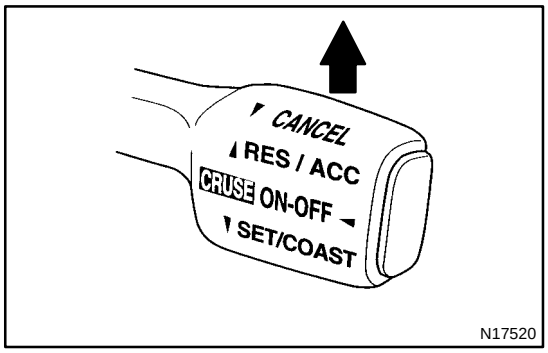
(d) CANCEL INSPECTION

(1) Push the main switch ON.

(2) Drive at a desired speed (40 km/h (25 mph) or higher).

(3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.

- Depress the brake pedal
- Shift to except D position
- Push the main switch OFF
- Pull the cruise control switch to CANCEL



(e) RESUME INSPECTION

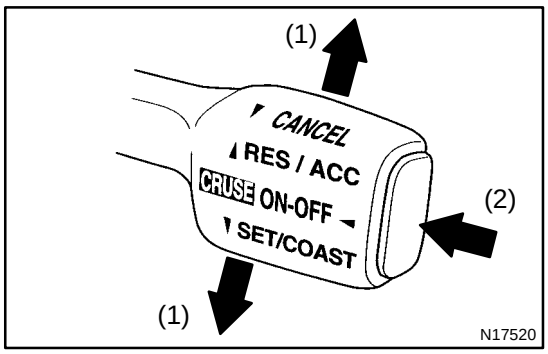
(1) Push the main switch ON.

(2) Drive at a desired speed (40 km/h (25 mph) or higher).

(3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.

- Depress the brake pedal
- Shift to except D position
- Push the main switch OFF
- Pull the cruise control switch to CANCEL

(4) After the control switch is turned to RES/ACC at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed prior to the cancellation.



6. INPUT SIGNAL CHECK

HINT:

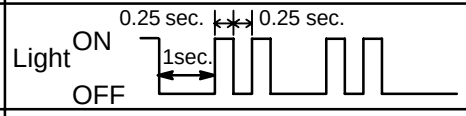
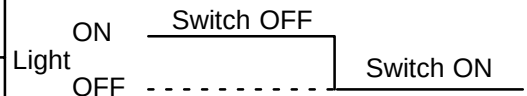
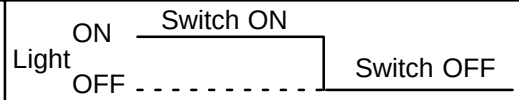
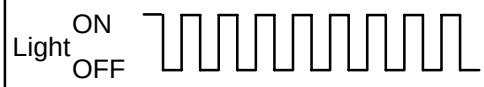
(1) For check No.1 ~ No.3
- Turn ignition switch ON.

(2) For check No.4
- Jack up the vehicle.
- Start the engine.
- Shift to D position.

(a) Press the control switch to SET/COAST or RES/ACC position and hold it down or hold it up ”1”.
(b) Push the main switch ON ”2”.
(c) Check that the CRUISE MAIN indicator light blinks twice or 3 times repeatedly after 3 seconds.
(d) Turn the SET/COAST or RES/ACC switch OFF.
(e) Operate each switch as listed in the table below.
(f) Read the blinking pattern of the CRUISE MAIN indicator light.
(g) After performing the check, turn the main switch OFF.

HINT:

When 2 or more signals are input to the ECU, the lowest numbered code will be displayed first.

No.	Operation Method	CRUISE MAIN Indicator Light Blinking Pattern	Diagnosis
1	Turn SET/COAST switch ON		SET/COAST switch circuit is normal
2	Turn RES/ACC switch ON		RES/ACC switch circuit is normal
3	Turn CANCEL switch ON		CANCEL switch circuit is normal
	Turn stop light switch ON Depress brake pedal		Stop light switch circuit is normal
	Turn PNP switch OFF (Shift to except D position)		PNP switch circuit is normal
4	Drive at about 40 km/h (25 mph)or higher		Vehicle Speed Sensor is normal
	Drive at about 40 km/h (25 mph) or below		

DI0EJ–01

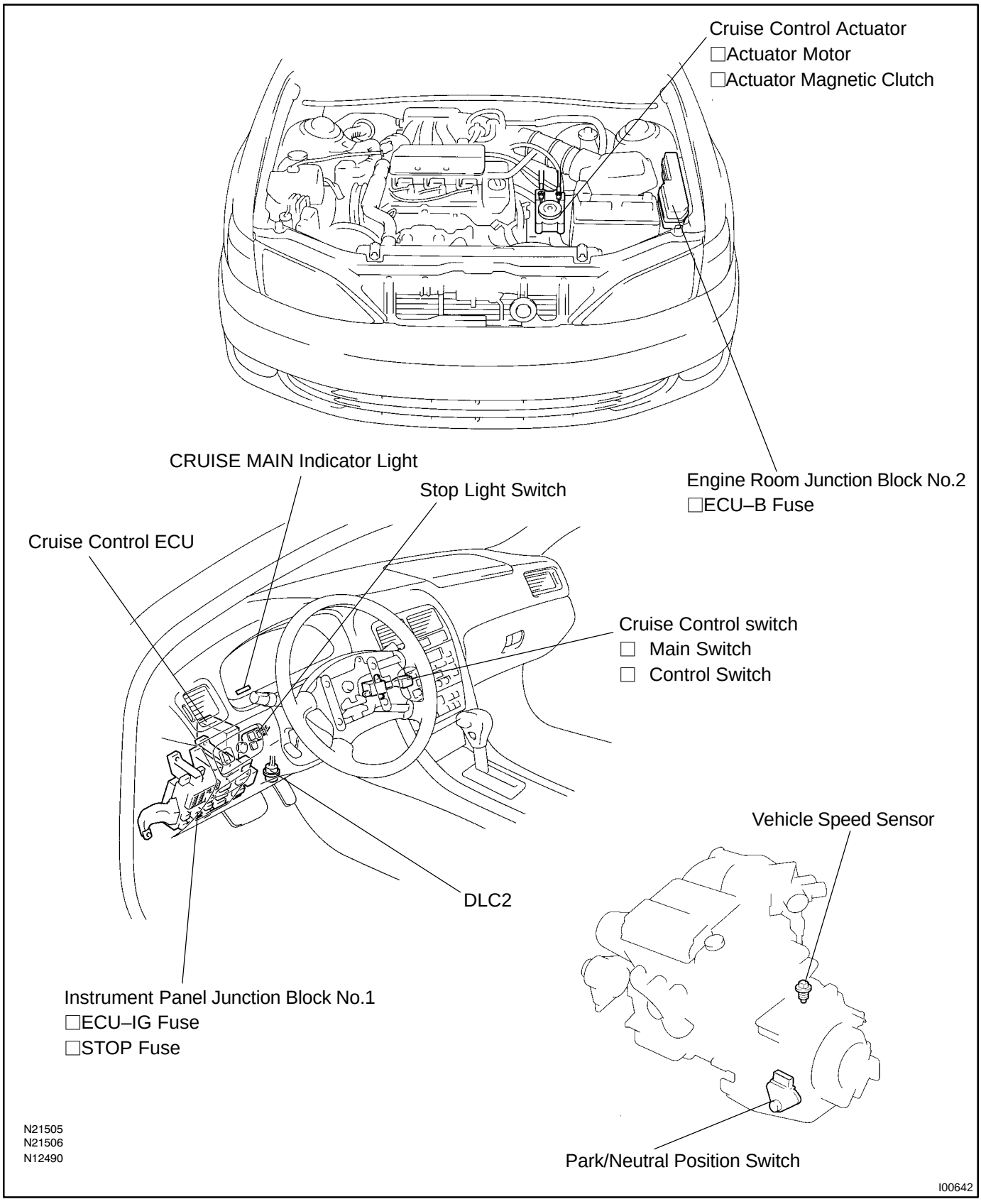
DIAGNOSTIC TROUBLE CODE CHART

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

DTC No. (See Page)	Circuit Inspection	Trouble Area
11, 15 (DI–488)	●Actuator Motor Circuit	●Actuator motor ●Harness or connector between cruise control ECU and actuator motor ●Cruise control ECU
12 (DI–490)	●Actuator Magnetic Clutch Circuit	●STOP Fuse ●Stop light switch ●Actuator magnetic clutch ●Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground ●Cruise control ECU
14 (DI–493)	●Actuator Mechanical Malfunction	●Actuator motor (actuator lock: motor, arm) ●Cruise control ECU
21 (DI–493)	●Open in Vehicle Speed Sensor Circuit	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU
23 (DI–498)	●Vehicle Speed Signal Abnormal	●Vehicle speed sensor ●Cruise control ECU
32 (DI–499)	●Control Switch Circuit	●Cruise control switch ●Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground ●Cruise control ECU
41	●Cruise control ECU	●Cruise control ECU
42	●Source voltage drop	●Power source
51 (DI–502)	●Idle Signal Circuit	●Throttle position sensor ●Harness or connector between ECM and throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

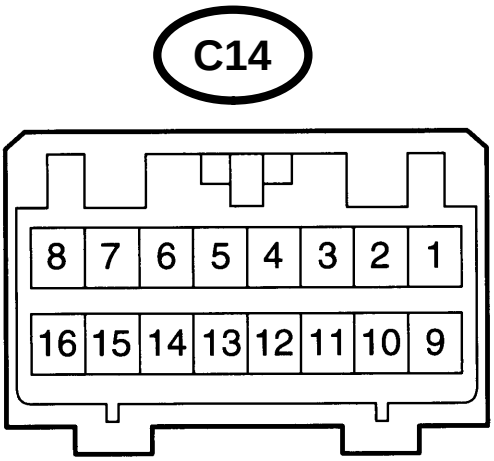
DI0EK–01

PARTS LOCATION



DI0EM–01

TERMINALS OF ECM



I00293

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT ↔ GND (C14–1 ↔ C14–16)	L–Y ↔ W–B	Constant	10 – 16 V
STP– ↔ GND (C14–2 ↔ C14–16)	G–W ↔ W–B	Depress brake pedal	10 – 16 V
		Release brake pedal	Below 1 V
D ↔ GND (C14–3 ↔ C14–16)	W–R ↔ W–B	Shift to except D position	Below 1 V
		Shift to D position	10 – 16 V
PI ↔ GND (C14–4 ↔ C14–16)	B–Y ↔ W–B	Ignition switch ON Cruise control main switch ON	Below 1.2 V
		Ignition switch ON Cruise control main switch OFF	10 – 16 V
TC ↔ GND (C14–5 ↔ C14–16)	Y–B ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON Connect terminals TC and E1 of diagnostic check connector	Below 1 V
ECT ↔ GND (C14–6 ↔ C14–16)	BR–Y ↔ W–B	During driving Gear position 3rd	10 – 16 V
		During driving Gear position O/D	Below 1 V
MC ↔ GND (C14–7 ↔ C14–16)	LG–B ↔ W–B	During cruise control driving COAST switch hold ON	9 – 15 V
		During cruise control driving ACC switch hold ON	Below 1 V
L ↔ GND (C14–8 ↔ C14–16)	L–B ↔ W–B	During cruise control driving	9 – 15 V
		Except during cruise control driving	Below 1 V
B ↔ GND (C14–9 ↔ C14–16)	Y ↔ W–B	Ignition switch ON	10 – 16 V
CCS ↔ GND (C14–10 ↔ C14–16)	G ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON CANCEL switch hold ON	4.2 – 8.8 V
		Ignition switch ON SET/COAST switch hold ON	2.5 – 6.3 V
		Ignition switch ON RES/ACC switch hold ON	0.8 – 3.7 V

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CMS ↔ GND (C14–11 ↔ C14–16)	G–B ↔ W–B	Ignition switch ON Main switch OFF	10 – 16 V
		Ignition switch ON Main switch ON	Below 0.5 V
SPD ↔ GND (C14–12 ↔ C14–16)	G–O ↔ W–B	Engine start Stoppage a car.	Below 1.5 V or 4.7 – 16 V
		During driving (Pulse generated).	3 – 7 V
IDL ↔ GND (C14–13 ↔ C14–16)	Y–L ↔ W–B	Ignition switch ON Throttle valve fully opened.	10 – 16 V
		Ignition switch ON Throttle valve fully closed.	Below 1.5 V
OD ↔ GND (C14–14 ↔ C14–16)	BR–Y ↔ W–B	During cruise control driving OD switch ON.	10 – 16 V
		During cruise control driving OD switch OFF (3rd driving)	Below 1 V
MO ↔ GND (C14–15 ↔ C14–16)	B–W ↔ W–B	During cruise control driving ACC switch hold ON	9 – 15 V
		During cruise control driving COAST switch hold ON	Below 1 V
GND ↔ Body Ground (C14–16 ↔ Body Ground)	W–B ↔ Body Ground	Constant	Below 1 V

DI0EN–01

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Main Switch Circuit (Cruise control switch) 2. Vehicle Speed Sensor 3. Control Switch Circuit (Cruise control switch) 4. Stop Light Switch Circuit 5. Park/Neutral Position Switch Circuit 6. Actuator Motor Circuit 7. Cruise Control Cable 8. Cruise Control ECU	DI–519 DI–495 DI–499 DI–505 DI–511 DI–488 DI–525 IN–27
SET not occurring or CANCEL occurring. (DTC dose not output)	1. ECU Power Source Circuit 2. Cruise Control ECU	DI–514 IN–27
Actual vehicle speed deviates above or below the set speed.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Electronically Controlled Transmission Communication Circuit 4. Actuator Motor Circuit 5. Idle Signal Circuit (main throttle position sensor) 6. Cruise Control ECU	DI–525 DI–498 DI–508 DI–488 DI–502 IN–27
Gear shifting frequent between 3rd O/D when driving on uphill road. (Hurting)	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–508 IN–27
Cruise control not cancelled, even when brake pedal is depressed.	1. Cruise Control Cable 2. Stop Light Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–525 DI–505 DI–488 IN–27
Cruise control not cancelled, even when transmission is shifted to ”N” position.	1. Cruise Control Cable 2. Park/Neutral Position Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–525 DI–511 DI–488 IN–27
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	1. Cruise Control Cable 2. Control Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–525 DI–499 DI–488 IN–27
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–525 DI–498 DI–488 IN–27
Poor response is ACCEL and RESUME modes.	1. Cruise Control Cable 2. Electronically Controlled Transmission Communication Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–525 DI–508 DI–488 IN–27
O/D does not RESUME, even though the road is not uphill.	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–508 IN–27
DTC memory is erased.	1. Back–up Power Source Circuit 2. Cruise Control ECU	DI–517 IN–27
DTC is not output, or is output when is should not be.	1. Diagnosis Circuit 2. Cruise Control ECU	DI–523 IN–27
Cruise MAIN indicator light remains ON or fall to light up.	Cruise MAIN Indicator Light Switch Circuit	DI–521

DI0EO–01

CIRCUIT INSPECTION

DTC	11, 15	Actuator Motor Circuit

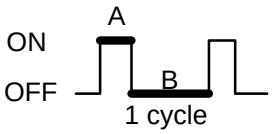
CIRCUIT DESCRIPTION

The actuator motor is operated by signals from the ECU. Acceleration and deceleration signals are transmitted by changes in the Duty Ratio (See note below).

Duty Ratio

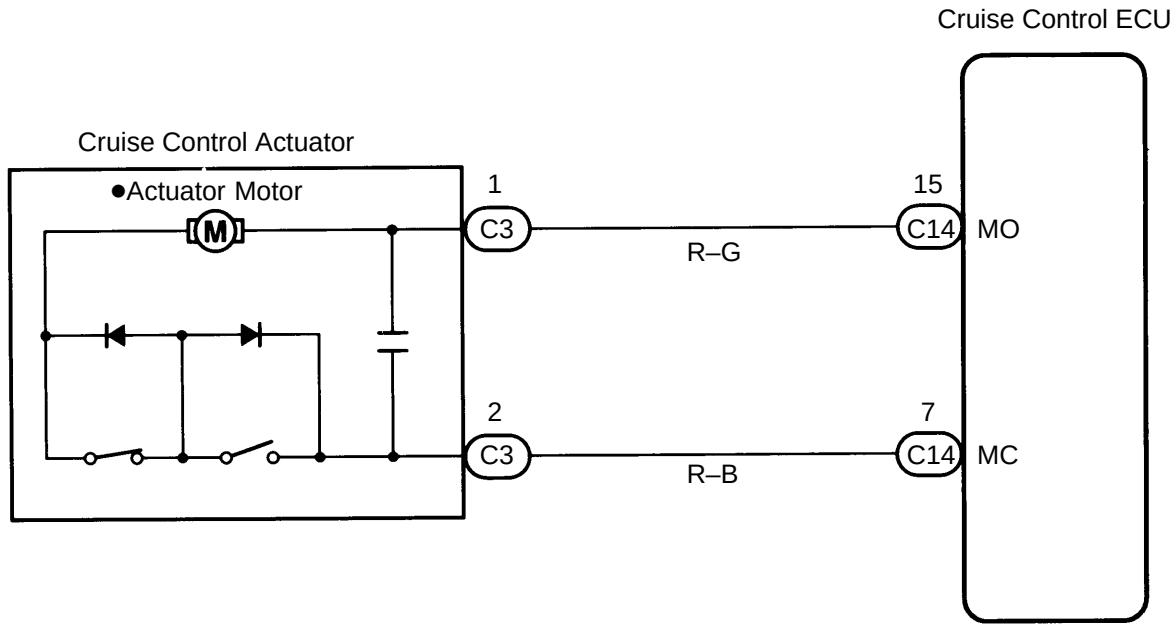
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then.

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



DTC No.	Detection Item	Trouble Area
11	□Short in actuator motor circuit.	□Actuator motor □Harness or connector between cruise control ECU and actuator motor □Cruise control ECU
15	□Open in actuator motor circuit.	□Actuator motor

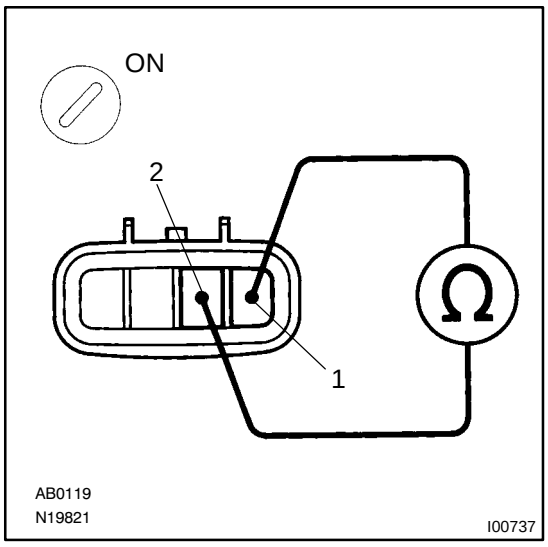
WIRING DIAGRAM



N21216

INSPECTION PROCEDURE

1	**Check resistance between terminals MO and MC of actuator motor.**



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Measure resistance between terminals 1 and 2.

HINT:

If control plate position is fully opened or fully closed, resistance can not measure.

OK:

Resistance: more than 4.2 Ω

NG → **Replace cruise control actuator.**

OK

2	**Check for open and short in harness and connectors between cruise control ECU and actuator motor (See page IN–27).**

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

OK

Check and replace cruise control ECU. (See page IN–27).

DI0EP–01

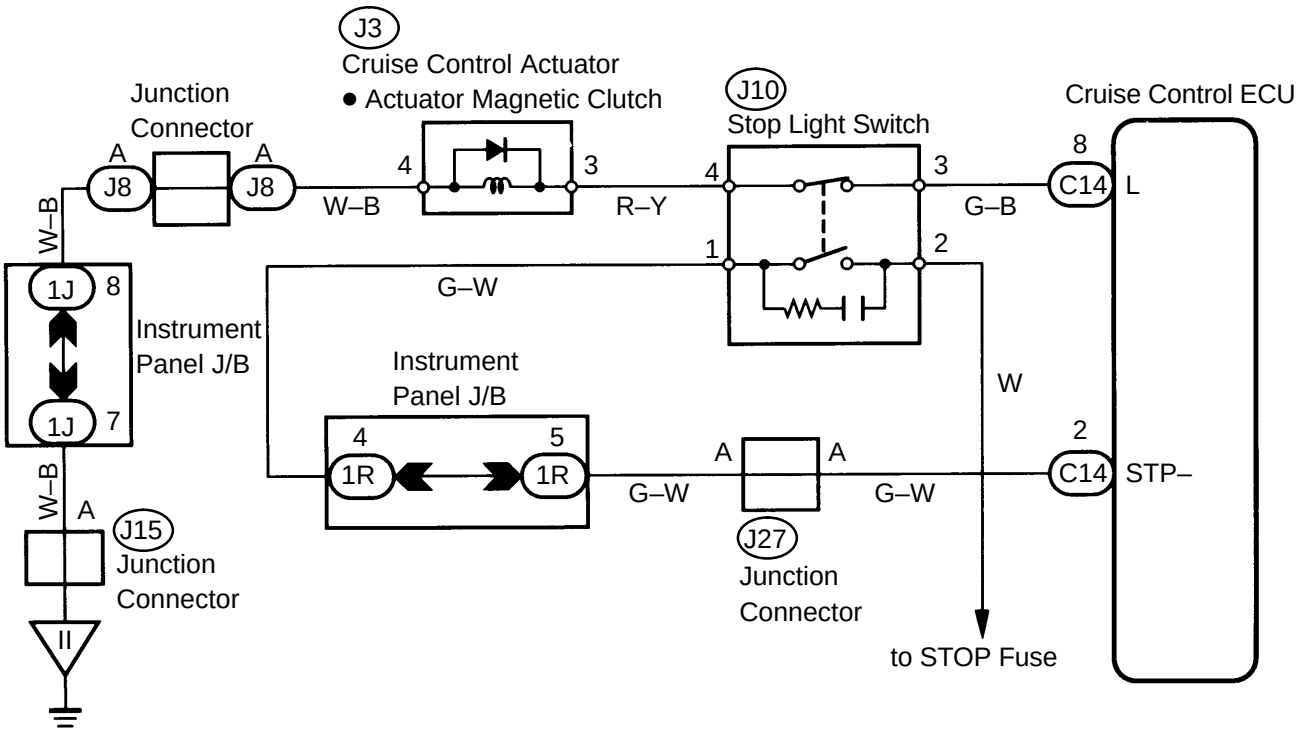
DTC	12	Actuator Magnetic Clutch Circuit

CIRCUIT DESCRIPTION

This circuit turns on the magnetic clutch inside the actuator during cruise control operation according to the signal from the ECU. If a malfunction occurs in the actuator or speed sensor, etc. during cruise control operation, the rotor shaft between the motor and control plate is released.
When the brake pedal is depressed, the stop light switch turns on, supplying electrical power to the stop light. Power supply to the magnetic clutch is mechanically cut and the magnetic clutch is turned OFF.
When driving downhill, if the vehicle speed exceeds the set speed by 15 km/h (9 mph), the ECU turns the safety magnet clutch OFF. If the vehicle speed later drops to within 10 km/h (6 mph) above the set speed, then cruise control at the set speed is resumed.

DTC No.	Detection Item	Trouble Area
12	□ Short in actuator magnetic clutch circuit. □ Open (0.8 sec.) in actuator magnetic clutch circuit.	□ STOP Fuse □ Stop light switch □ Actuator magnetic clutch □ Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground □ Cruise control ECU

WIRING DIAGRAM

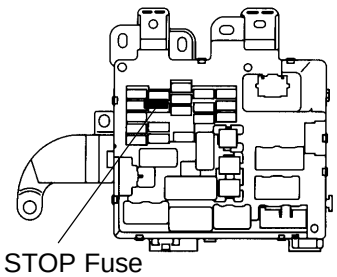


1997 LEXUS ES300 (RM511U)

INSPECTION PROCEDURE

1	**Check STOP fuse.**

Instrument Panel Junction Block No.1



PREPARATION:

(a) Turn ignition switch OFF.

(b) Remove the STOP fuse from instrument panel junction block No.1.

CHECK:

Check fuse continuity.

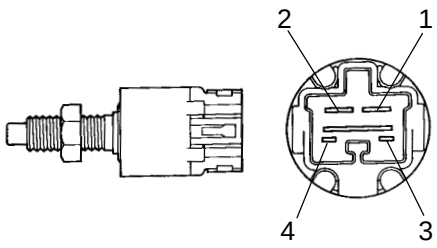
OK:

There is continuity.

NG → **Replace STOP fuse.**

OK

2	**Check stop light switch.**



PREPARATION:

Disconnect the stop light switch connector.

CHECK:

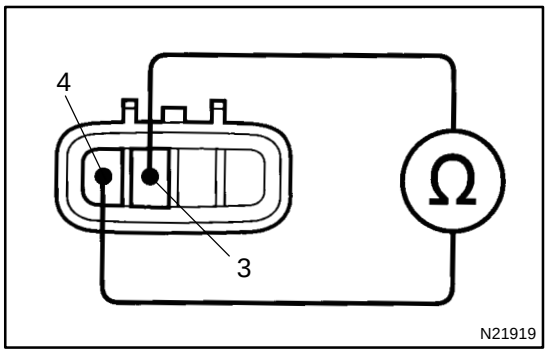
Check continuity between terminals.

Switch position	Continuity
Switch pin free (Brake pedal depressed)	1 – 2
Switch pin pushed in (Brake pedal released)	3 – 4

NG → **Replace stop light switch.**

OK

3	**Check resistance between terminals L and GND of actuator magnetic clutch.**



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Measure resistance between terminals 3 and 4.

OK:

Resistance: 34.65 ~ 42.35 Ω.

NG → **Replace cruise control actuator.**

OK

4	**Check for open and short in harness and connectors between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground (See page IN–27).**

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

OK

Check and replace cruise control ECU (See page IN–27).

DI0EQ–01

DTC	14	Actuator Mechanical Malfunction

CIRCUIT DESCRIPTION

The circuit detects the rotation position of the actuator control plate and sends a signal to the ECU.

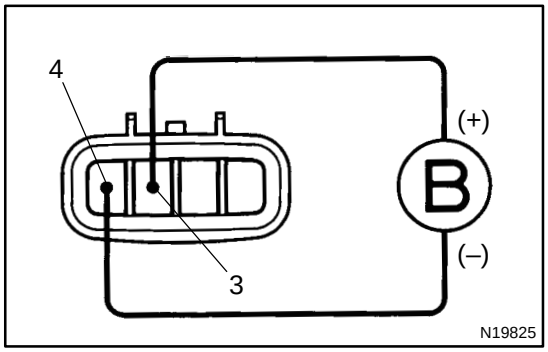
DTC No.	Detection Item	Trouble Area
14	●Cruise control actuator mechanical malfunction.	●Actuator lock: (motor, arm) ●Actuator motor ●Cruise control ECU

WIRING DIAGRAM

See page DI–488.

INSPECTION PROCEDURE

1	Check cruise control actuator arm locking operation



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Connect the positive (+) lead from the battery to the terminal 3 of actuator and the negative (–) lead to terminal 4.

NOTICE:

Do not connect the high tension cables to the wrong battery terminal. You will damage the cruise control actuator.

(a) Move the control plate by hand.

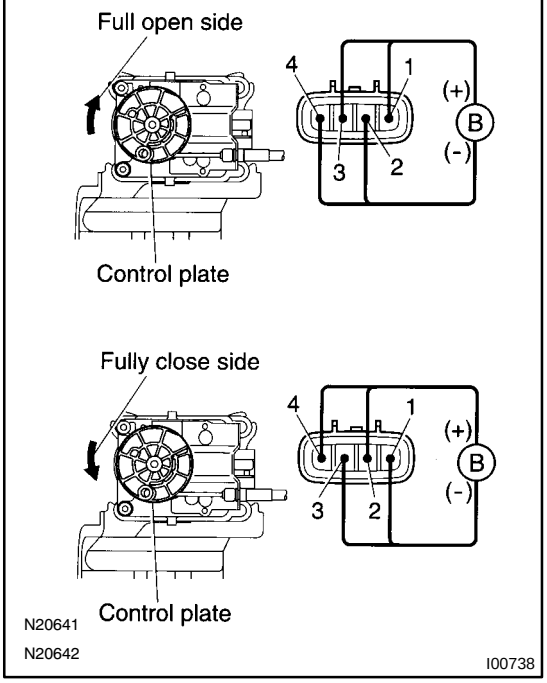
OK:

Control plate doesn't move.

NG → **Replace cruise control actuator.**

OK

2	Check cruise control actuator operation.



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Connect the positive (+) lead from the battery to terminals 1 and 3 of actuator, connect the negative (–) lead to terminals 2 and 4 of actuator.

OK:

Control arm moves to full open side

CHECK:

Connect the positive (+) lead from the battery to terminals 2 and 4 of actuator, connect the negative (–) lead to terminals 1 and 3 of actuator.

OK:

Control arm moves to full close side

NG → **Replace cruise control actuator.**

OK

3	Check harness and connector between cruise control ECU and cruise control actuator (See page IN–27).

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

OK

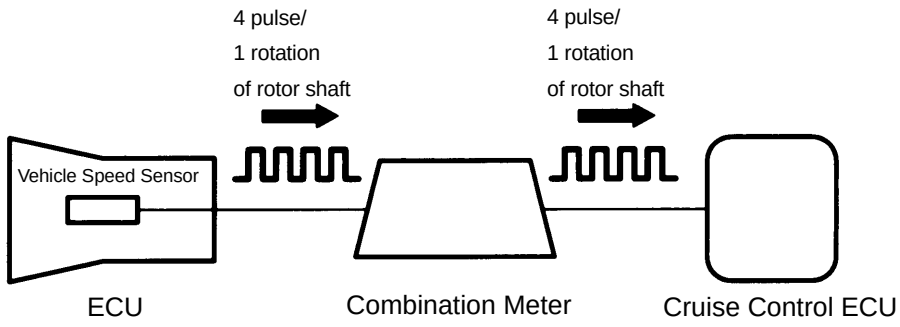
Check and replace cruise control ECU (See page IN–27).

DI0ER–01

DTC	21	Open in Vehicle Speed Sensor Circuit

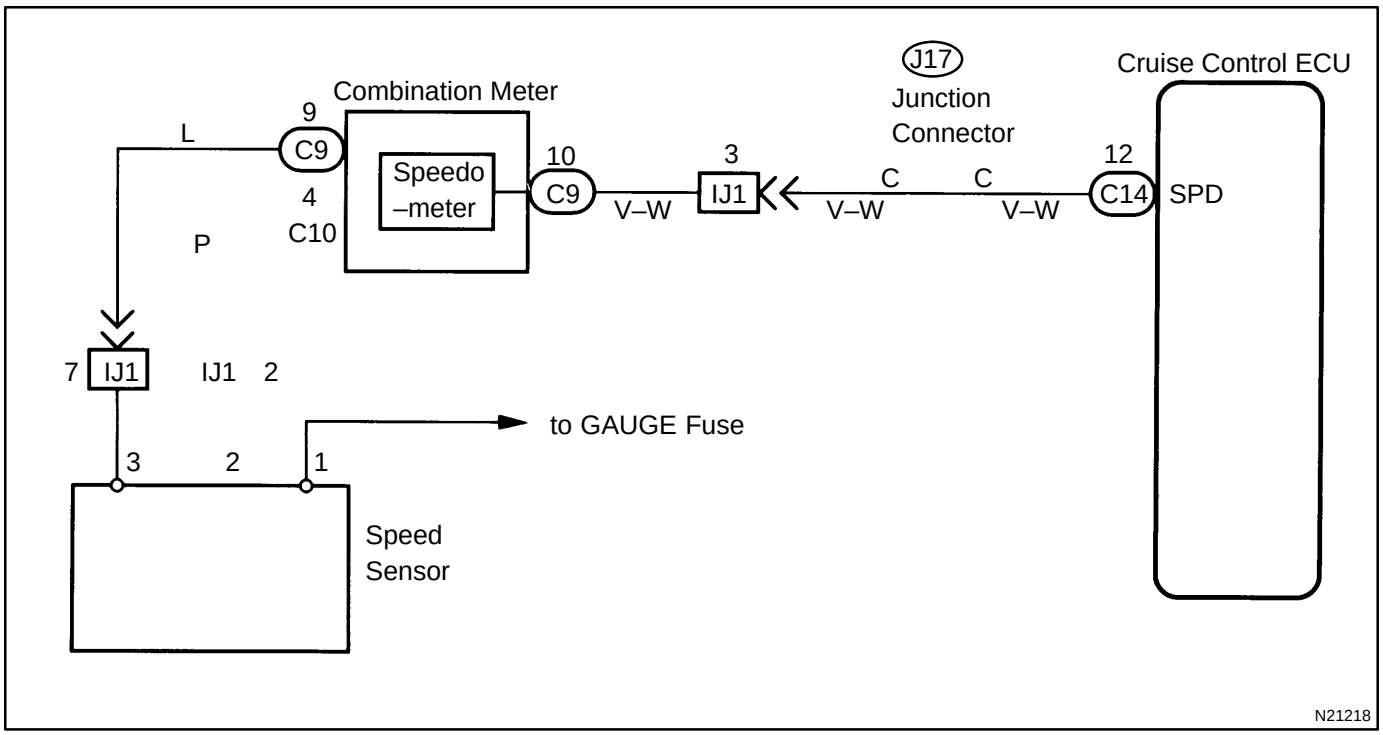
CIRCUIT DESCRIPTION

The vehicle speed sensor circuit is sent to cruise control ECU as vehicle speed signal.
The rotor shaft is driven by the gear of the transmission.
For each rotation of the shaft, the vehicle speed sensor sends a 4 pulse signal through the combination meter to the cruise control ECU (See the following).
This signal is converted inside the combination meter and sent as a 4–pulse signal to the cruise control ECU.
The ECU calculates the vehicle speed from this pulse frequency.



DTC No.	Detection Item	Trouble Area
21	●Speed signal is not input to the cruise control ECU while cruise control is set.	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Drive at about 40 km/h (25 mph) or below	Light: ON — OFF
Drive at about 40 km/h (25 mph) or higher	Light: ON / OFF 

CHECK:

(a) See input signal check on page DI–478.

(b) Check indicator light operation when driving with vehicle speed above 40 km/h (25 mph), and with vehicle speed below 40 km/h (25 mph).

OK:

Vehicle speed above 40 km/h (25 mph):
Indicator light blinks

Vehicle speed below 40 km/h (25 mph):
Indicator light stays on

OK → **Check and replace cruise control ECU (See page IN–27).**

NG

2	**Check speedometer circuit (See Combination meter troubleshooting on page BE–2).**

NG → **Repair or replace harness, connector or combination meter assembly.**

OK

3	**Check harness and connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor (See page DI–493).**

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

OK

4	**Check vehicle speed sensor (See page BE–92).**

NG → **Replace vehicle speed sensor.**

OK

Check and replace cruise control ECU (See page IN–27).

DI0ES–01

DTC	23	Vehicle Speed Signal Abnormal

CIRCUIT DESCRIPTION

See page DI–495.

DTC No.	Detection Item	Trouble Area
23	●Vehicle speed sensor pulse is abnormal.	●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM

See page DI–495.

INSPECTION PROCEDURE

1	**Check vehicle speed sensor (See page BE–92).**

NG → **Replace vehicle speed sensor.**

OK

Check and replace cruise control ECU (See page IN–27).

DI0EU–01

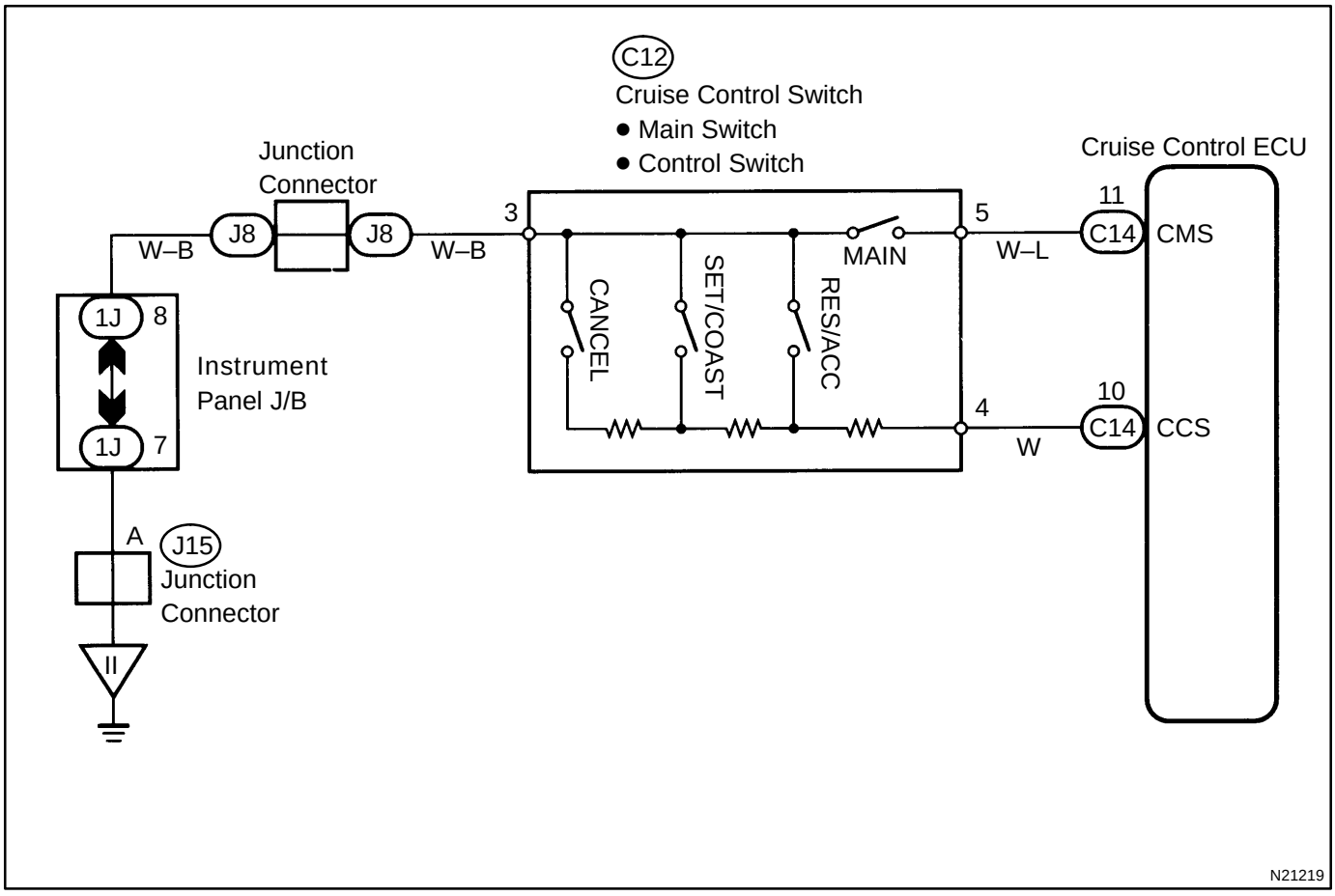
DTC	32	Control Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

This circuit carries the SET/COAST, RESUME/ACCEL and CANCEL signals (each voltage) to the ECU.

DTC No.	Detection Item	Trouble Area
32	□Short in control switch circuit.	□Cruise control switch □Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground □Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
SET/COAST switch	2 Pulses: ON / OFF
RESUME/ACCEL switch	3 Pulses: ON / OFF
CANCEL switch	SW OFF / SW ON: ON / OFF

PREPARATION:

See input signal check on page DI–478.

CHECK:

Check the indicator light operation when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned on.

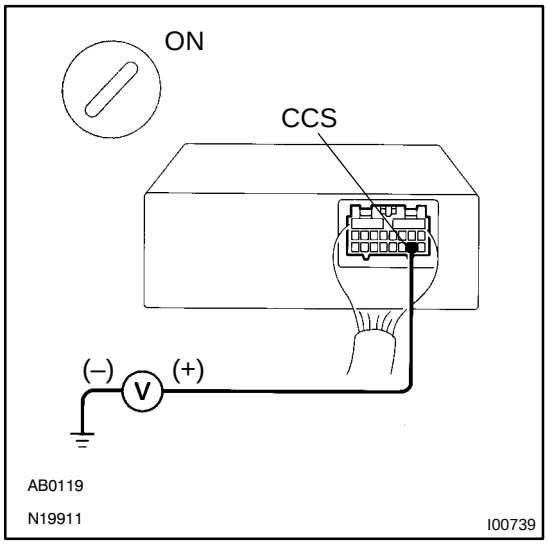
OK:

SET/COAST, RESUME/ACCEL switch
The signals shown in the table on the left should be output when each switch is ON. The signal should disappear when the switch is turned OFF.
CANCEL switch
The indicator light goes off when the cancel switch is turned ON.

OK	**Wait and see.**

NG

2	**Check voltage between terminals CCS of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.

CHECK:

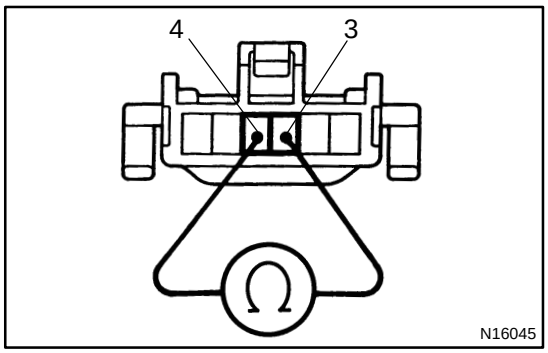
Measure voltage between terminals 18 of ECU connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

Switch position	Resistance (V)
Neutral	10 – 16 V
RES/ACC	0.8 – 3.7 V
SET/COAST	2.5 – 6.3 V
CANCEL	4.2 – 8.8 V

NG	**Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

OK

3	**Check control switch.**



PREPARATION:

(a) Remove steering wheel center pad.

(b) Disconnect the control switch connector.

CHECK:

Measure resistance between terminals 3 and 4 of control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
RES/ACC	50 – 80
SET/COAST	180 – 220
CANCEL	400 – 440

NG → **Replace control switch.**

OK ↓

4	**Check harness and connector between cruise control ECU and cruise control switch, cruise control switch and body ground (See page IN–27).**

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

OK ↓

5	**Input signal check (See step 1).**

OK → **Wait and see.**

NG ↓

Check and replace cruise control ECU (See page IN–27).

DI0EW–01

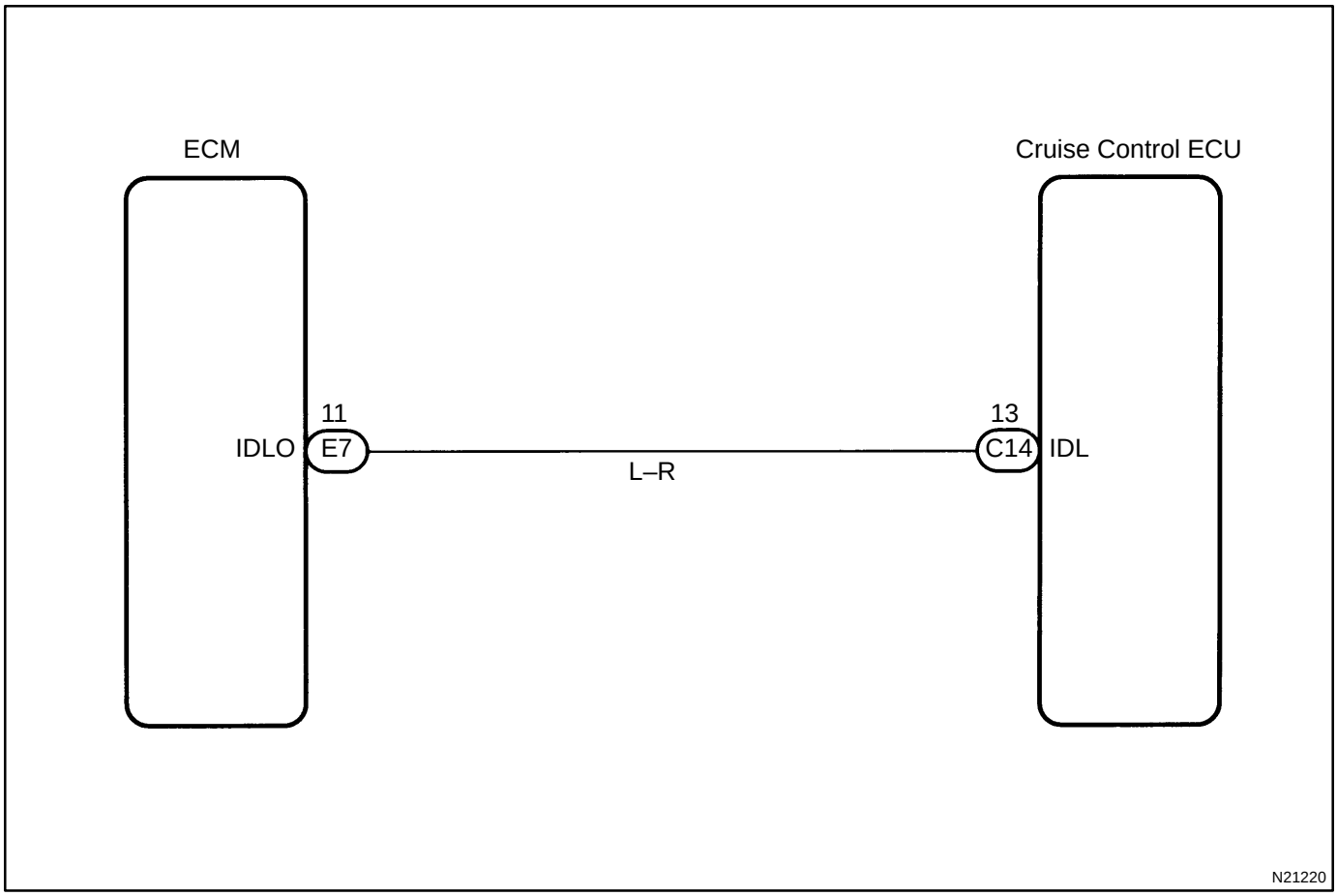
DTC	51	Idle Signal Circuit

CIRCUIT DESCRIPTION

When the idle switch in turned ON, a signal is sent to the ECU. The ECU uses this signal to correct the discrepancy between the throttle valve position and the actuator position sensor value to enable accurate cruise control at the set speed. If the idle switch is malfunctioning, problem symptoms also occur in the engine, so also inspect the engine.

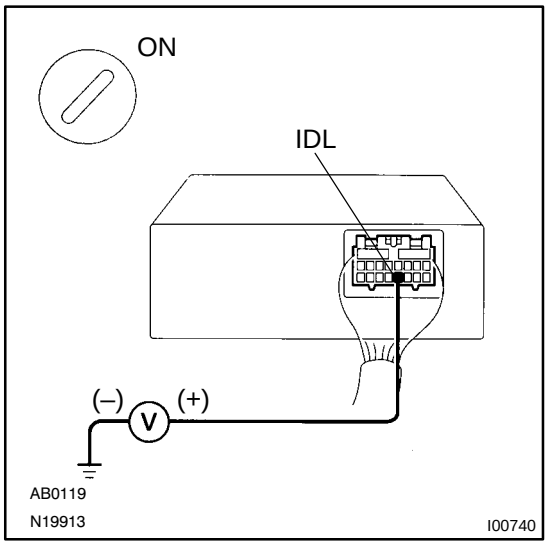
DTC No.	Detection Item	Trouble Area
51	●Short in idle signal circuit.	●Harness or connector between ECM and throttle position sensor ●Throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal IDL of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Disconnect the ECM connector.
(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminal IDL of ECU connector and body ground when the throttle valve is fully closed and fully opened.

OK:

Throttle valve position	Voltage
Fully opened	10 – 14 V
Fully closed	Below 2 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

2	**Check harness and connector between ECM and throttle position sensor (See page IN–27).**

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

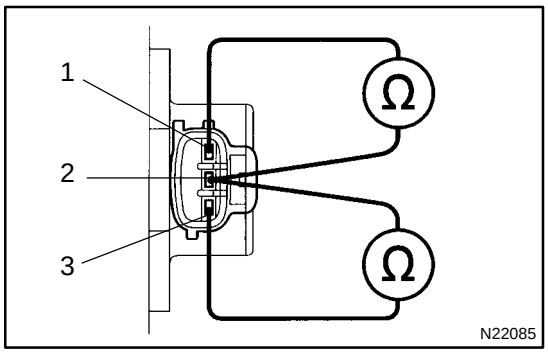
OK

3	**Check throttle position sensor circuit (See page DI–38).**

NG → **Replace throttle position sensor.**

OK

4	Check throttle position sensor.



PREPARATION:

Disconnect the throttle position sensor connector.

CHECK:

Measure resistance between terminals 1, 3 and 2 of throttle position sensor connector.

OK:

Terminals	Throttle valve position	Resistance
1 – 2	–	2.5 ~ 5.9 kΩ
2 – 3	Fully opened	0.2 ~ 6.3 kΩ
2 – 3	Fully closed	2.0 ~ 10.2 kΩ

NG → **Replace throttle position sensor.**

OK

5	Check for open and short in harness and connector between cruise control ECU and ECM (See page IN–27).

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

OK

Check and replace cruise control ECU (See page IN–27).

DI0EZ–01

Stop Light Switch Circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECU. When the 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 conditions are: Battery positive voltage at terminal STP–

When the brake is on, battery positive voltage normally applies through the STOP fuse and stop light switch to terminal STP– of the ECU, and the ECU turns the cruise control off.

If the harness connected to terminal STP– has an open circuit, terminal STP– will have battery positive voltage and the cruise control will be turned off.

Also, when the brake is on, the magnetic clutch circuit is cut mechanically by the stop light switch, turning the cruise control off. (See page DI–490 for operation of the magnetic clutch)

WIRING DIAGRAM

See page DI–490.

INSPECTION PROCEDURE

1	**Check operation of stop light.**

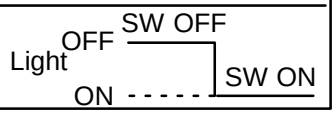
CHECK:

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–2).**

OK

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Stop Light switch ON	

CHECK:

(a) See input signal check on DI–478.

(b) Check the indicator light when the brake pedal is depressed.

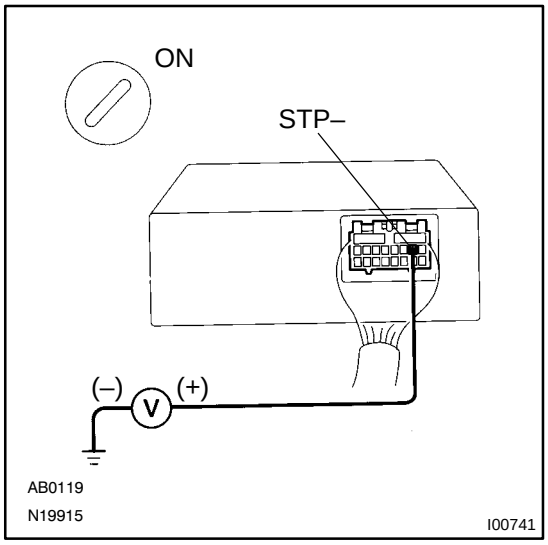
OK:

The indicator light goes off when the brake pedal is depressed.

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

3	Check voltage between terminal STP– of cruise control ECU connector and body ground.



PREPARATION:

(a) Remove the ECU with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP– of cruise control 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 on problem symptom table (See page DI–487).**

NG

4	Check for open in harness and connectors between terminal STP– of cruise control ECU and stop light switch (See page IN–27).

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

OK

Check and replace cruise control ECU (See page IN–27).

DI0F2–01

Electronically Controlled Transmission Communication Circuit

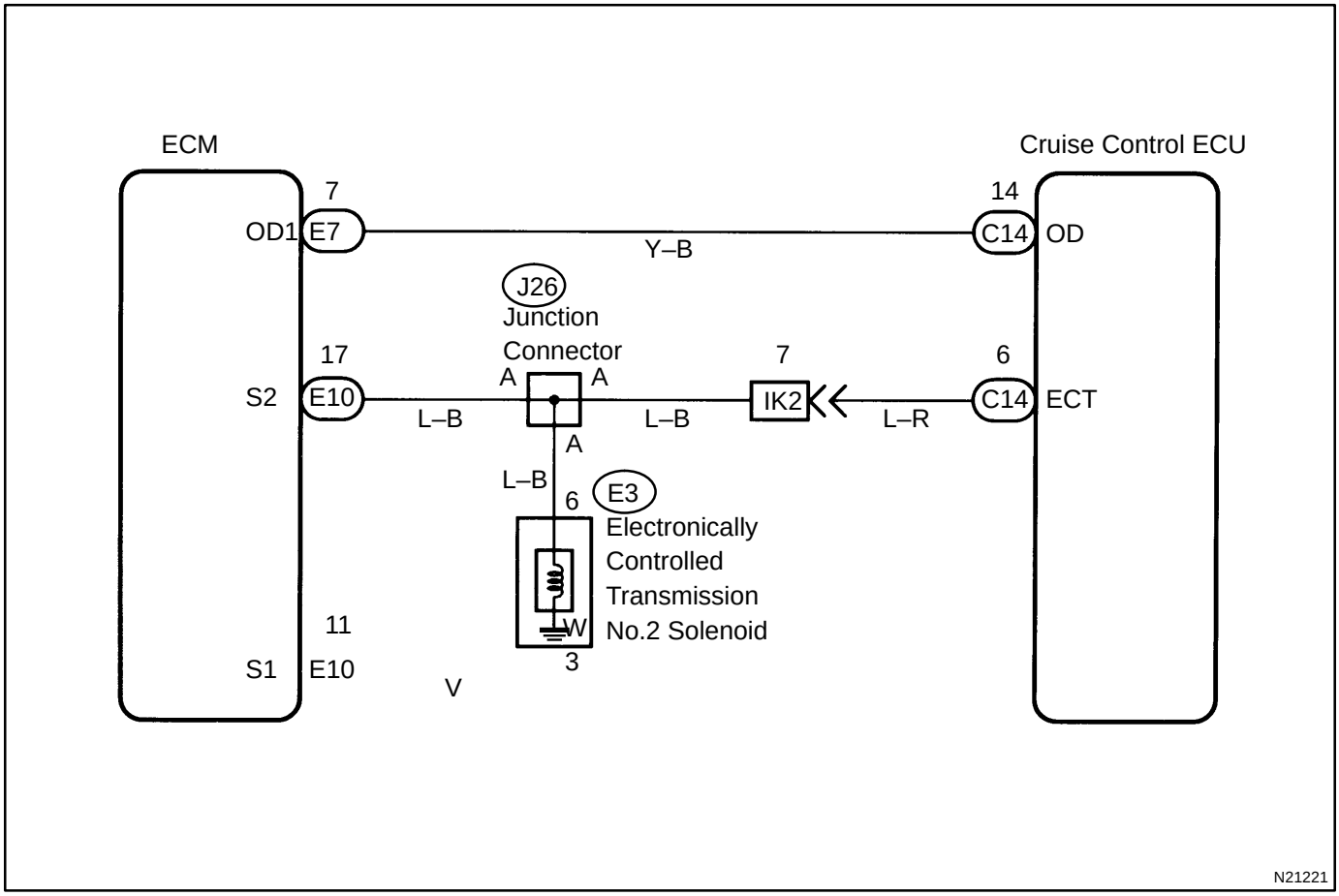
CIRCUIT DESCRIPTION

When driving uphill under cruise control, in order to reduce shifting due to ON–OFF overdrive operation and to provide smooth driving, when down shifting in the electronically controlled transmission occurs, a signal to prevent upshift until the end of the up hill slope is sent from the cruise control ECU to the electronically controlled transmission.

Terminal ECT of the cruise control ECU detects the shift change signal (output to electronically controlled transmission No. 2 solenoid) from the ECM.

If vehicle speed down, also when terminal ECT of the cruise control ECU receives down shifting signal, it sends a signal from terminal OD to ECM to cut overdrive until the end of the uphill slope, and the gear shifts are reduced and gear shift points in the electronically controlled transmission are changed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of overdrive.**

PREPARATION:

Test drive after engine warms up.

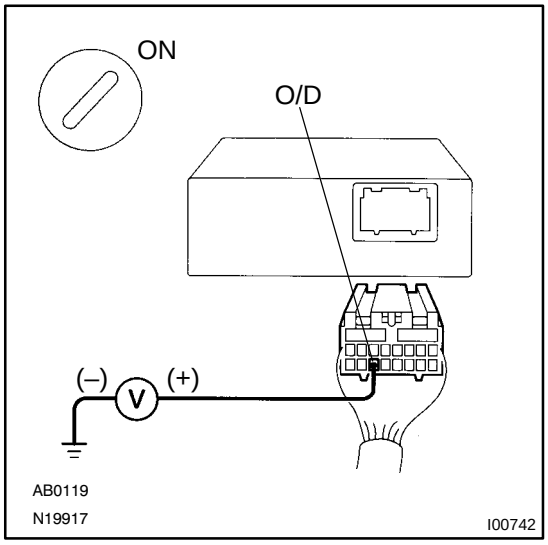
CHECK:

Check that overdrive ON ↔ OFF occurs with operation of OD switch ON–OFF.

NG → **Check and repair electronically controlled transmission.**

OK

2	**Check voltage between terminal OD of harness side connector of cruise control ECU and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.
(c) Disconnect the ECU connector.

CHECK:

Measure voltage between terminal OD of harness side connector of ECU and body ground.

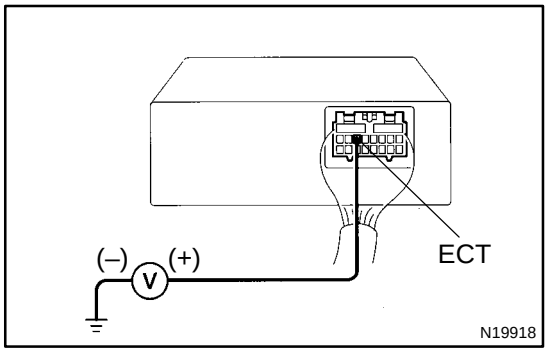
OK:

Voltage: 10 – 14 V

NG → **Go to step 5.**

OK

3	Check voltage between terminal ECT of cruise control ECU connector and body ground (On test drive).



PREPARATION:

(a) Connect the ECU connector.

(b) Test drive after engine warms up.

CHECK:

Check voltage between terminal ECT of ECU connector and body ground when OD switch is ON and OFF.

OK:

OD switch position	Voltage
ON	8 – 14 V
OFF	Below 0.5 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

4	Check harness and connector between terminal ECT of cruise control ECU and electronically controlled transmission solenoid (See page IN–27).

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

OK

Check and replace cruise control ECU.

5	Check harness and connector between terminal OD of cruise control ECU and terminal OD1 of ECM (See page IN–27).

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

OK

Check and replace cruise control ECU (See page IN–27).

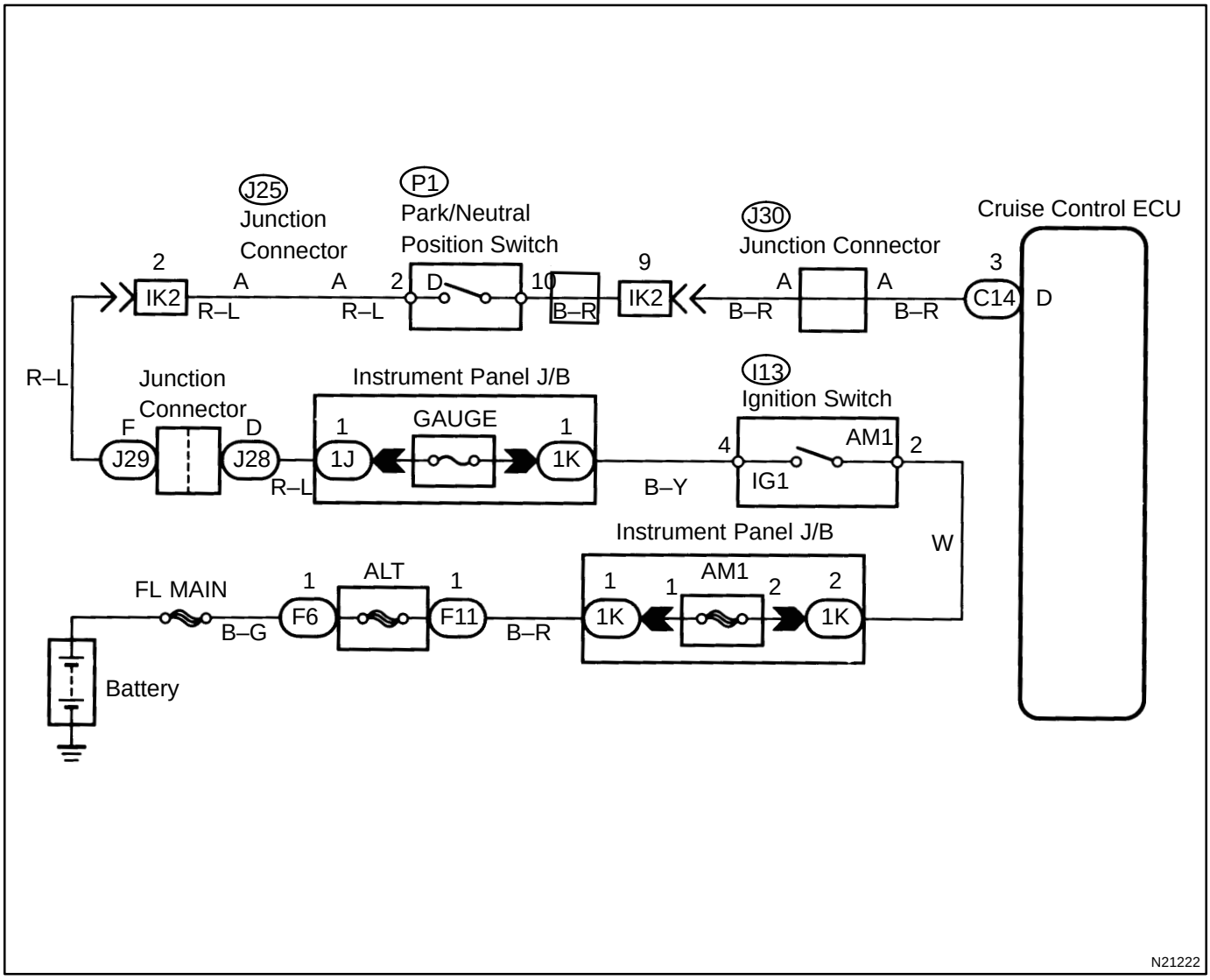
DI0F4–01

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

When the shift position is put in except D position, a signal is sent from the park/neutral position switch to the ECU. When this signal is input during cruise control driving, the ECU cancels the cruise control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check starter operation.**

CHECK:

Check that the starter operates normally and that the engine starts.

NG → **Proceed to engine troubleshooting. (See page ST–1).**

OK ↓

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Turn PNP switch OFF (Shift to except D position)	Light: ON (SW ON) / OFF (SW OFF)

PREPARATION:

See input signal check on page DI–478.

CHECK:

Check the indicator light when shifting into except D position.

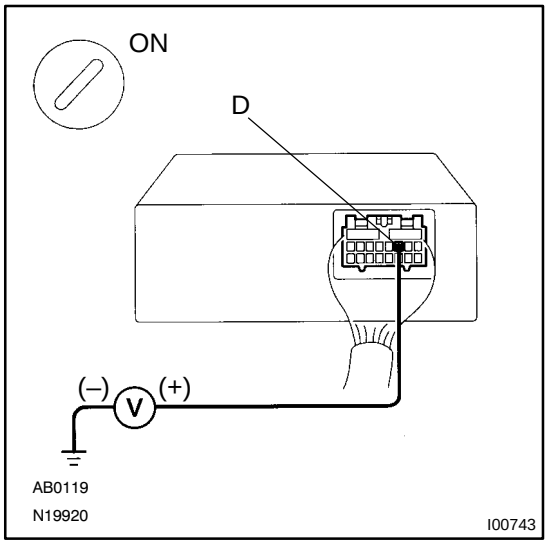
OK:

The indicator light goes off when shifting into except D position.

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG ↓

3	Check voltage between terminal D of cruise control ECU connector and body ground.



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminal D of ECU connector and body ground when shifting into D position and other positions.
OK:

Shift Position	Voltage
D position	10 – 14 V
Other positions	Below 1 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

4	Check harness and connector between cruise control ECU and park/neutral position switch (See page IN–27).

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

OK

Check and replace cruise control ECU (See page IN–27).

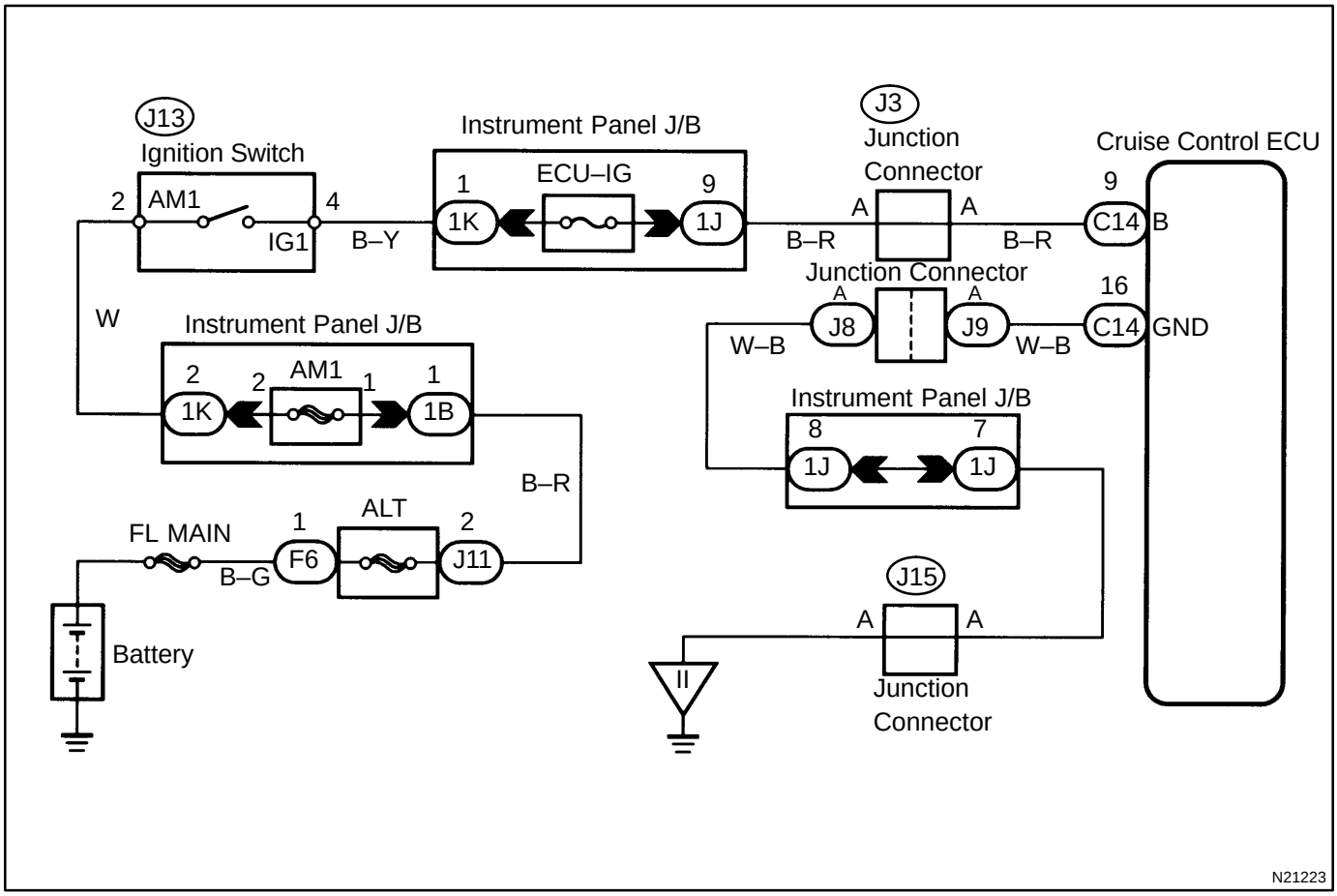
DI0F6–01

ECU Power Source Circuit

CIRCUIT DESCRIPTION

The ECU power source supplies power to the actuator and sensors, etc.. When terminal GND and the cruise control ECU case are grounded.

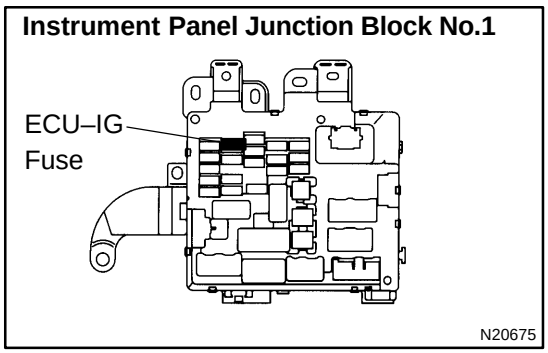
WIRING DIAGRAM



N21223

INSPECTION PROCEDURE

1	Check ECU–IG fuse.

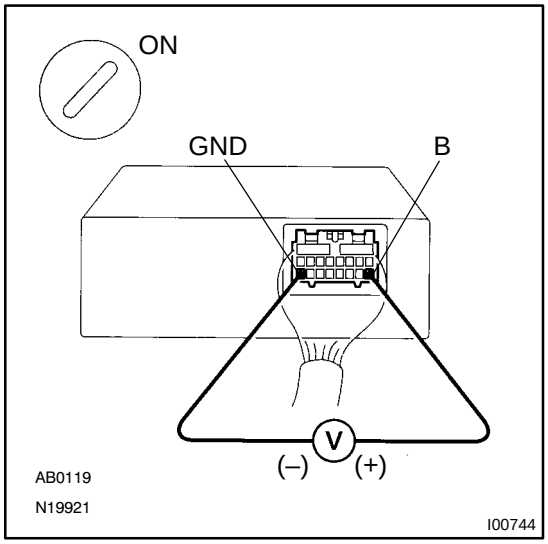


PREPARATION:
Remove the ECU–IG fuse from instrument panel junction block No.1.
CHECK:
Check continuity of ECU–IG fuse.
OK:
Continuity

NG → **Check for short in all the harness and components connected to ECU–IG fuse.**

OK ↓

2	Check voltage between terminals B and GND of cruise control ECU connector.

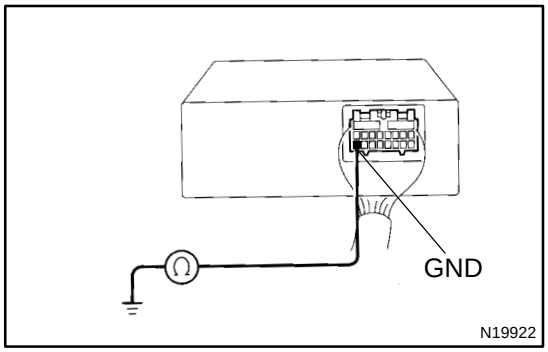


PREPARATION:
(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.
CHECK:
Measure voltage between terminals B and GND of ECU connector.
OK:
10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG ↓

3	**Check resistance between terminal GND of cruise control ECU connector and body ground.**



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.
OK:
Resistance: Below 1 Ω

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

OK

Check and repair harness and connector between cruise control ECU and battery (See page IN–27).

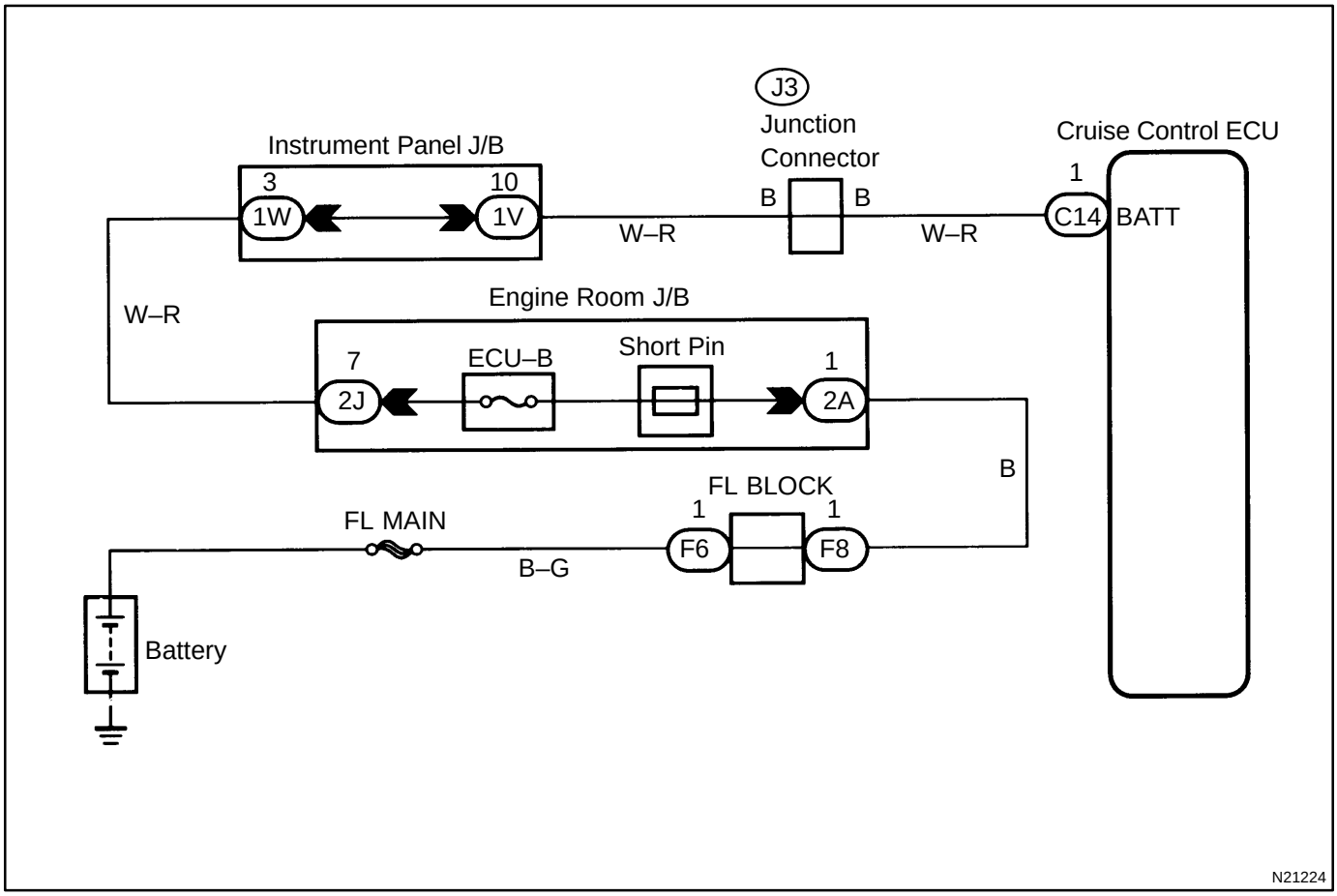
DI0F8–01

Back–up Power Source Circuit

CIRCUIT DESCRIPTION

The ECU back–up power source provides power even when the ignition is off and is used for DTC memory, etc..

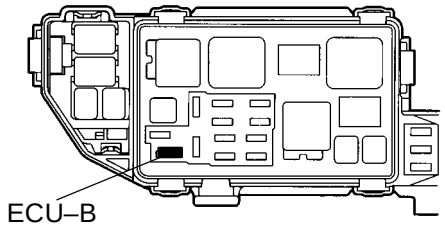
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check ECU–B fuse.

Engine Room Junction Block No.2

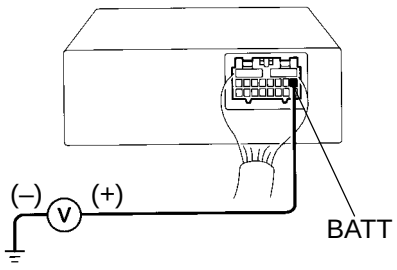


PREPARATION:
Remove the ECU–B fuse from engine room junction block No.2.
CHECK:
Check continuity of ECU–B fuse.
OK:
Continuity

NG → **Check for short in all the harness and components connected to the ECU–B fuse.**

OK

2	Check voltage between terminal BATT of cruise control ECU connector and body ground.



PREPARATION:
Remove the ECU with connector still connected.
CHECK:
Measure voltage between terminal BATT of ECU connector and body ground.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

Check and repair harness and connector between battery and cruise control ECU (See page IN–27).

DI0FA–01

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

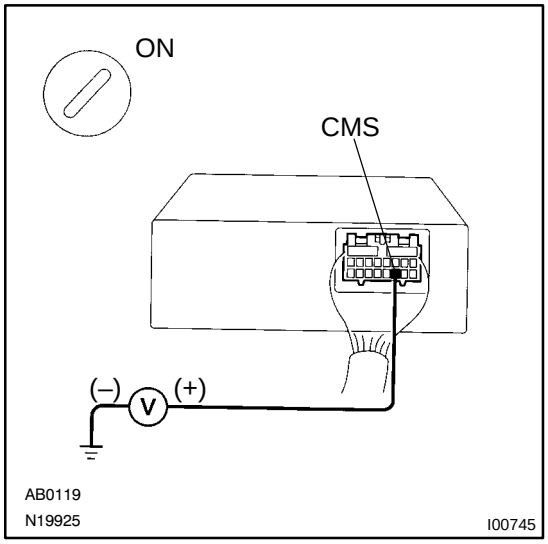
When the cruise control main switch is turned off, the cruise control does not operate.

WIRING DIAGRAM

See page DI–499.

INSPECTION PROCEDURE

1	**Check voltage between terminal CMS of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CMS of cruise control ECU connector when main switch is held on and off.

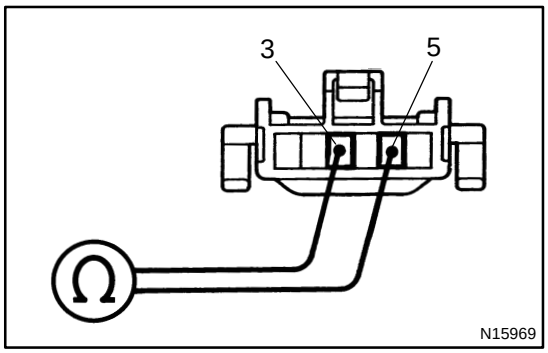
OK:

Main switch	Voltage
OFF	10 – 14 V
ON	Below 0.5 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

2	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad (See page SR–11).

(b) Disconnect the control switch connector.

CHECK:

Check continuity between terminals 3 and 5 of control switch connector when main switch is held on and off.

OK:

Switch position	Tester connection	Specified condition
OFF	3 – 5	No continuity
Hold ON	3 – 5	Continuity

NG → **Replace control switch.**

OK ↓

3	Check harness and connector between cruise control ECU and main switch (See page IN–27).

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

OK ↓

Check and replace cruise control ECU (See page IN–27).

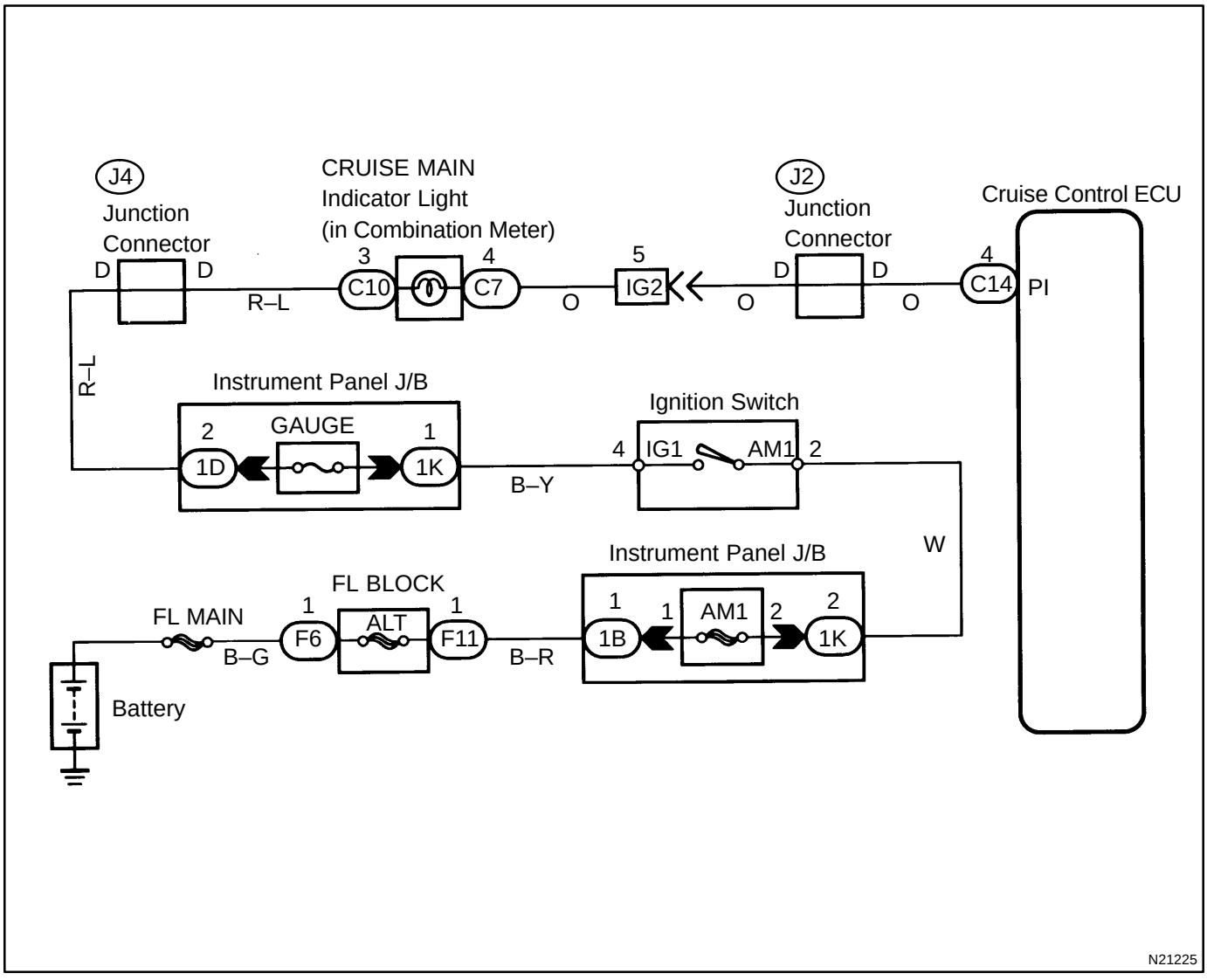
DI0FD–01

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

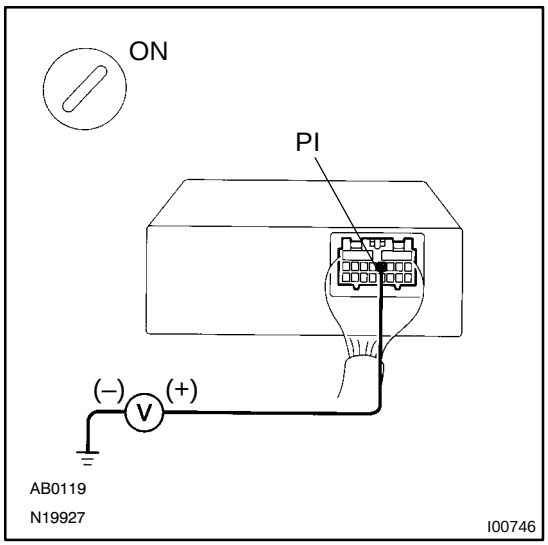
When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals PI and GND of cruise control ECU connector.**



PREPARATION:
Tun ignition switch ON.
CHECK:
Measure voltage between terminals PI and GND of cruise control ECU connector when main switch on and off.
OK:

Switch position	Voltage
OFF	10 – 16 V
ON	Below 1.2 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

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

NG → **Replace combination meter.**

OK

Check and replace cruise control ECU (See page IN–27).

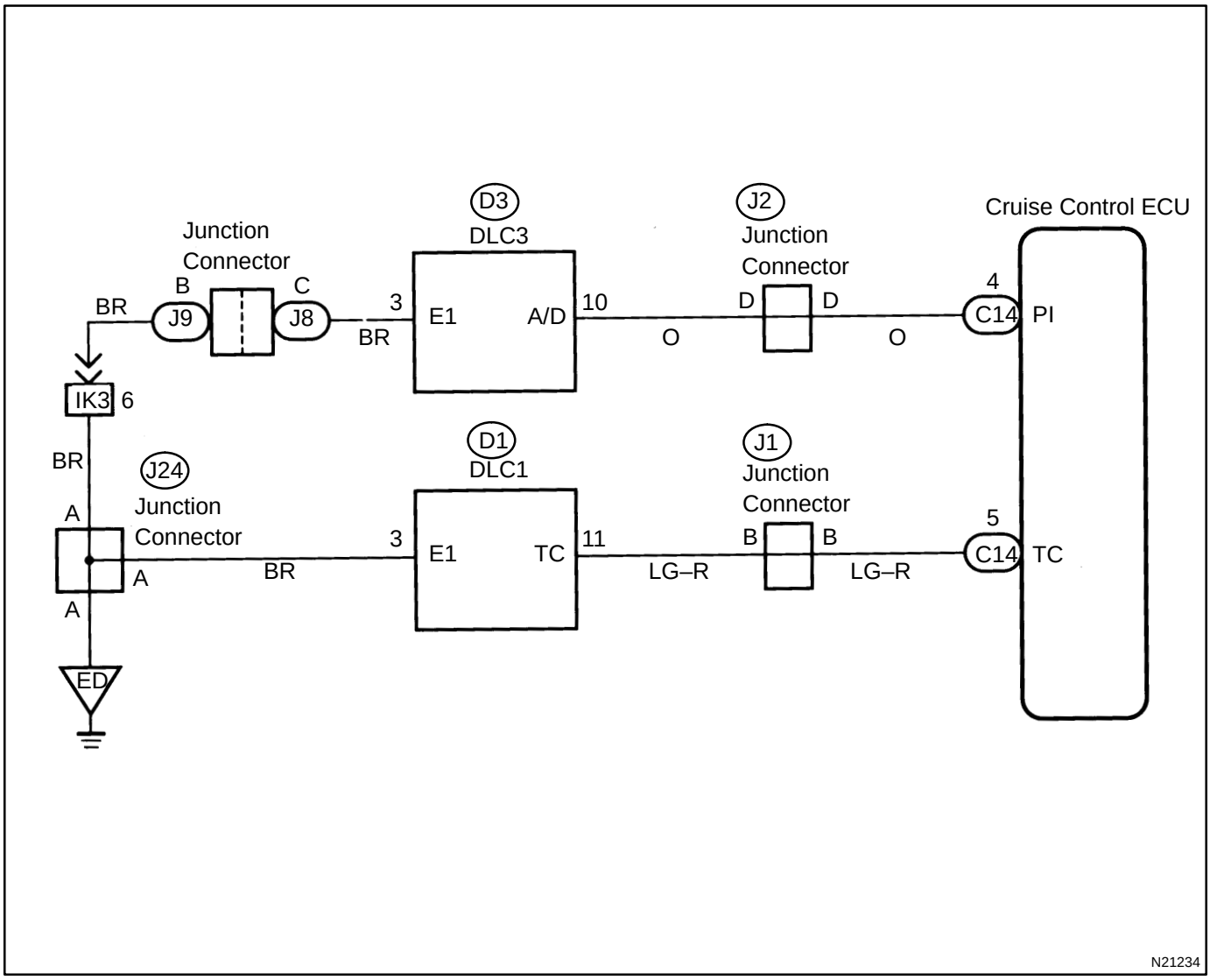
DI0FF–01

Diagnosis Circuit

CIRCUIT DESCRIPTION

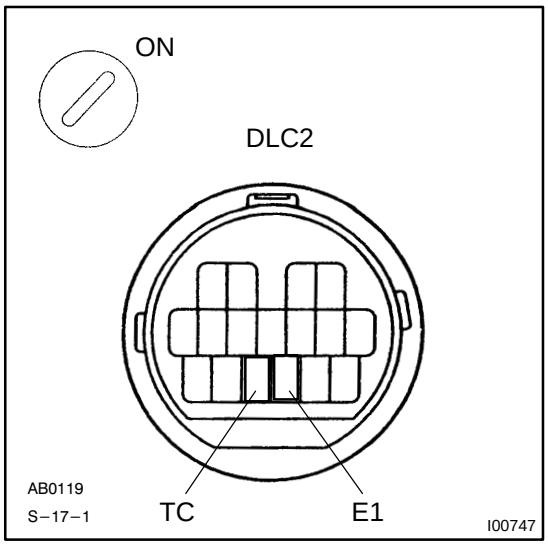
This circuit sends a signal to the ECU that DTC output is required.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals Tc and E_1 of DLC2.
OK:
Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptom table (See page DI–487).**

NG

2	**Check harness and connector between cruise control ECU and DLC2, DLC2 and body ground (See page IN–27).**

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

OK

Check and replace cruise control ECU (See page IN–27).

DI0FH–01

Actuator Control Cable

INSPECTION PROCEDURE

1	**Actuator control cable inspection**

OK:

(a) Check that the actuator, control cable throttle link are properly installed and that the cable and link are connected correctly.

(b) Check that the actuator and bell crank are operating smoothly.

(c) Check that the cable is not loose or too tight.

OK:

Freeplay: less than 10 mm

HINT:

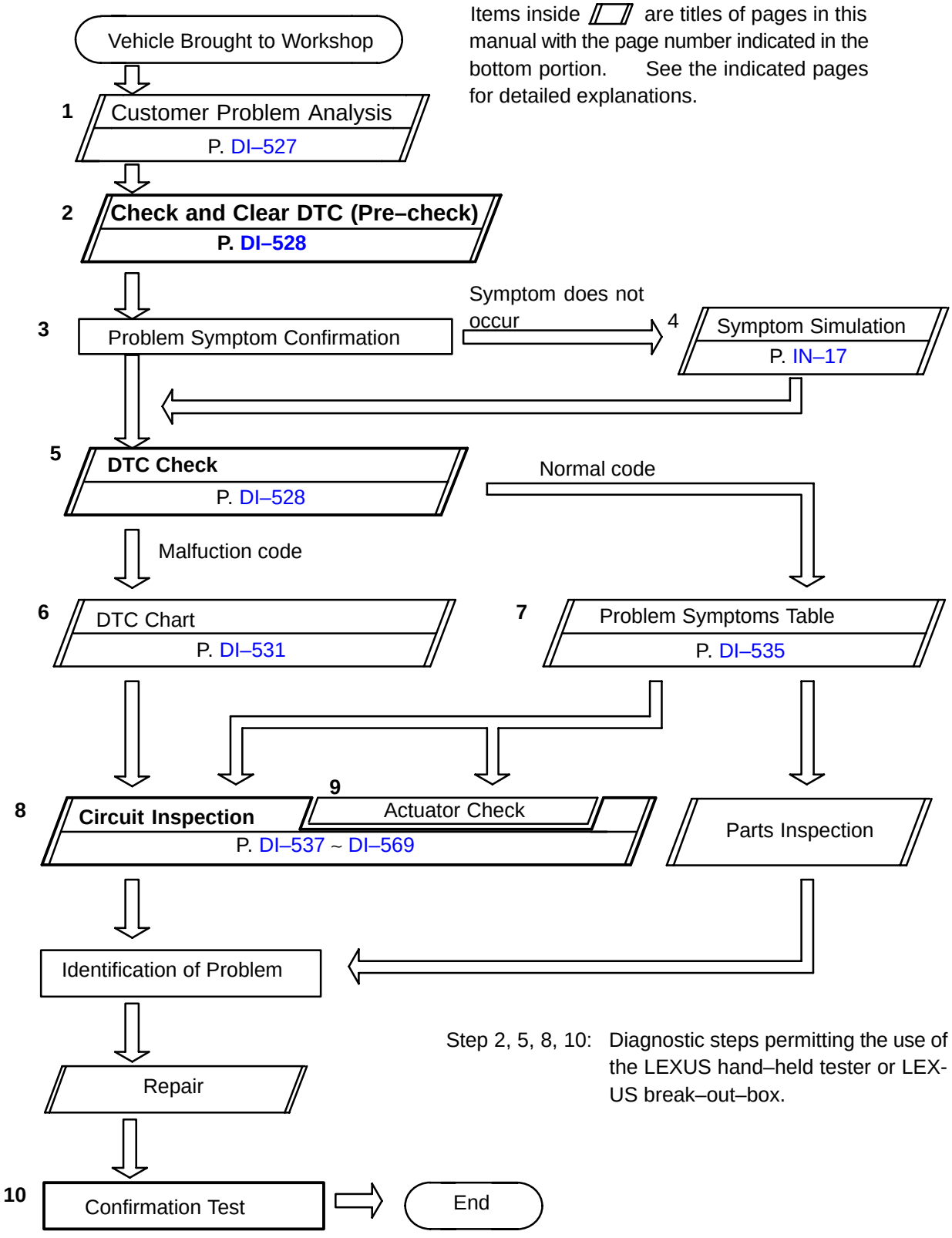
- If the control cable is very loose, the vehicle's loss of speed going uphill will be large.
- If the control cable is too tight, the idle RPM will become high.

AIR CONDITIONING SYSTEM

DI0D2–01

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.



DI0D3–01

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

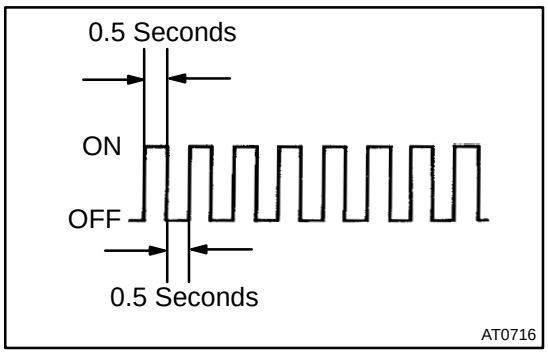
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date vehicle Brought In	/ /	**Odometer Reading**	**km Miles**

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 doe 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 rese ● 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 change ● Will not enter the desired mode

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

DI0D4–01



PRE–CHECK

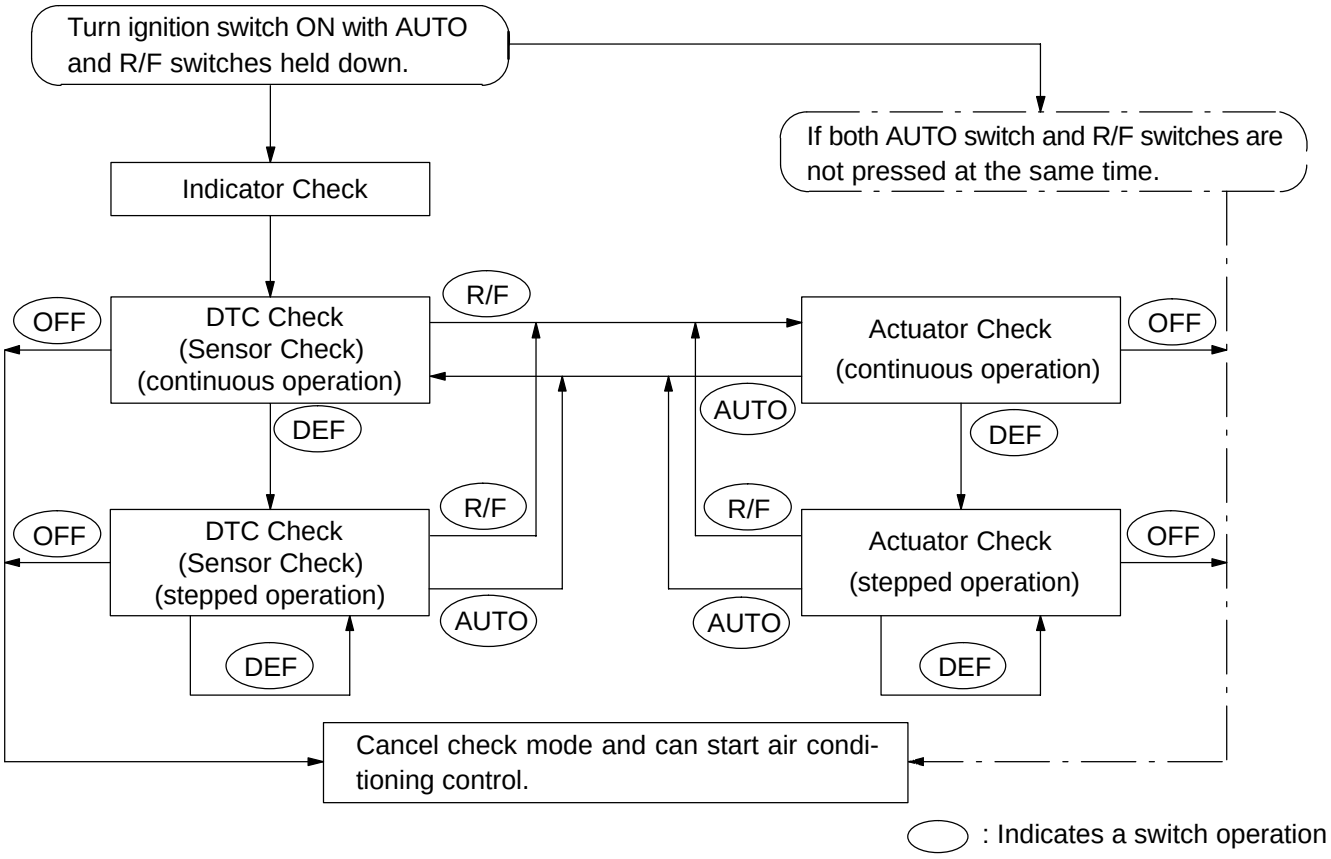
1. WARNING FOR A/C COMPRESSOR LOCK

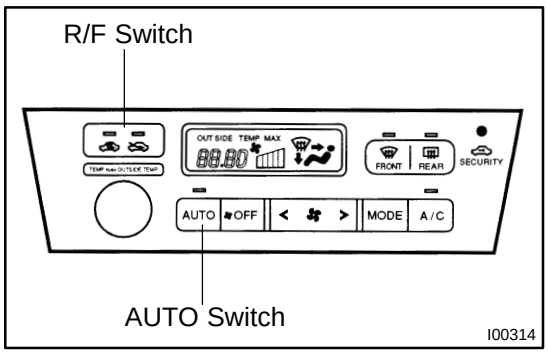
If compressor lock occurs during air conditioning operation, the A/C switch indicator on the air conditioning control assembly starts blinking to warn the driver.

When this occurs, check for compressor lock (DTC 22) using DTC check then proceed to inspect the circuit or the component (See page DI–552).

2. LIST OF OPERATION METHODS

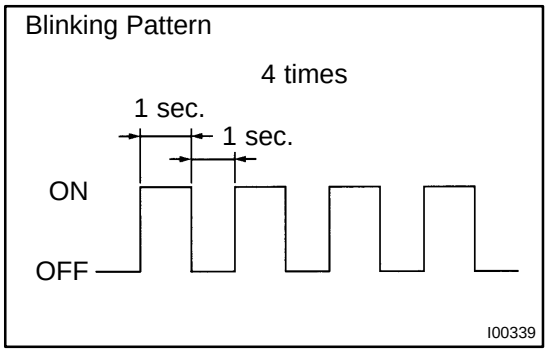
By operating each of the air conditioning control switches as shown the diagram below, it is possible to enter the diagnosis check mode.





3. INDICATOR CHECK

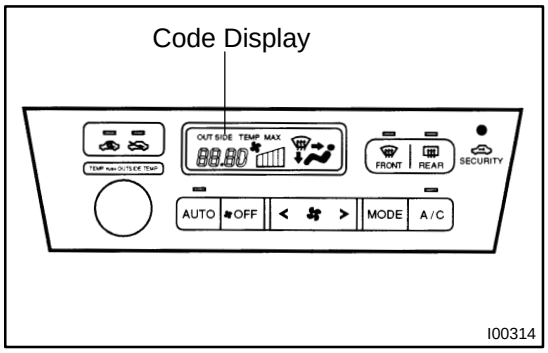
(a) Turn the ignition switch on while pressing the air conditioning control AUTO switch and R/F switch simultaneously.



(b) Check that the indicators light up and go off at second intervals 4 times in succession.

HINT:

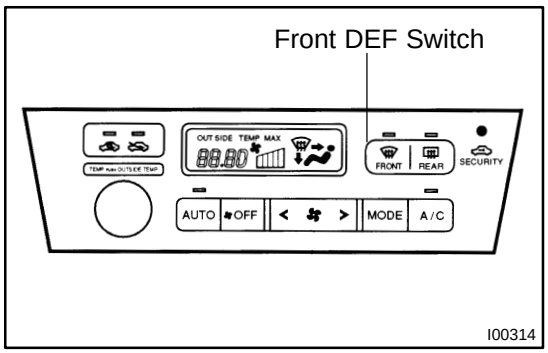
- After the indicator check is completed, the system enters the DTC begins automatically.
- Press the OFF switch when desiring to cancel the check mode.



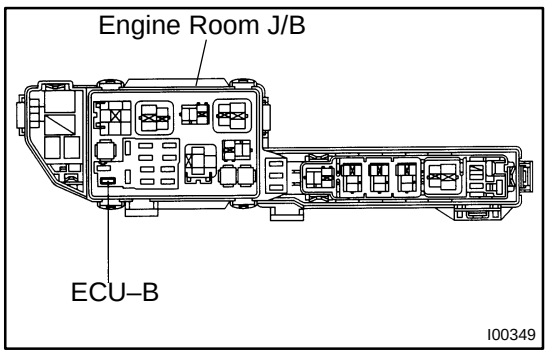
4. DTC CHECK (SENSOR CHECK)

(a) Perform an indicator check. After the indicator check is completed, the system enters the DTC check mode automatically.

(b) Read the code displayed on the panel. Refer to the list of codes on page DI–531 when reading the codes. (Trouble code are output at the temperature display.)



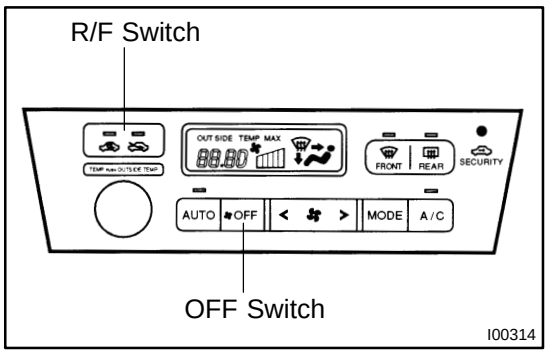
(c) If the slower display is desired, press the front DEF switch and change it to stepped operation. Each time the front DEF switch is pressed, the display changes by 1 step.



5. CLEARING DTC

(a) Pull out the ECU–B fuse in engine room J/B for 10 sec. or longer to clear the DTC memory.

(b) After reinserting the fuse, check that the normal code is output.



6. ACTUATOR CHECK

(a) After entering the DTC check mode (Sensor Check Mode) press the R/F switch.

(b) Since each damper, motor and relay automatically operates at 1 second intervals beginning in order from 10 in the temperature display, check the temperature and air flow visually and by hand.

If the slower display is desired, press the DEF switch and change it to step operation. Each time the DEF switch is pressed, the display changes by 1 step.

HINT:

- Code are displayed in order from the smaller to the larger numbers.
- To cancel the check mode, press the OFF switch.

Step No.	Display Code	Conditions				
		Blower Motor	Air Flow Vent	Air Inlet Damper	Magnetic Clutch	Air Mix Damper
1	0	OFF	FACE	FRESH	OFF	Cool side (0 % open)
2	1	1	FACE	FRESH	OFF	Cool side (0 % open)
3	2	3	FACE	FRESH	ON	Cool side (0 % open)
4	3	3	FACE	FRS/REC	ON	Cool side (0 % open)
5	4	3	FACE	RECIRC	ON	Cool/Hot (50 % open)
6	5	3	BI–LEVEL	RECIRC	ON	Cool/Hot (50 % open)
7	6	3	FOOT	RECIRC	ON	Hot side (100 % open)
8	7	3	FOOT	RECIRC	ON	Hot side (100 % open)
9	8	3	FOOT/DEF	RECIRC	ON	Hot side (100 % open)
10	9	5	DEF	RECIRC	ON	Hot side (100 % open)

DI0D5–01

DIAGNOSTIC TROUBLE CODE CHART

If malfunction code is displayed during the DTC check (sensor check), check the circuit listed for that code in the table below (Proceed to the page given for that circuit).

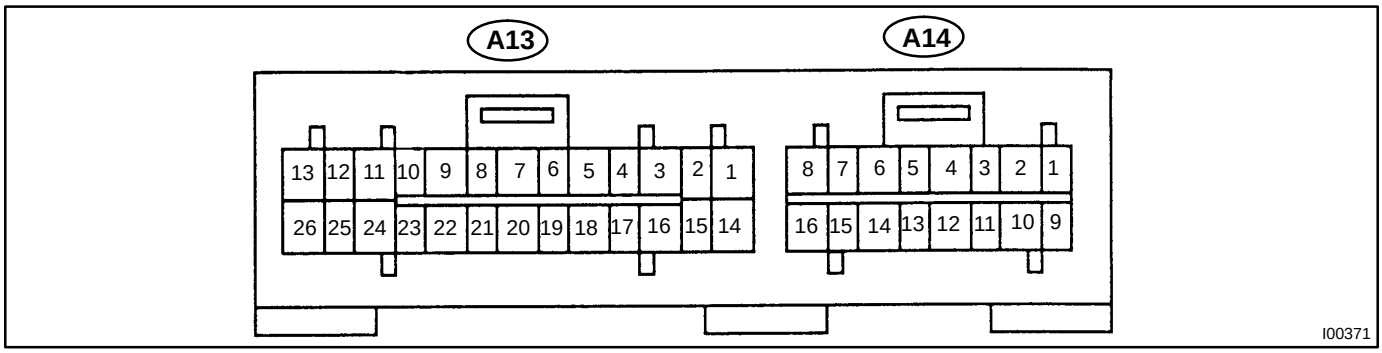
DTC No. (See Page)	Detection Item	Trouble Area	Memory
00	Normal	–	–
11*1 (DI–537)	Room temperature sensor circuit	●Room temp. Sensor ●ECU ●Harness or connector between room temp. sensor and A/C control assembly	□ (8.5 min. or more)
12*2 (DI–540)	Ambient temperature sensor circuit	●Ambient temp. Sensor ●Harness or connector between ambient temp. sensor and ECU ●ECU	□ (8.5 min. or more)
13 (DI–543)	Evaporator temperature sensor circuit	●Evaporator temp. Sensor ●Harness or connector between evaporator temp. sensor and ECU ●ECU	□ (8.5 min. or more)
14 (DI–546)	Engine coolant temperature sensor circuit	●Engine coolant temp. sensor ●Harness or connector between engine coolant temp. sensor and ECU ●Harness or connector between ECM and A/C ECU ●ECU	–
21*3 (DI–549)	Solar sensor circuit (short)	●Solar sensor ●Harness or connector between solar sensor and ECU ●ECU	□ (8.5 min. or more)
	Solar sensor circuit (open)		–
22*4 (DI–552)	Compressor lock sensor circuit	●Compressor Drive Belt ●Compressor lock sensor ●Compressor ●Harness or connector between compressor and ECU, compressor lock sensor ●ECU	–
23 (DI–554)	Pressure sensor circuit	●Pressure switch ●Harness or connector between pressure switch and ECU ●Refrigerant pipe line ●ECU	–
31 (DI–557)	Air mix damper position sensor circuit	●Air mix damper position sensor ●ECU ●Harness or connector between air mix damper position sensor and ECU	□ (1 min. or more)
32 (DI–560)	Air inlet damper position sensor circuit	●Air inlet damper position sensor ●ECU ●Harness or connector between air inlet damper position sensor and ECU	□ (1 min. or more)
41 (DI–557 DI–563)	Air mix control servomotor	●Air mix control servomotor ●Air mix damper position sensor ●Harness or connector between air mix damper servomotor and ECU ●ECU	□ (15 sec.)
42 (DI–560 DI–566)	Air inlet control servomotor	●Air inlet control servomotor ●Air inlet damper position sensor ●Harness or connector between air inlet damper, servomotor and ECU ●ECU	□ (15 sec.)

HINT:

- *1: If the room temp. is approx. –18.6˚C (–3.7˚F) or lower, trouble code 11 may be output even though the system is normal.
- *2: If the ambient temp. is approx. –52.9˚C (–61.4˚F) or lower, a malfunction code may be output even though the system is normal.
- *3: If the check is being performed in a dark place, DTC 21 (solar sensor circuit abnormal) could be displayed.
- *4:Compressor lock (DTC22) is indicated only for a current occurring malfunction (See page DI–552). To confirm DTC 22, perform the following steps.
  (1) With the engine ON, enter the DTC check mode.
  (2) Press the F/R switch to enter actuator check mode, and set the operation to Step No.3.
  (3) Press the AUTO switch to return to DTC check mode.
  (4) The DTC is displayed after approx. 3 secs..
- *5: The ECU memorizes the DTC of the respective malfunction it has occurred for the period of the time indicated in the brackets.

DI0D6–01

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
MGCR ↔ GND (A14–2 ↔ A13–14)	L–Y ↔ W–B	Start the engine and push AUTO switch. A/C switch ON	Below 1 V
		Start the engine and push AUTO switch. A/C switch OFF	10 – 14 V
TAM ↔ SG (A14–3 ↔ A13–1)	Y ↔ W–R	IG ON. Ambient Temp.: 25 °C (77 °F)	1.35 – 1.75 V
		IG ON. Ambient Temp.: 40 °C (104 °F)	0.85 – 1.25 V
TR ↔ SG (A14–4 ↔A13–1)	G–Y ↔ W–R	IG ON. Room Temp.: 25 °C (77 °F)	1.8 – 2.2 V
		IG ON. Room Temp.: 40 °C (104 °F)	1.2 – 1.6 V
TS ↔ SG (A14–5 ↔ A13–1)	W ↔ W–R	IG ON. Sensor subjected to electrical light.	1 V or more
		IG ON. Sensor covered by cloth	Below 1 V
TE ↔ SG (A14–6 ↔ A13–1)	L–W ↔ W–R	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
TPI ↔ SG (A14–7 ↔ A13–1)	P–L ↔ W–R	Push Recircu Switch	3.5 – 4.5 V
		Push Fresh Switch	0.5 – 1.8 V
TP ↔ SG (A14–8 ↔ A13–1)	B–Y ↔ W–R	Set Temp.: Max. Cool	3.5 – 4.5 V
		Set Temp.: Max. Hot	0.5 – 1.8 V
PSW ↔ GND (A14–9 ↔ A13–14)	L–B ↔ W–B	IG ON.	Below 1 V
ACT ↔ GND (A14–10 ↔ A13–14)	LG–R ↔ W–B	Start the Engine (Idling). Operate the Compressor	10 – 14 V
		Start the Engine (Idling). Do not operate Compressor	Below 1.5 V
AC1 ↔ GND (A14–13 ↔ A13–14)	B–Y ↔ W–B	Start the engine. A/C Switch ON.	Below 1 V
		Start the engine. A/C Switch OFF.	More than 1 V
TW2 ↔ SG (A14–14 ↔ A13–1)	V ↔ W–R	Engine Coolant Temp.: 0 °C (32 °F)	2.8 – 3.8 V
		Engine Coolant Temp.: 40 °C (104 °F)	1.8 – 2.2 V
		Engine Coolant Temp.: 70 °C (158 °F)	0.9 – 1.3 V
BLW ↔ GND (A14–16 ↔ A13–14)	B–W ↔ W–B	IG ON. Operate the Blower Motor	Below 1.5 V
SG ↔ Body (A13–1 ↔ Body Ground)	W–R ↔ Body Ground	Always	1 Ω or less
ILL ↔ GND (A13–2 ↔ A13–14)	G ↔ W–B	Turn the Light Control Switch to TAIL position.	10 – 14 V
LOCK ↔ GND (A13–3 ↔ A13–14)	W–L ↔ W–B	IG OFF. at 20 °C (68 °F)	65 – 125 Ω
FACE ↔ GND (A13–4 ↔ A13–14)	L–W ↔ W–B	IG ON. Air Flow: FACE	Below 1 V
SECU ↔ GND (A13–5 ↔ A13–14)	↔ W–B	IG ON.	Below 1 V

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
AIF ↔ AIR (A13–6 ↔A13–7)	L–Y ↔ R	IG ON.	13 – 19 Ω
AMC ↔ AMH (A13–8 ↔ A13–9)	P ↔ G–R	IG ON.	13 – 19 Ω
HR ↔ GND (A13–10 ↔ A13–14)	L–W ↔ W–B	IG ON. Operate the Blower Motor	Below 1 V
		IG ON. Do not operate the Blower Motor	10 – 14 V
S5 ↔ SG (A13–11 ↔ A13–1)	L ↔ W–R	IG ON.	4 – 6 V
S5 ↔ TS (A13–11 ↔A14–5)	L ↔ W	IG ON. Sensor Subjected to Electrical Light.	Below 4 V
		IG ON. Sensor Covered by a Cloth.	4 – 4.5 V
ILL+ ↔ GND (A13–12 ↔ A13–14)	G ↔ W–B	Turn the Light Control Switch to TAIL position.	10 – 14 V
B+ ↔ GND (A13–13 ↔ A13–14)	W–R ↔ W–B	IG OFF.	10 – 14 V
GND ↔Body Ground (A13–14 ↔ Body Ground)	W–B ↔ Body Ground	Always	1 Ω or less
IGN ↔ GND (A13–16 ↔ A13–14)	B–O ↔ W–B	Start the Engine	10 – 14 V
B/L ↔ GND (A13–17 ↔ A13–14)	L ↔ W–B	IG ON. Air Flow: BI–LEVEL.	Below 1 V
FOOT ↔ GND (A13–18 ↔ A13–14)	L–R ↔ W–B	IG ON. Air Flow: FOOT.	Below 1 V
F/D ↔ GND (A13–19 ↔ A13–14)	B–L ↔ W–B	IG ON. Air Flow: FOOT/DEF	Below 1 V
DEF ↔ GND (A13–20 ↔ A13–14)	L–O ↔ W–B	IG ON. Air Flow: DEF	Below 1 V
RDFG ↔ GND (A13–23 ↔ A13–14)	L–G ↔ W–B	Rear Defogger Switch ON.	Below 1 V
		Rear Defogger Switch OFF	10 – 14 V
TELI ↔ GND (A13–24 ↔ A13–14)	L–R ↔ W–B	IG ON. Hand Free Telephone ON.	Below 1 V
TC ↔ GND (A13–25 ↔ A13–14)	B–R ↔ W–B	Light Control Switch Position: TAIL. Rheostat Volume: Most Upward	10 – 14 V
		Light Control Switch Position: TAIL. Rheostat Volume: Most Downward	Below 1 V
IG+ ↔ GND (A13–16 ↔ A13–14)	L–B ↔ W–B	IG ON.	10 – 14 V

DI0D7–01

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate.	1. IG power source circuit 2. ECU (A/C control assembly)	DI–576 IN–27
Air Flow Control: No blower operation	1. Heater main relay circuit 2. Blower motor circuit 3. Engine coolant temperature sensor circuit 4. IG power source circuit 5. ECU (A/C control assembly)	DI–580 DI–583 DI–546 DI–576 IN–27
Air Flow Control: No blower control	1. Blower motor circuit 2. IG power source circuit 3. Heater main relay circuit	DI–583 DI–576 DI–580
Air Flow Control: Insufficient air out	Blower motor circuit	DI–583
Temperature Control: No cool air comes out	1. Volume of refrigerant 2. Drive Belt Tension 3. Inspect refrigeration system with manifold gauge set 4. Compressor lock sensor circuit 5. Compressor circuit 6. Pressure switch circuit 7. Igniter circuit 8. Air mix control servomotor circuit 9. Air mix damper position sensor circuit 10. Room temp. sensor circuit 11. Ambient temp. sensor circuit 12. A/C control assembly	AC–3 AC–14 AC–3 DI–552 DI–569 DI–554 DI–585 DI–557 DI–563 DI–560 DI–537 DI–540 IN–27
Temperature Control: No warm air comes out	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. Ambient temp. sensor circuit 4. Room temp. sensor circuit 5. Evaporator temp. sensor circuit 6. A/C control assembly 7. Heater radiator (in heater unit)	DI–557 DI–563 DI–560 DI–540 DI–537 DI–543 IN–27 AC–23
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow.	1. Volume of refrigerant 2. Drive Belt Tension 3. Inspect refrigeration system with manifold gauge set 4. Cooling fan system 5. Ambient temp. sensor circuit 6. Evaporator temp. sensor circuit 7. Solar sensor circuit 8. Air mix damper position sensor circuit 9. Engine coolant temp. sensor 10. Air mix control servomotor circuit 11. Compressor 12. Condenser 13. Receiver 14. Evaporator 15. Heater radiator (in heater unit) 16. Expansion valve 17. A/C control assembly	AC–3 AC–14 AC–3 AC–104 DI–540 DI–543 DI–549 DI–560 DI–546 DI–557 DI–563 AC–35 AC–45 AC–42 AC–48 AC–23 AC–55 IN–27
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. A/C control assembly	DI–557 DI–563 DI–560 IN–27

No air inlet control	1. Air inlet damper position sensor circuit 2. Air inlet control servomotor circuit 3. A/C control assembly	DI–560 DI–560 DI–566 IN–27
No air outlet control	1. Air outlet control servomotor circuit 2. A/C control assembly	DI–574 IN–27
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. Igniter circuit 3. A/C control assembly	DI–569 DI–585 IN–27
Blinking of A/C switch indicator.	1. Compressor lock sensor circuit 2. A/C control assembly	DI–552 IN–27
Set temperature value displayed does not much up with operation of temperature control switch.	A/C control assembly	IN–27
Brightness does not changes when rheostat volume or light control switch it turned.	1. Illumination light system 2. A/C control assembly	BE–2 IN–27
Unable to access the diagnosis mode.	A/C control assembly	IN–27
DTC not recorded. Set mode is cleared when IG switch is turned off.	1. Back–up power source circuit 2. A/C control assembly	DI–578 IN–27

DI0D8–01

CIRCUIT INSPECTION

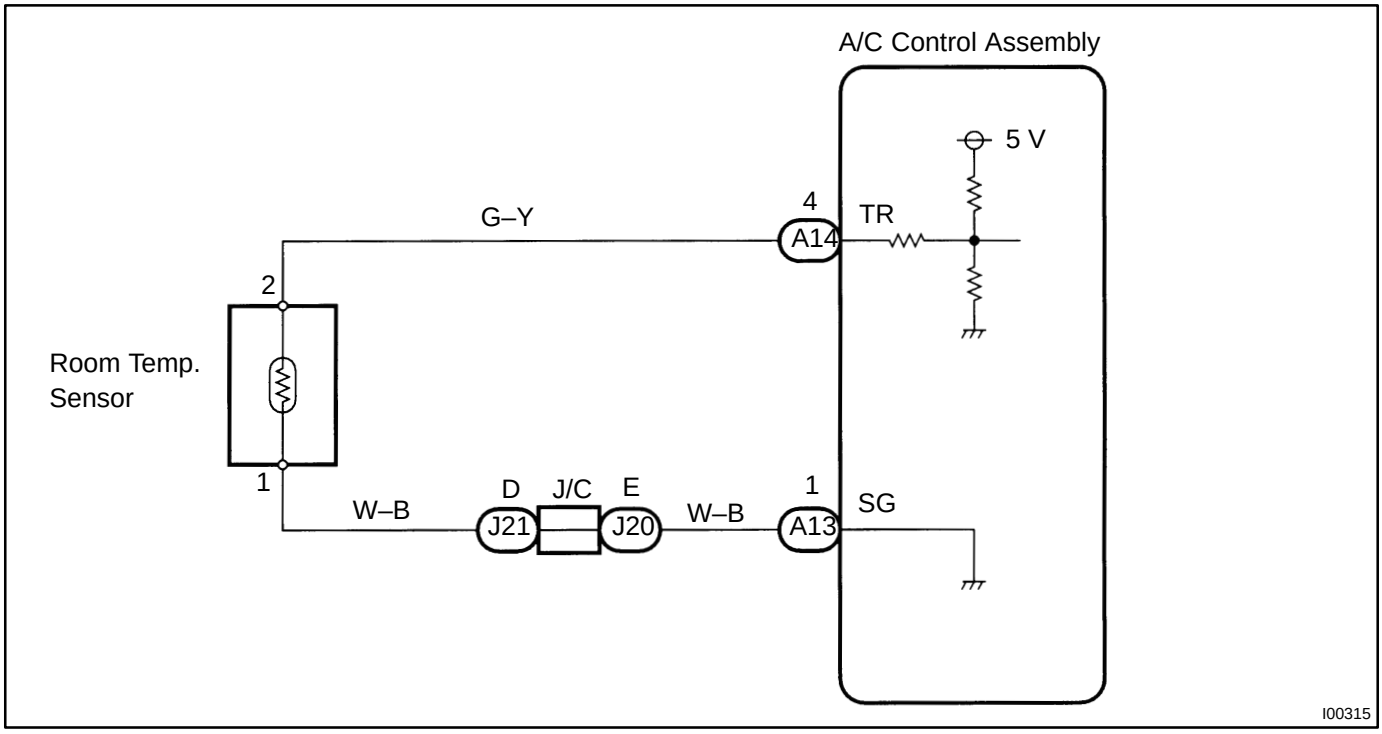
DTC	11	Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C control assembly.

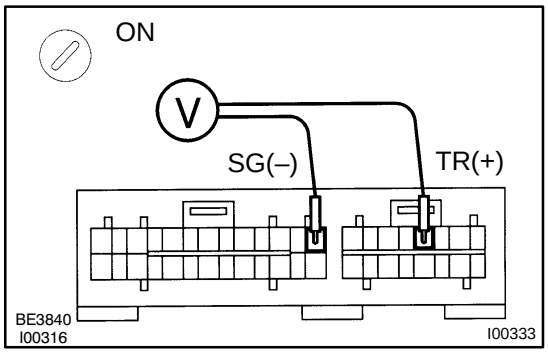
DTC No.	Detection Item	Trouble Area
11	Open or short in room temperature sensor circuit	●Room temperature sensor ●Harness or connector between room temp. sensor and A/C control Assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals TR and SG of air conditioning control assembly connector



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn the ignition switch ON.

CHECK:

Check voltage between terminals TR and SG of air conditioning control assembly connector at each temperature.

OK:

at 25˚C (77˚F): 1.8 – 2.2 V

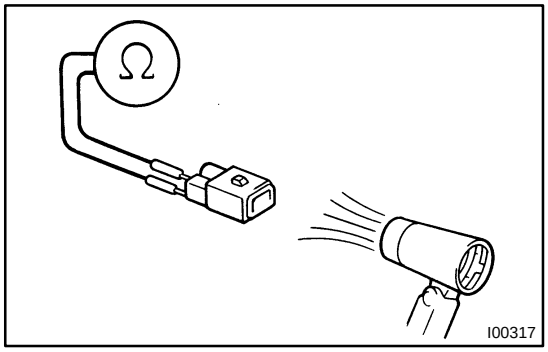
at 40˚C (104˚F): 1.2 – 1.6 V

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 11 is displayed, check and replace air conditioning control assembly.

2	Check room temperature sensor.



PREPARATION:

(a) Remove room temperature sensor from safety pad No.2 (See page BO–79).

(b) Disconnect room temperature sensor connector.

CHECK:

Check resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.

OK:

at 25˚ (77˚F): 1.6 – 1.8 kΩ

at 40˚ (104˚F): 0.5 – 0.7 kΩ

HINT:

As the temperature increases, the resistance decreases.

NG → **Replace room temperature sensor.**

OK

3	**Check harness and connector between air conditioning control assembly and room temperature sensor (See page IN–27).**

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

OK

Check and replace air conditioning control assembly.

DI0D9–01

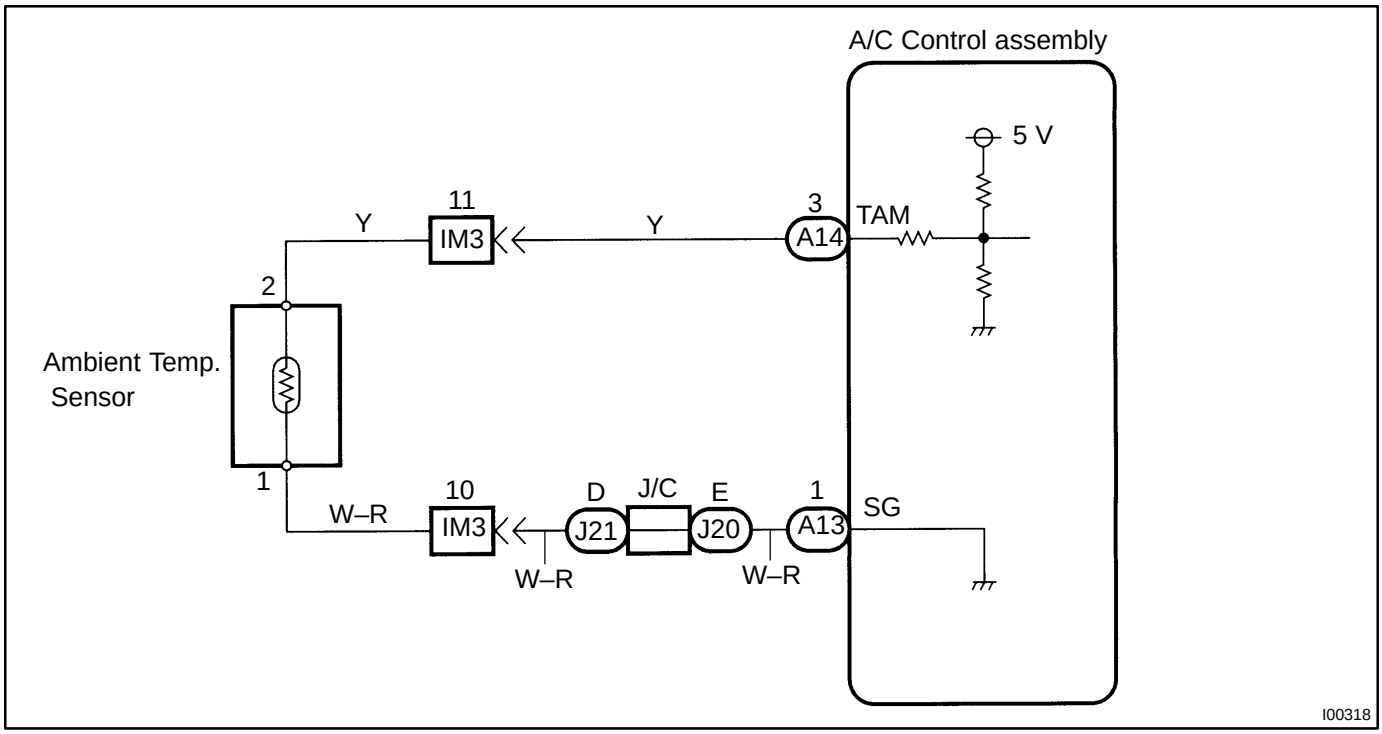
DTC	12	Ambient Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the A/C control assembly.

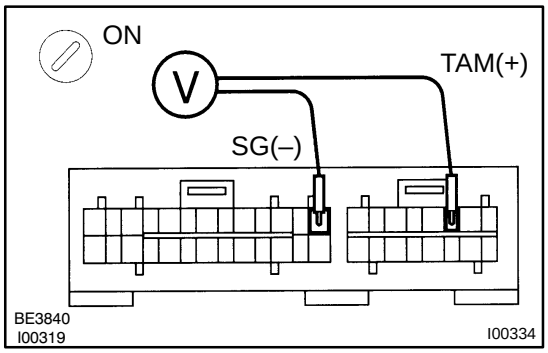
DTC No.	Detection Item	Trouble Area
12	Open or short in ambient temperature sensor circuit	●Ambient temperature sensor ●Harness or connector between ambient temperature sensor and A/C control assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals TAM and SG of air conditioning control assembly connector.



PREPARATION:

(a) Remove the A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Check voltage between terminals TAM and SG of A/C control assembly 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:

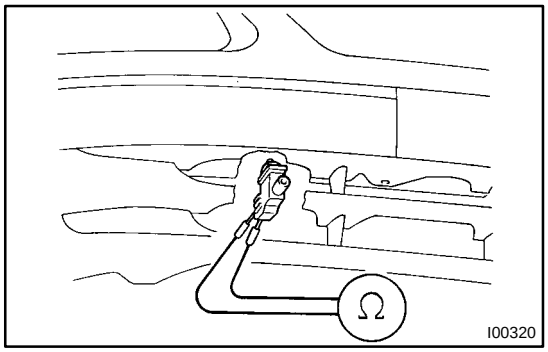
As the temperature increases, the voltage decreases.

NG	Go to step 2.

OK

Proceed to the next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 12 is displayed, check and replace A/C control assembly.

2	Check ambient temperature sensor.



PREPARATION:

Disconnect ambient temperature sensor connector.

CHECK:

Check 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 40 ˚C (104 ˚F): 0.5 – 0.7kΩ

NG	Replace ambient temperature sensor.

OK

3	**Check harness and connector between A/C control assembly and ambient temperature sensor (See page IN–27).**

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

OK

Check and replace A/C control assembly.

DI0DA–01

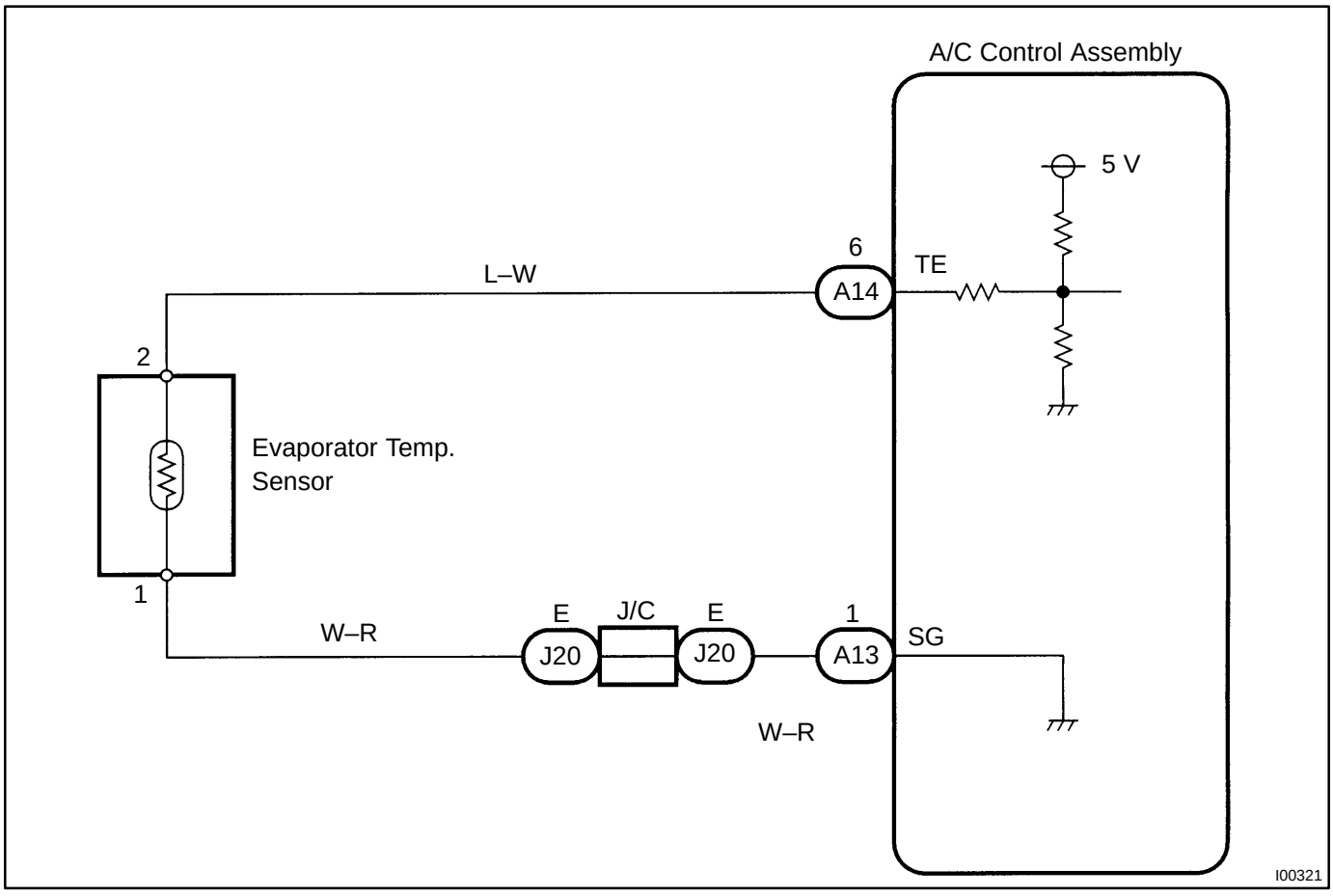
DTC	13	Evaporator Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the A/C control assembly.

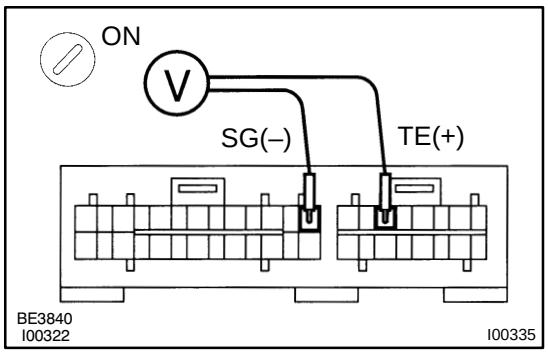
DTC No.	Detection Item	Trouble Area
13	Open or short in evaporator temperature sensor circuit.	●Evaporator temperature sensor. ●Harness or connector between evaporator temperature sensor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals TE and SG of A/C control assembly connector.



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals TE and SG of A/C control assembly 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:

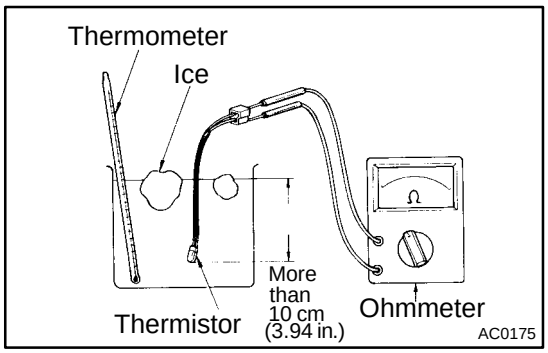
As the temperature increases, the voltage decreases.

NG → **Go to step 2**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 13 is displayed, check and replace A/C control assembly.

2	Check evaporator temperature sensor.



PREPARATION:

Remove evaporator temperature sensor (See page AC–88).

CHECK:

Check resistance between terminals 1 and 2 of evaporator temperature sensor connector at each temperature.

OK:

Resistance
at 0 °C (32 °F): 4.6 – 5.1 kΩ
at 15 °C (59 °F): 2.1 – 2.6 kΩ

HINT:

As the temperature increases, the voltage decreases.

NG → **Replace evaporator temperature sensor.**

OK

3	**Check harness and connector between A/C control assembly and evaporator temperature sensor (See page IN–27).**

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

OK

Check and replace A/C control assembly.

DI0DB–01

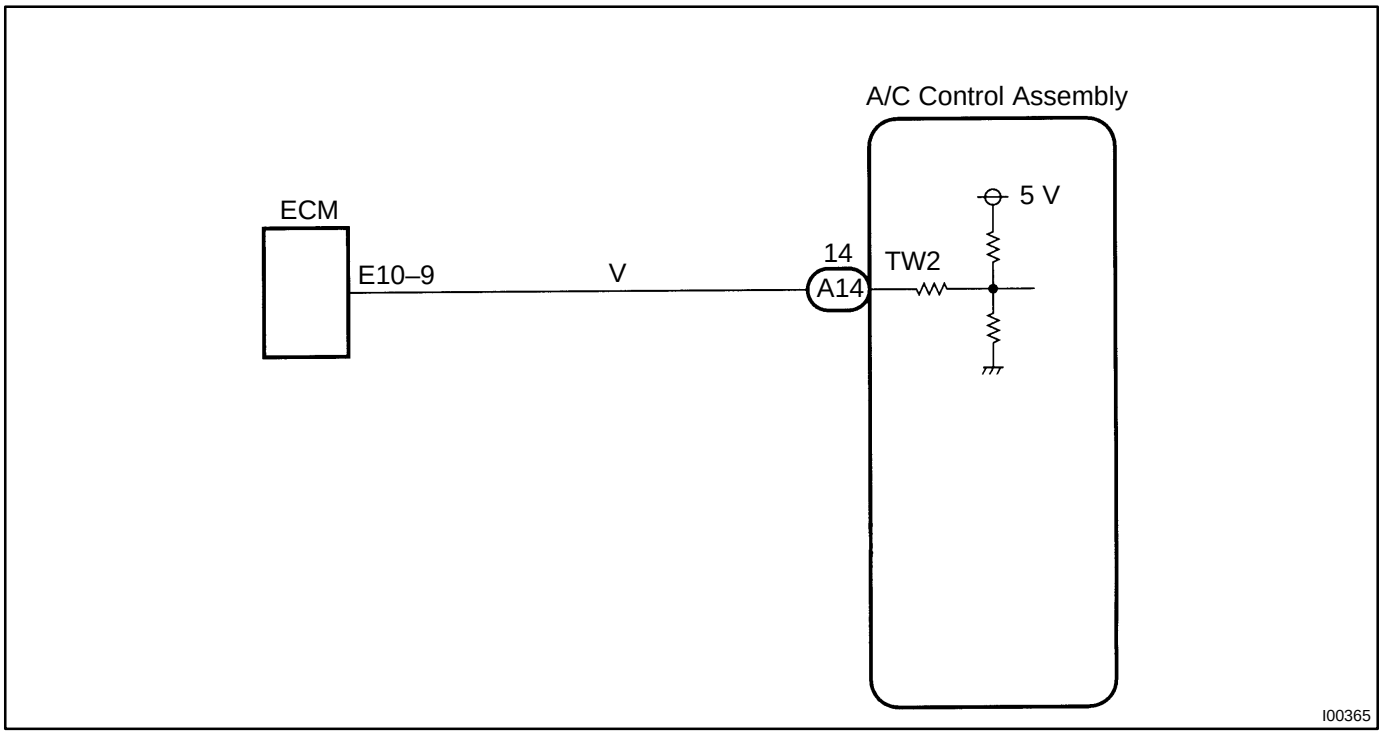
DTC	14	Engine Coolant Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the engine coolant temperature and sends the appropriate signals to the A/C control assembly. These signals are used for warm up control when the engine is cold.

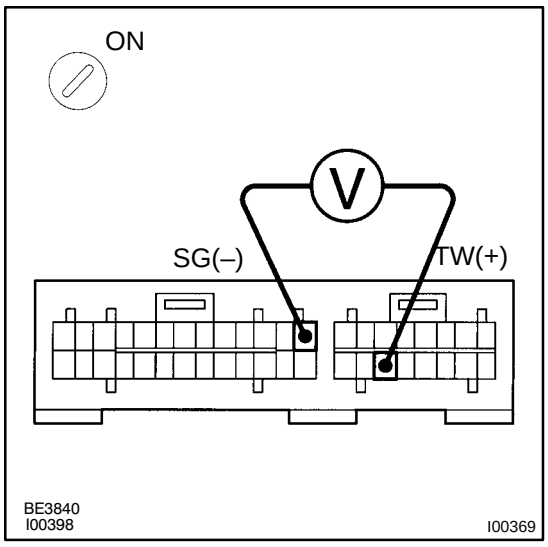
DTC No.	Detection Item	Trouble Area
14	Open or short in ECT sensor circuit.	●ECT sensor ●Harness or connector between ECT sensor and A/C control assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals TW and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals TW and SG of A/C control assembly connector at each temperature.

OK:

Voltage
at 0 ˚C (32 ˚F): 2.8 – 3.2 V
at 40 ˚C (104 ˚F): 1.8 – 2.2 V
at 70 ˚C (158 ˚F): 0.9 – 1.3 V

HINT:

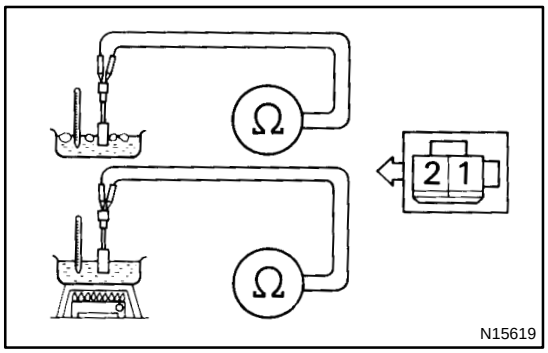
As the temperature increases, the voltage decreases.

NG → **Go to step 2**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 14 is displayed, check and replace A/C control assembly.

2	Check engine coolant temperature sensor.



PREPARATION:

(a) Remove A/C unit (See page AC–23).

(b) Remove engine coolant temperature sensor.

CHECK:

Measure resistance between terminals 1 and 2 of engine coolant temperature sensor connector at each temperature.

OK:

Resistance
at 0 °C (32 °F): 50 kΩ or less
at 40 °C (104 °F): 2.5 – 2.7 kΩ
at 100 °C (212 °F): 0.2 kΩ or more

HINT:

As the temperature increases, the voltage decreases.

NG → **Replace engine coolant temperature sensor.**

OK

3	Check harness and connector between A/C control assembly and ECT sensor (See page IN–27).

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

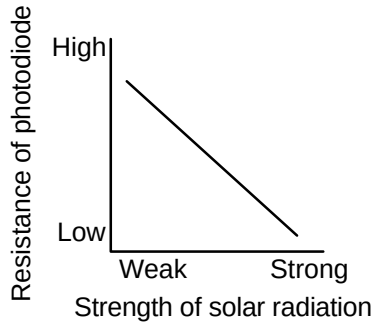
OK

Check and replace A/C control assembly.

DI0DC–01

DTC	21	Solar Sensor Circuit

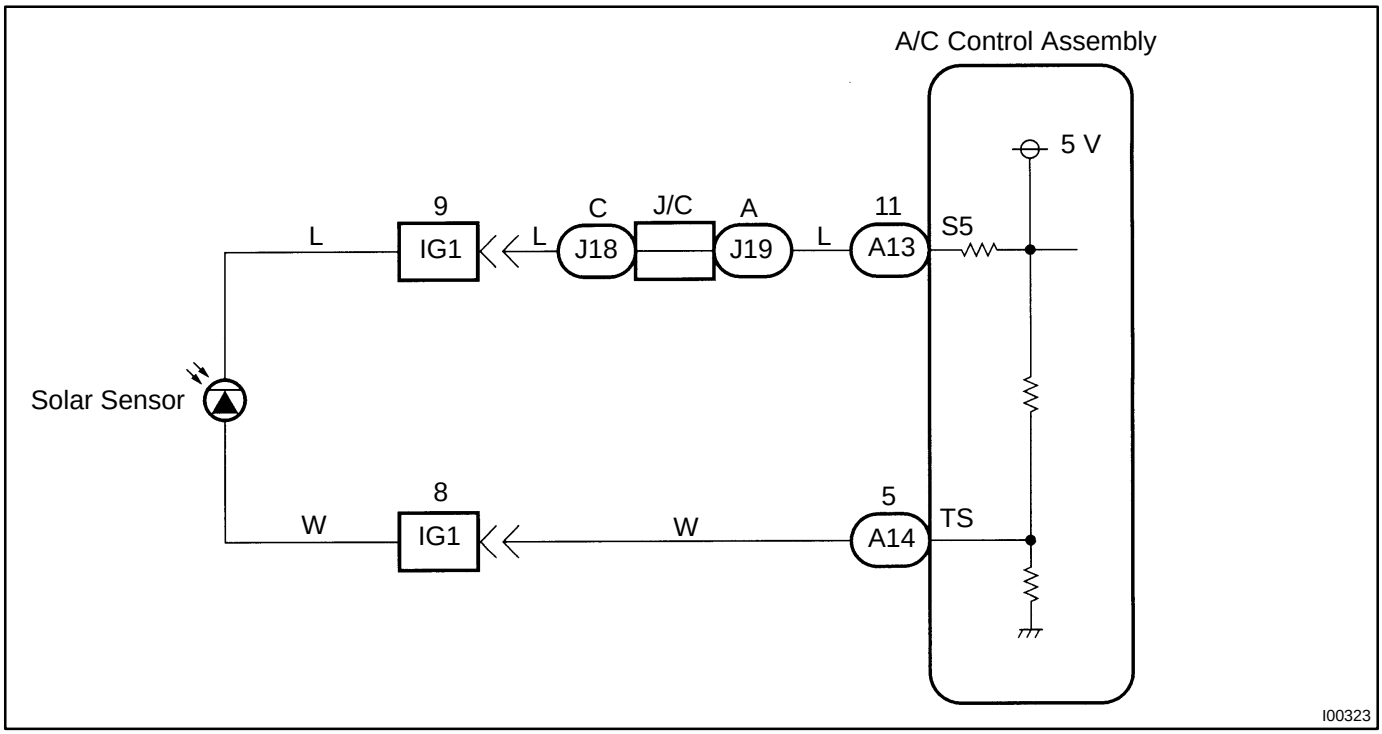
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C control assembly.

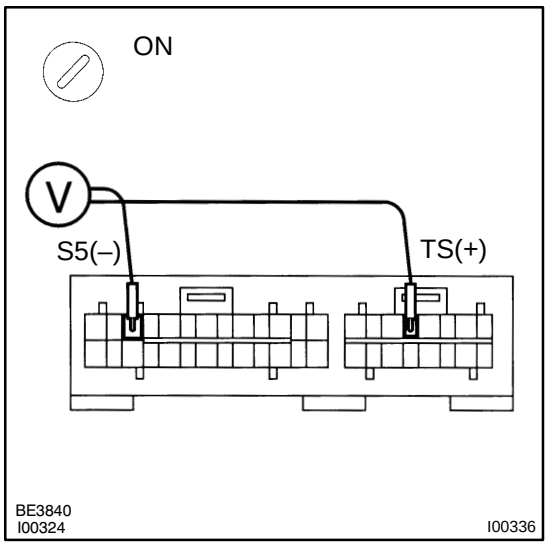
DTC No.	Detection Item	Trouble Area
21	Open or short in solar sensor circuit. (Please note that display of DTC 21 is not abnormal when the sensor is not receiving solar radiation.)	●Solar sensor ●Harness or connector between solar sensor and A/C control assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals S5 and TS of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals S5 and TS of A/C control assembly 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	Below 4.0 V
Sensor covered by a cloth	4.0 – 4.5 V

HINT:

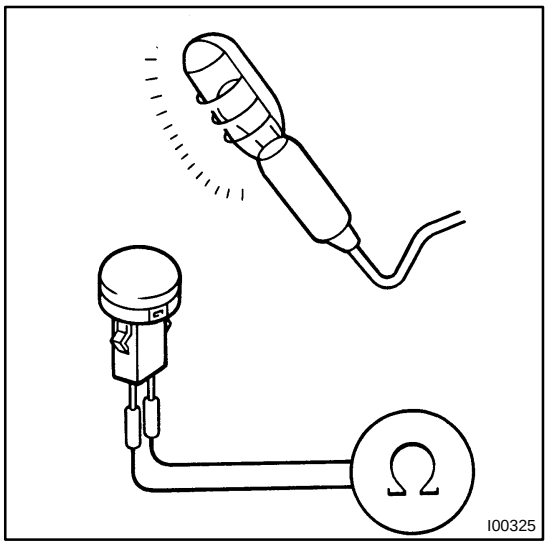
As the inspection light is gradually moved away from the sensor, the voltage increases.

NG	**Go to step 2**

NG

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 21 is displayed, check and replace A/C control assembly.

2	Check solar sensor.



PREPARATION:

(a) Remove instrument panel (See page BO–79).

(b) Disconnect solar sensor connector.

CHECK:

(a) Cover the sensor by a cloth.

(b) Measure resistance between terminals 1 and 2 of solar sensor connector.

HINT:

Connect positive (+) lead of ohmmeter to terminal 2 and negative (–) lead to terminal 1 of the solar sensor.

OK:

Resistance: ∞Ω (No continuity)

PREPARATION:

Remove the cloth from the solar sensor and subject the sensor to electric light.

CHECK:

Measure resistance.

OK:

Resistance: Below 10 kΩ (Continuity)

HINT:

As the electric light is moved gradually away from the sensor, the resistance increases.

NG → **Replace solar sensor.**

OK ↓

3	Check harness and connector between A/C control assembly and solar sensor (See page IN–27).

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

OK ↓

Check and replace A/C control assembly.

DI0DD–01

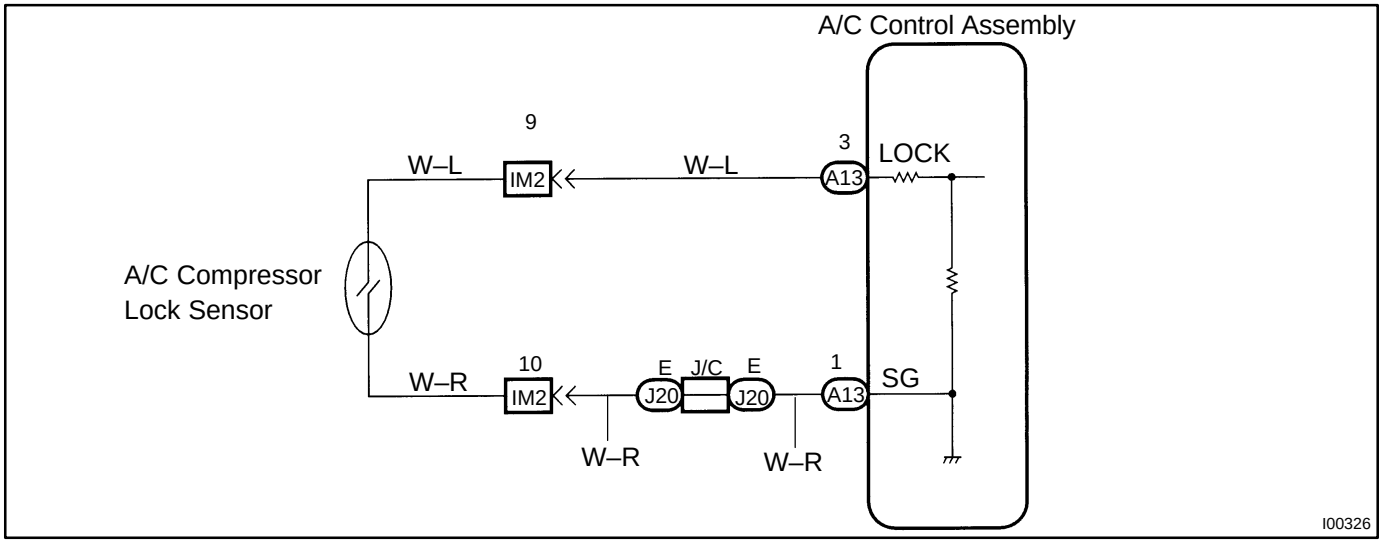
DTC	22	Compressor Lock Sensor Circuit

CIRCUIT DESCRIPTION

This sensor sends 4 pulses par engine revolution to the A/C control assembly. If the number ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the A/C control assembly turns the compressor off. And, the indicator flashes at about 1 second intervals.

DTC No.	Detection Item	Trouble Area
22	All conditions below are detected for 3 secs. or more. (a) Engine speed: 450 rpm 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 A/C control assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check compressor.

PREPARATION:

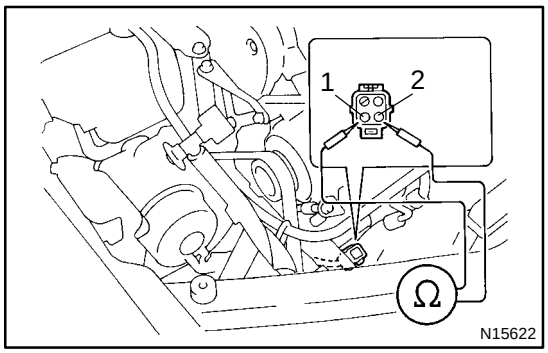
(a) Check compressor drive belt tension (See page AC–14).

(b) Check if the compressor does not lock during operation with engine started and blower switch and A/C switch ON.

NG → **Adjust drive belt tension or repair compressor.**

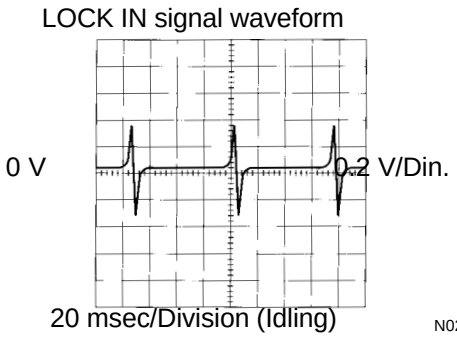
OK

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): 65 – 125 Ω

Reference: Inspection using oscilloscope



During cranking or idling, measure voltage between terminals LOCK IN and SG of A/C control assembly.
HINT:
The correct waveform appears as shown in the illustration on the left.

NG → **Replace compressor lock sensor.**

OK ↓

3	Check harness and connector between A/C control assembly and compressor lock sensor (See page IN–27).

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

OK ↓

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 22 is displayed, check and replace A/C control assembly.

DI0DE–01

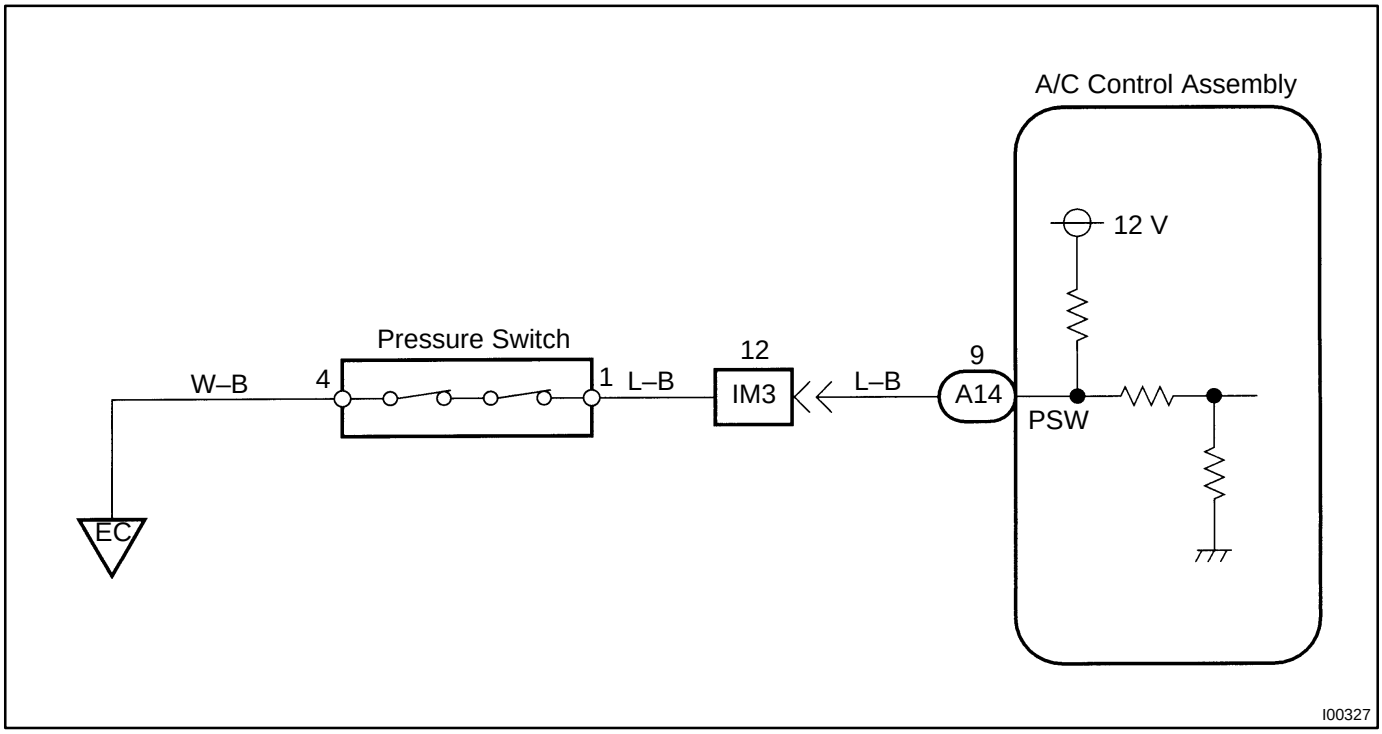
DTC	23	Pressure Switch Circuit

CIRCUIT DESCRIPTION

This pressure switch sends the appropriate signals to the A/C control assembly when the air conditioning refrigerant pressure drops too low or rises too high. When the A/C control assembly receives these signals, if outputs signals via the ECM to switch off the compressor relay and turns the magnetic clutch off.

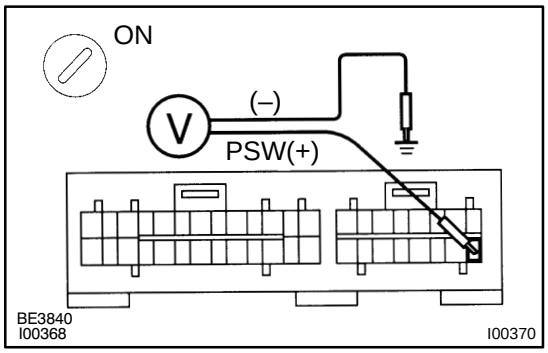
DTC No.	Detection Item	Trouble Area
23	●Open in pressure sensor circuit. ●Abnormal refrigerant pressure. below 196 kPa (2.0 kgf/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)	●Pressure switch ●Harness or connector between pressure switch and A/C control assembly. ●Refrigerant pipe line. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals PSW of A/C control assembly and body ground.



PREPARATION:

(a) Install the manifold gauge set (See page AC–17).

(b) Turn ignition switch ON.

CHECK:

Check voltage between terminals PSW of A/C control assembly connector and body ground when air conditioning gas pressure is changed.

OK:

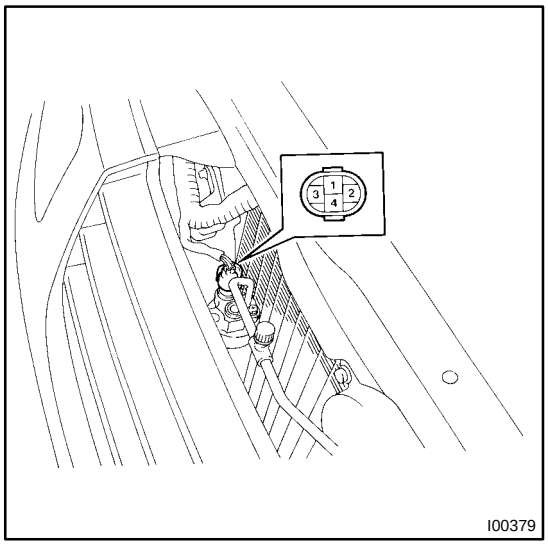
The voltage changes with gas pressure, as shown in the diagram below.

Low Pressure Cut Side	Reference: High Pressure Cut Side
ON (0 V) 225 kPa 196 kPa OFF (12 V)	ON (0 V) 2,550 kPa 3,140 kPa OFF (12 V)

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–535).**

NG

2	Check pressure switch.



PREPARATION:

Disconnect pressure switch connector.

CHECK:

Check continuity between terminals 1 and 4 of pressure switch when air conditioning gas pressure is changed.

OK:

The continuity changes with gas pressure as shown below.

Low Pressure Cut Side	Reference: High Pressure Cut Side
ON (continuity 225 kPa 196 kPa OFF (no continuity	ON (continuity) 2,550 kPa 3,140 kPa OFF (no continuity)

NG → **Replace pressure switch.**

OK

3	**Check harness and connector between A/C control assembly and pressure switch, pressure switch and body ground (See page IN–27).**

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

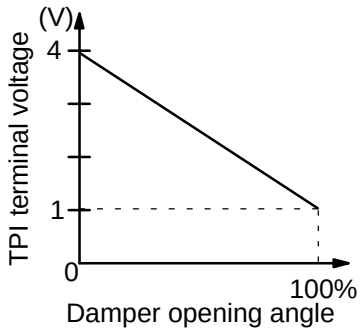
OK

Check and replace A/C control assembly.

DI0DF–01

DTC	31, 41	Air Mix Damper Position Sensor Circuit

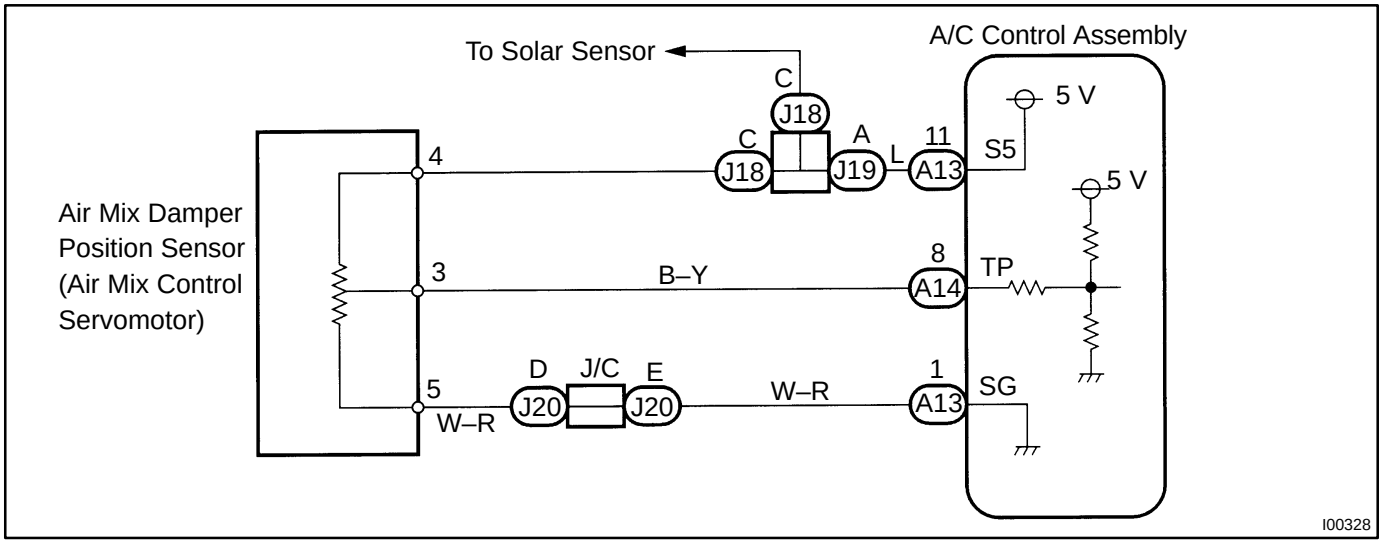
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C control assembly. The position sensor is built into the air mix control servomotor.

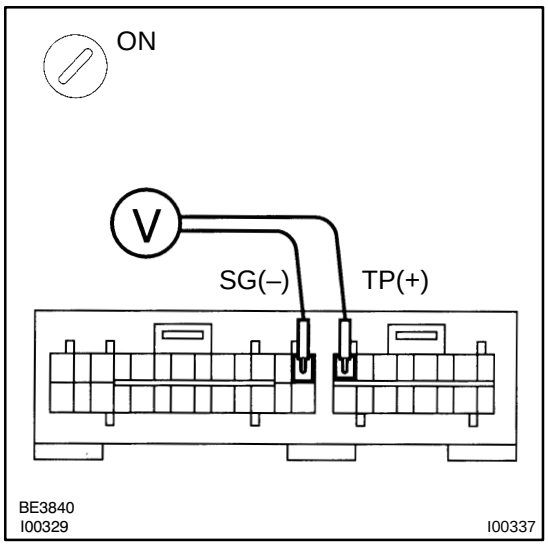
DTC No.	Detection Item	Trouble Area
31	Short to ground or power source circuit in air mix damper position sensor circuit.	●Air mix damper position sensor ●Harness of connector between air mix control servomotor and A/C control assembly ●A/C control assembly
41	Air mix damper position sensor value does not change even if ECM operates air mix control servomotor.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals TP and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Change the set temperature to activate the air mix damper, and measure the voltage between terminals TP and SG of A/C control assembly connector each time when the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. hot	0.5 – 1.8 V

HINT:

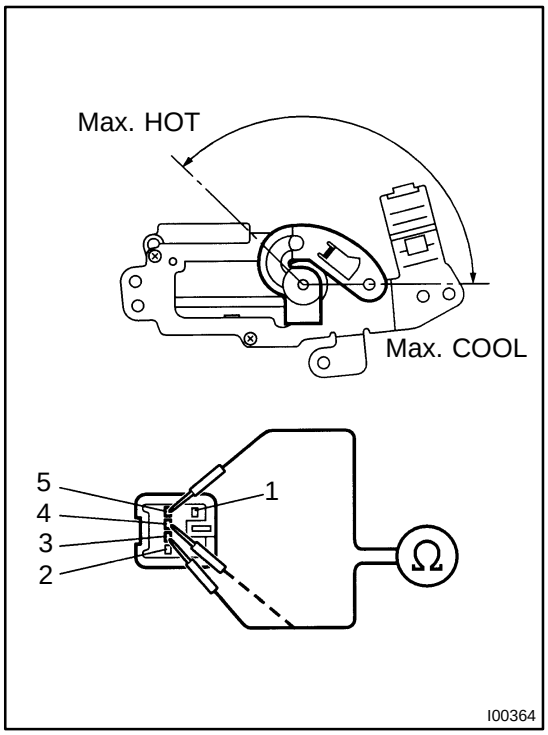
As the set temperature increases, the voltage decreases gradually without interruption.

NG → **Go to step 2.**

OK →

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 31 or 41 is displayed, check and replace A/C control assembly.

2	Check air mix damper position sensor.



PREPARATION:

(a) Remove air mix control servomotor (See page AC–73).

(b) Disconnect air mix control servomotor connector.

CHECK:

Measure resistance between terminals 4 and 5 of air mix control servomotor connector.

OK:

Resistance: 4.8 – 7.2 kΩ

CHECK:

While operating air mix control servomotor as shown in the procedure on page DI–563, measure resistance between terminals 3 and 5 of air mix control servomotor connector.

OK:

Position	Resistance
Max. cool	3.8 – 5.8 kΩ
Max. hot	0.95 – 1.45 kΩ

HINT:

As the air mix control servomotor moves from cool side to hot side, the resistance decreases gradually without interruption.

NG → **Replace air mix control servomotor.**

OK

3	Check harness and connector between A/C control assembly and air mix control servomotor (See page IN–27).

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

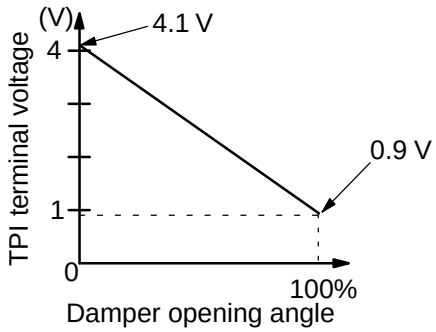
OK

Check and replace A/C control assembly.

DI0DG–01

DTC	32, 42	Air Inlet Damper Position Sensor Circuit

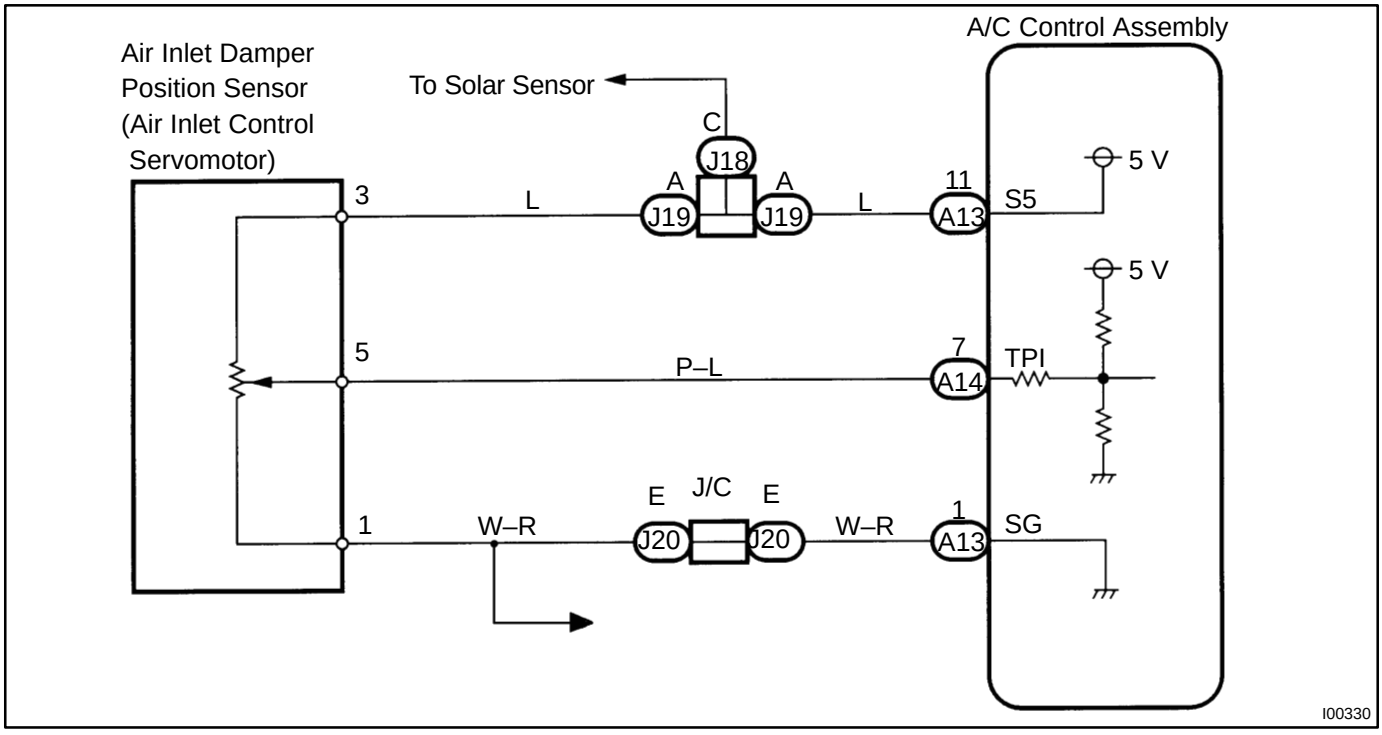
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet damper and sends the appropriate signals to the A/C control assembly. The position sensor is built into the air inlet control servomotor.

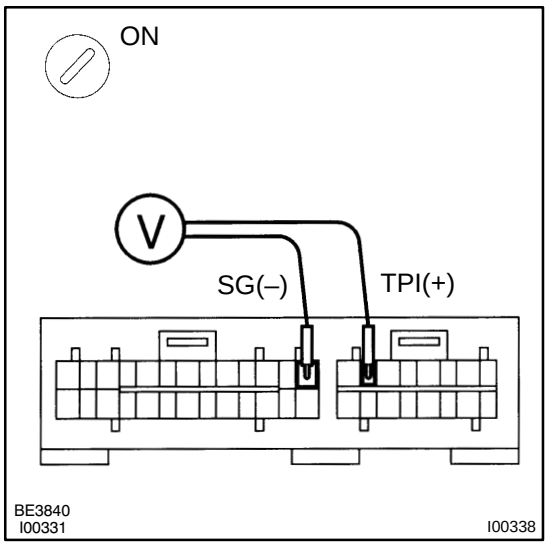
DTC No.	Detection Item	Trouble Area
32	Short to ground or power source circuit in air inlet damper position sensor circuit.	●Air inlet damper position sensor. ●Harness or connector between air inlet control servomotor and A/C control assembly. ●A/C control assembly.
42	Air inlet damper position sensor value does not change even if A/C control assembly operates air inlet control servomotor.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals TPI and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Press REC/FRS switch to change air inlet between fresh and recirculation air, and measure voltage between terminals TPI and SG of A/C control assembly when the air inlet servomotor operates.

OK:

REC/FRS Switch	Voltage
REC	3.5 – 4.5 V
FRS	0.5 – 1.8 V

HINT:

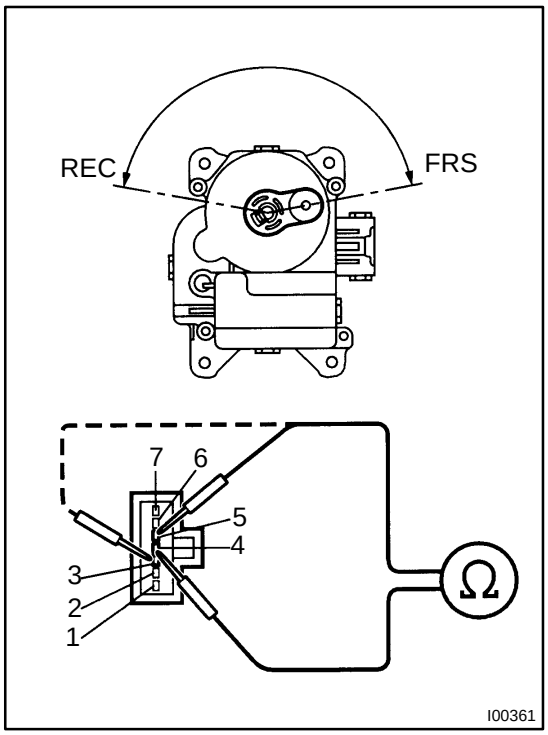
As the air inlet control servomotor is moved from REC side to FRS side, the voltage decreases gradually without interruption.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535). However, if DTC 32 or 42 is displayed, check and replace A/C control assembly.

2	Check air inlet damper position sensor.



PREPARATION:

(a) Remove air inlet control servomotor (See page AC–70).

(b) Disconnect air inlet control servomotor connector.

CHECK:

Measure resistance between terminals 4 and 5 of air inlet control servomotor connector.

OK:

Resistance: 4.2 – 7.8 kΩ

CHECK:

While operating air inlet control servomotor as in the procedure on page , measure resistance between terminals 3 and 4 of air inlet control servomotor connector.

OK:

Resistance:

Damper Position	Resistance
REC side	3.4 – 6.4 kΩ
FRS side	0.76 – 1.4 kΩ

HINT:

As the air inlet control servomotor is moved from REC side to FRS side, the voltage decreases gradually without interruption.

NG → **Replace air mix control servomotor.**

OK ↓

3	Check harness and connector between A/C control assembly and air inlet control servomotor (See page IN–27).

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

OK ↓

Check and replace A/C control assembly.

DI0DH–01

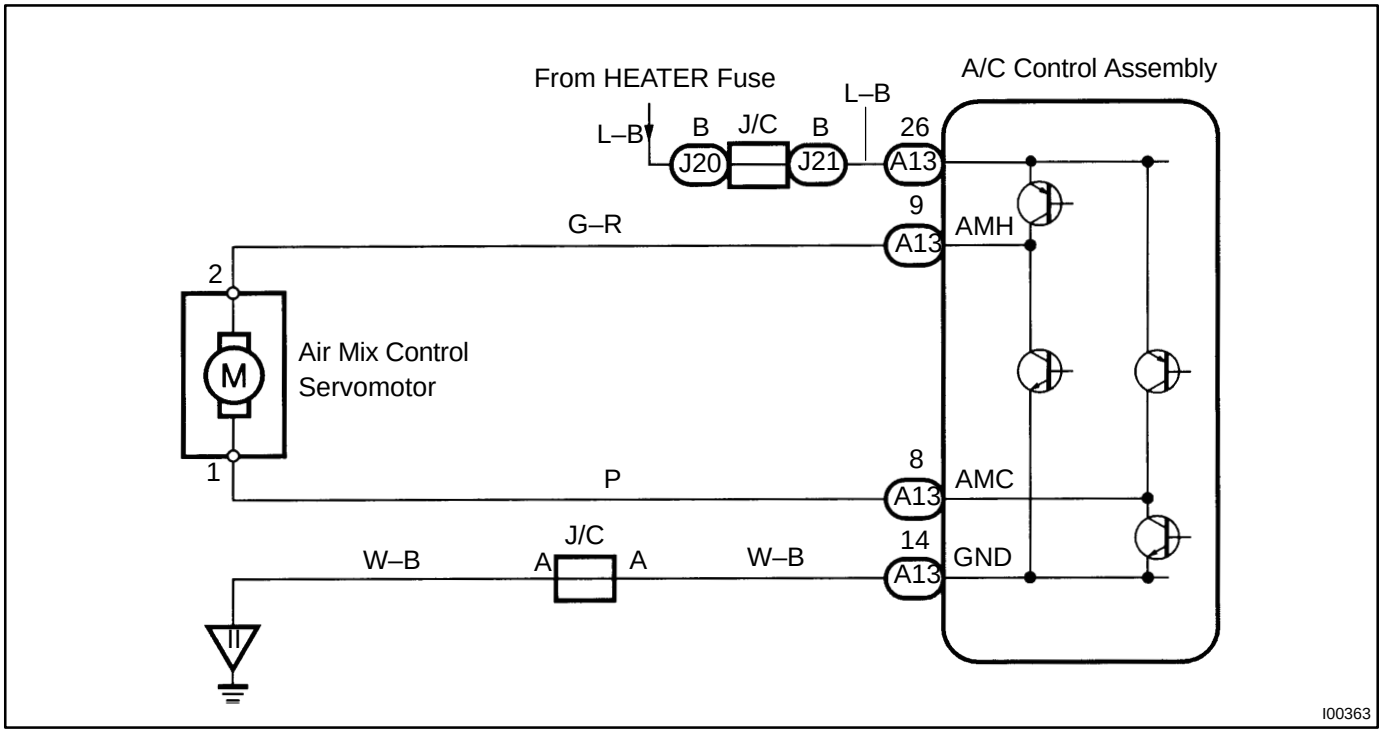
DTC	41	Air Mix Control Servomotor Circuit

CIRCUIT DESCRIPTION

This air mix control sevomotor is controlled by the A/C control assembly and moves the air mix damper to the disired position.

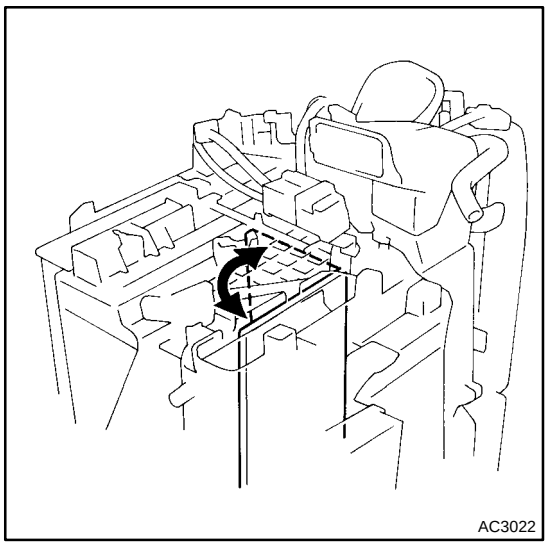
DTC No.	Detection Item	Trouble Area
41	Air mix damper position sensor value does not change even if A/C control assembly operates air mix control servomotor.	●Air mix control sevomotor ●Air mix damper position sensor ●Harness or connector between A/C control assembly and air mix control servomotor, air mix damper position sensor. ●A/C control assenbly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check



PREPARATION:

(a) Warm up the engine.

(b) Set to the actuator check mode (See page DI–528).

(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation of the air mix damper and the condition of the blower.

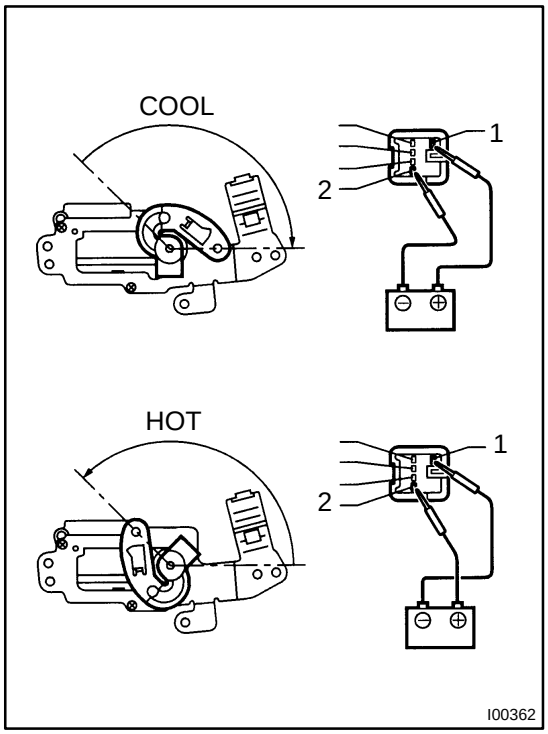
OK:

Display Code	Air Mix Damper	Condition
0 – 3	0 % (Fully closed)	Cool air comes out
4 – 5	50 %	
6 – 9	100 % (Fully opened)	Warm air comes out

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–535).**

NG

2	Check air mix control servomotor.



PREPARATION:

Remove ari mix control servomotor (See page AC–73).

CHECK:

Connect positive (+) lead to terminal 1 and the negative (–) lead to terminal 2.

OK:

The lever turns smoothly to HOT side.

CHECK:

Connect negative (–) lead to terminal 1 and positive (+) lead to terminal 2.

OK:

The lever turns smoothly to HOT side.

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

OK

3	**Check harness and connector between A/C control assembly and air mix control servomotor (See page IN–27).**

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

OK

Chek and replace A/C control assembly (See page IN–27).

DI0DI–01

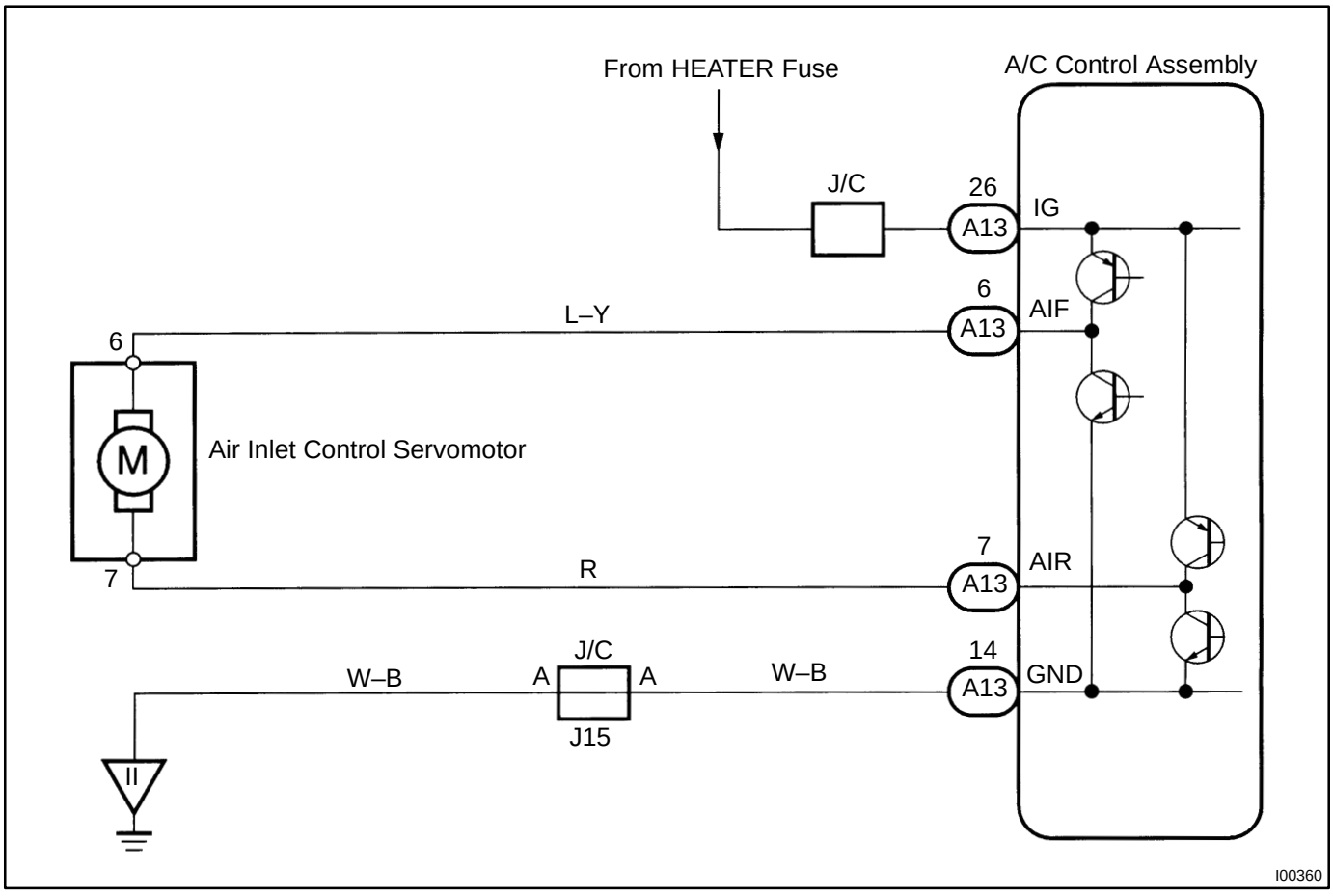
DTC	42	Air Inlet Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet control servomotor is controlle by the A/C control assembly and moves the air inlet damper to the desired position.

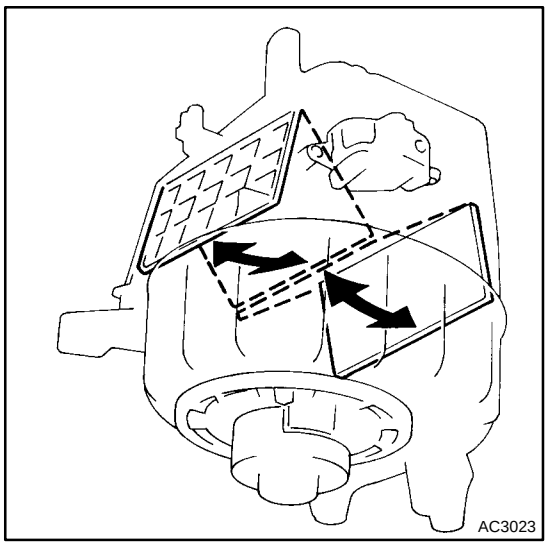
DTC No.	Detection Item	Trouble Area
42	Air inlet damper position sensor value does not change even if A/C control assembly operates air inlet control servomotor.	●Air inlet damper position sensor. ●Harness or connector between air inlet control servomotor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.



PREPARATION:

(a) Remove glove box to see and check the air inlet damper operation.

(b) Set to the actuator check mode (See page DI–528).

(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation air inlet damper.

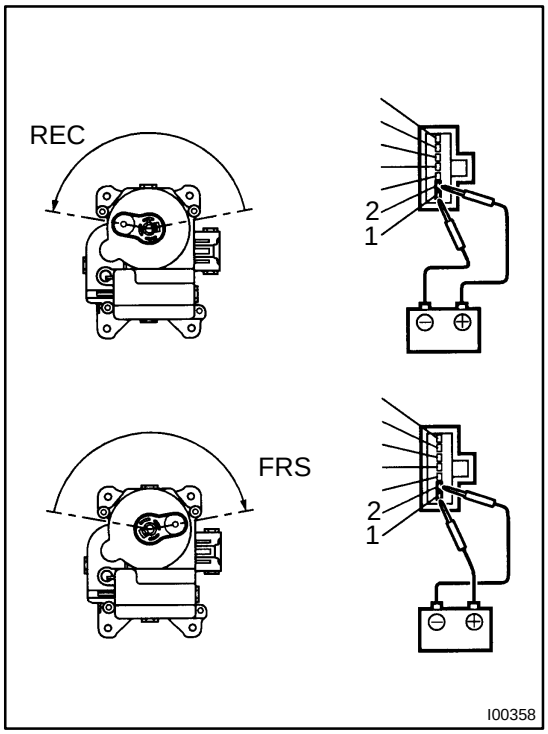
OK:

Display Code	Air Inlet Damper
0 – 2	FRS
3	REC/FRS
4 – 9	REC

OK	Proceed to next circuit inspection shown on matrix chart (See page DI–535).

NG

2	Check air inlet control servomotor.



PREPARATION:

Remove air inlet control servomotor (See page AC–70).

CHECK:

Connect positive (+) lead to terminal 2 and negative (–) lead to terminal 1.

OK:

The lever moves smoothly to REC position.

CHECK:

Connect negative (–) lead to terminal 2 and positive (+) lead to terminal 1.

OK:

The lever moves smoothly to FRS position.

NG	Replace air inlet control servomotor assembly.

OK

3	**Check harness and connector between A/C control assembly and air inlet control servomotor. (See page IN–27).**

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

OK

Check and replace A/C control assembly.

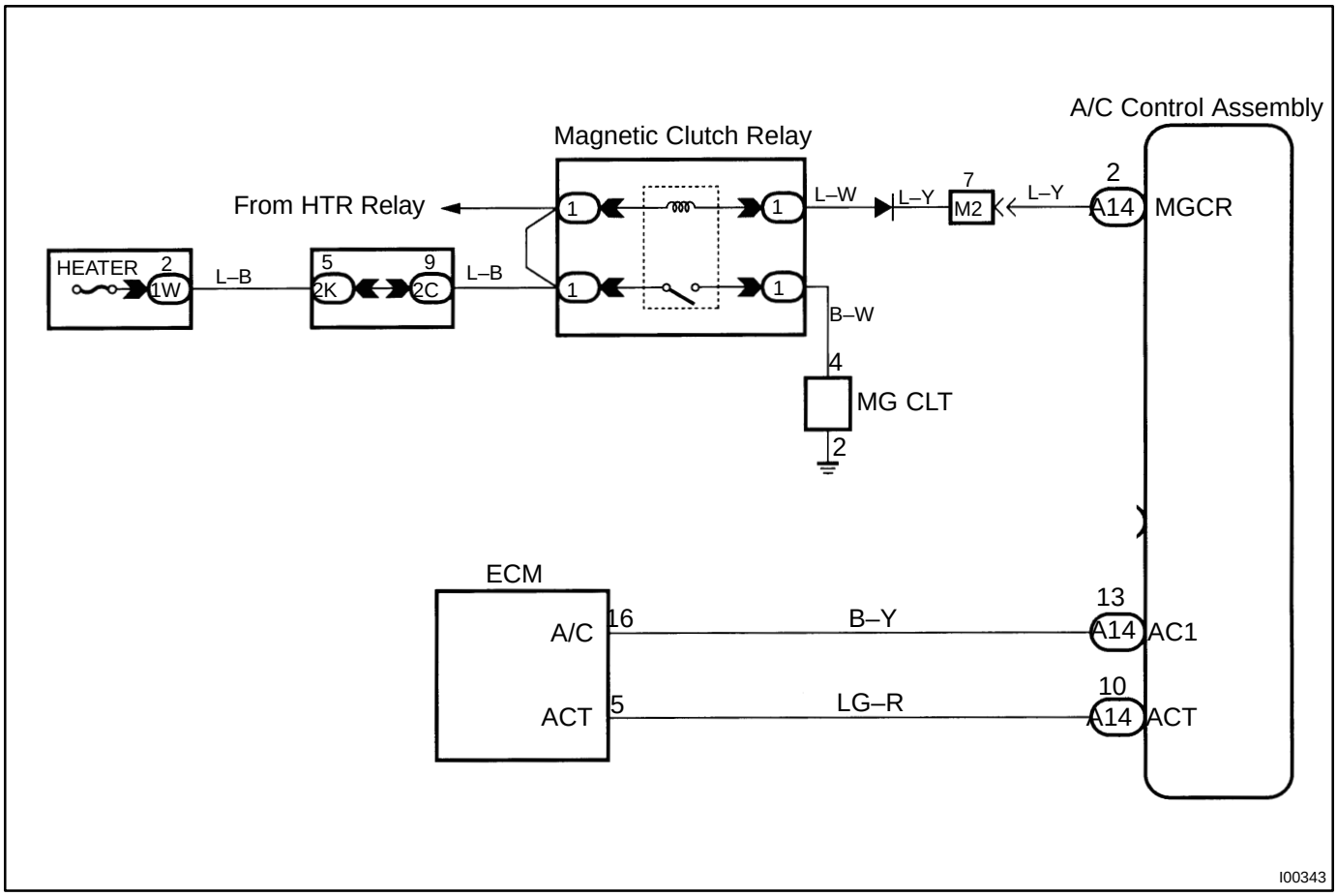
DI0DJ–01

Compressor Circuit

CIRCUIT DESCRIPTION

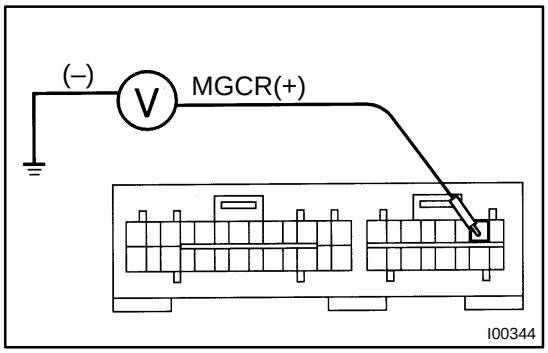
The A/C control assembly outputs the magnetic clutch ON signal from terminal AC1 to the ECM. When the ECM receives this signal, it sends a signal from terminal ACT and switches the A/C magnetic clutch relay ON, thus turning on the A/C magnetic clutch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal MGC of A/C control assembly connector and body ground.



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Start the engine and push AUTO switch.

CHECK:

Check voltage between terminal MGC of A/C control assembly connector and body ground when magnetic clutch is ON and OFF by A/C switch.

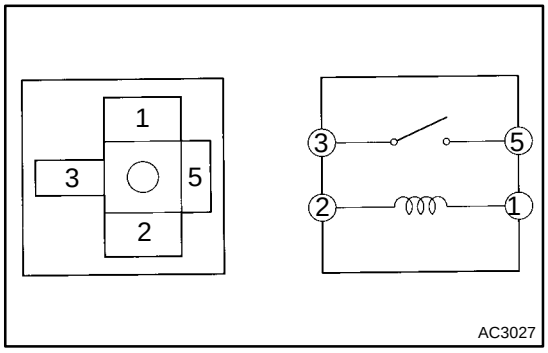
OK:

A/C switch	Voltage
ON	Below 1 V
OFF	10 – 14 V

NG → **Go to step 5.**

OK

2	Check magnetic clutch relay.



PREPARATION:

Remove magnetic clutch relay from R/B No.5.

CHECK:

Check continuity between each pair of terminals shown below of magnetic clutch relay.

OK:

Tester connection	Specified condition
1 – 2	62.5 – 90.9 Ω
3 – 5	No continuity

PREPARATION:

Apply battey positive (+) voltage between terminals 1 and 2.

CHECK:

Check continuity between terminals 3 and 5.

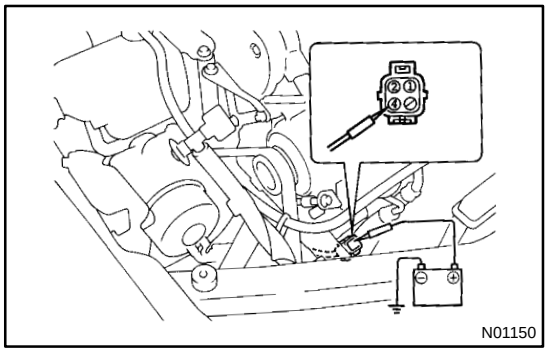
OK:

There is continuity.

NG → **Replace magnetic clutch relay.**

OK

3	Check A/C magnetic clutch.



PREPARATION:
Disconnect magnetic clutch connector.
CHECK:
Connect positive (+) lead connected to battery to magnetic clutch connector terminal 4.
OK:
Magnetic clutch is energized.

NG → **Repair A/C magnetic clutch.**

OK

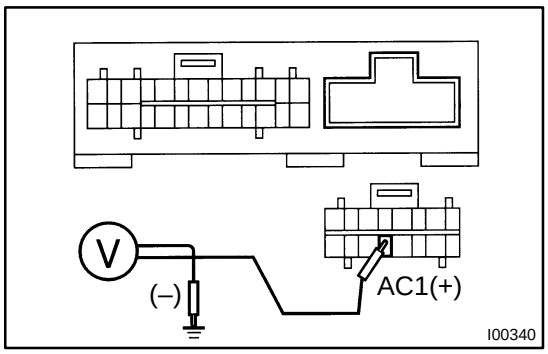
4	Check harness and connector between magnetic clutch relay and A/C compressor, A/C compressor and body ground (See page IN–27).

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

OK

Proceed to next circuit inspeciton shown on matrix chart (See page DI–535).

5	Check voltage between terminal AC1 of A/C control assembly connector side and body ground.

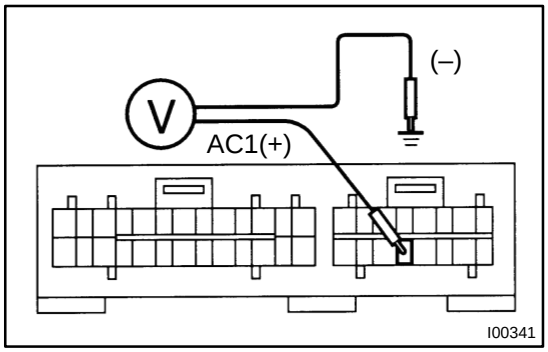


PREPARATION:
(a) Disconnect A/C control connector.
(b) Ignition switch ON.
CHECK:
Check voltage between terminal AC1 of A/C control assembly harness side connector.
OK:
Voltage: 10 – 14 V

NG → **Check and replace ECM.**

Ok

6	Check voltage between terminal AC1 of A/C control assembly connector and body ground.



PREPARATION:

(a) Remove A/C control assembly with connector still connected (See page BO–79).

(b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal AC1 of A/C control assembly connector and body ground when magnetic clutch is ON and OFF by A/C switch.

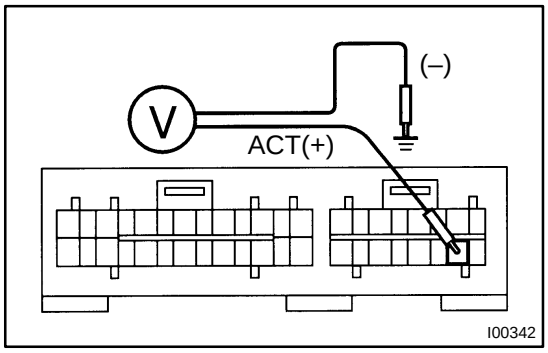
OK:

Magnetic clutch	Voltage
ON	Below 1 V
OFF	10 – 14 V

NG → **Check and replace A/C control assembly.**

OK

7	Check voltage between terminal ACT of A/C control assembly and body ground.



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal ACT of A/C control assembly and body ground.

OK:

A/C switch	Voltage
ON	10 – 14 V
OFF	Below 1.5 V

NG → **Check and replace ECM.**

OK

8	**Check voltage between terminal ACT of ECM connector and body ground (See page IN–27).**

NG → **Check and replace ECM.**

OK

9	**Check harness and connector between A/C control assembly and ECM (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535).

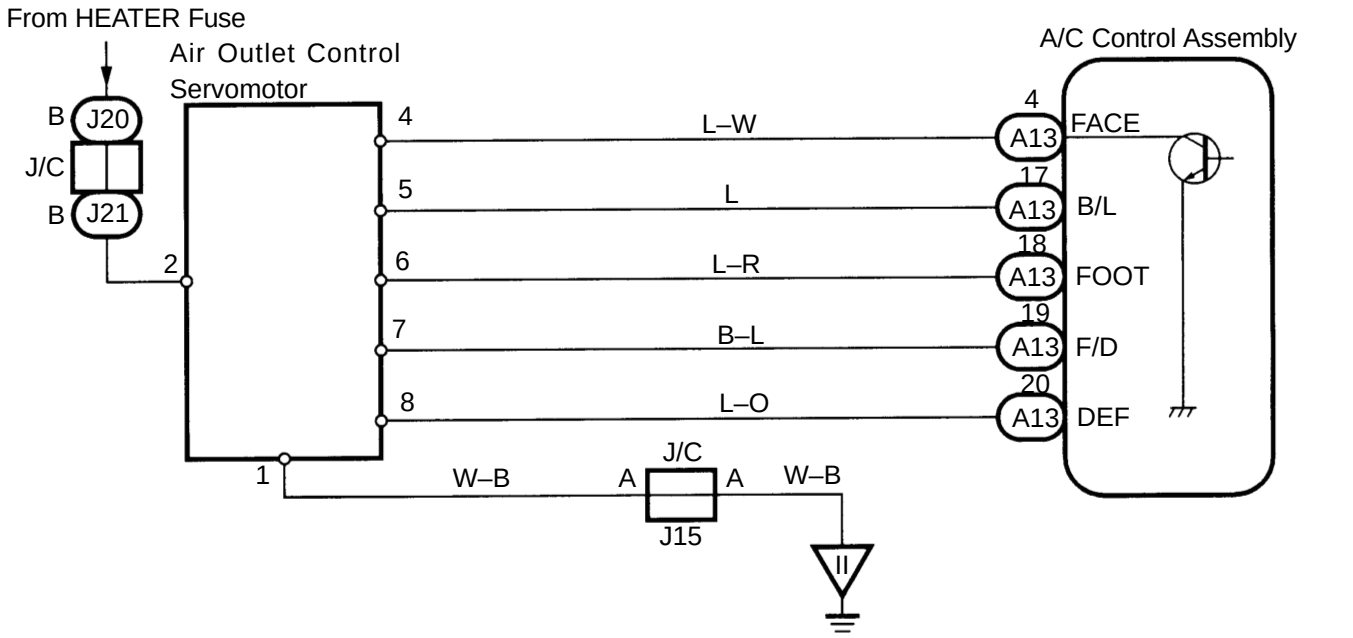
DI0DK–01

Air Outlet Control Servomotor Circuit

CIRCUIT DESCRIPTION

This circuit turns the servomotor and changes each mode damper position by signals from the A/C control assembly. When the AUTO switch is ON, the A/C control assembly changes the mode automatically between FACE, BI–LEVEL. and FOOT according to the temperature setting.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Actuator check.**

Display Code	Air Flow Mode
0 – 4	FACE
5	BI–LEVEL
6 – 7	FOOT
8	FOOT DEF
9	DEF

PREPARATION:

(a) Set to the actuator check mode (See page DI–528).

(b) Press the DEF switch and change to step operation.

CHECK:

Press the DEF switch in order and check the condition of air flow mode.

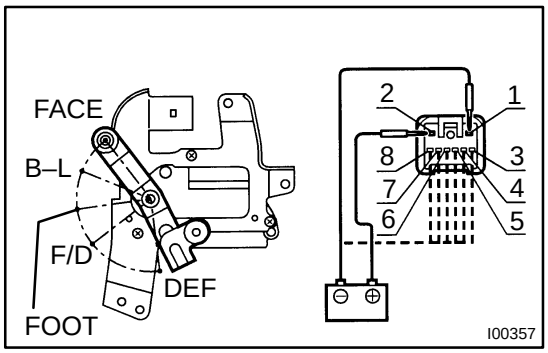
OK:

The mode changes with the change in the temperature displaly as shown in the table.

OK → **Proceed to next circuit inspeciton shown on matrix chart (See page DI–535).**

NG

2	Check air outlet control servomotor.



PREPARATION:

Remove air outlet control servomotor (See page AC–76).

CHECK:

(a) Connect positive (+) lead to teminal 2 and negative (–) lead to terminal 1.

(b) Check the lever operation when the negaitive (–) lead is connected to the teminals shown below.

OK:

The lever moves smoothly to the position for each mode.

Ground Terminals	Mode
4	FACE
5	BI–LEVEL
6	FOOT
7	FOOT DEF
8	DEF

NG → **Replace air outlet control servomotor.**

OK

3	Check harness and connector between A/C control assembly and air outlet control servomotor, air outlet control servomotor and battery, ari outlet control servomotor and body ground (See page IN–27).

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

OK

Repair or replace A/C control assembly.

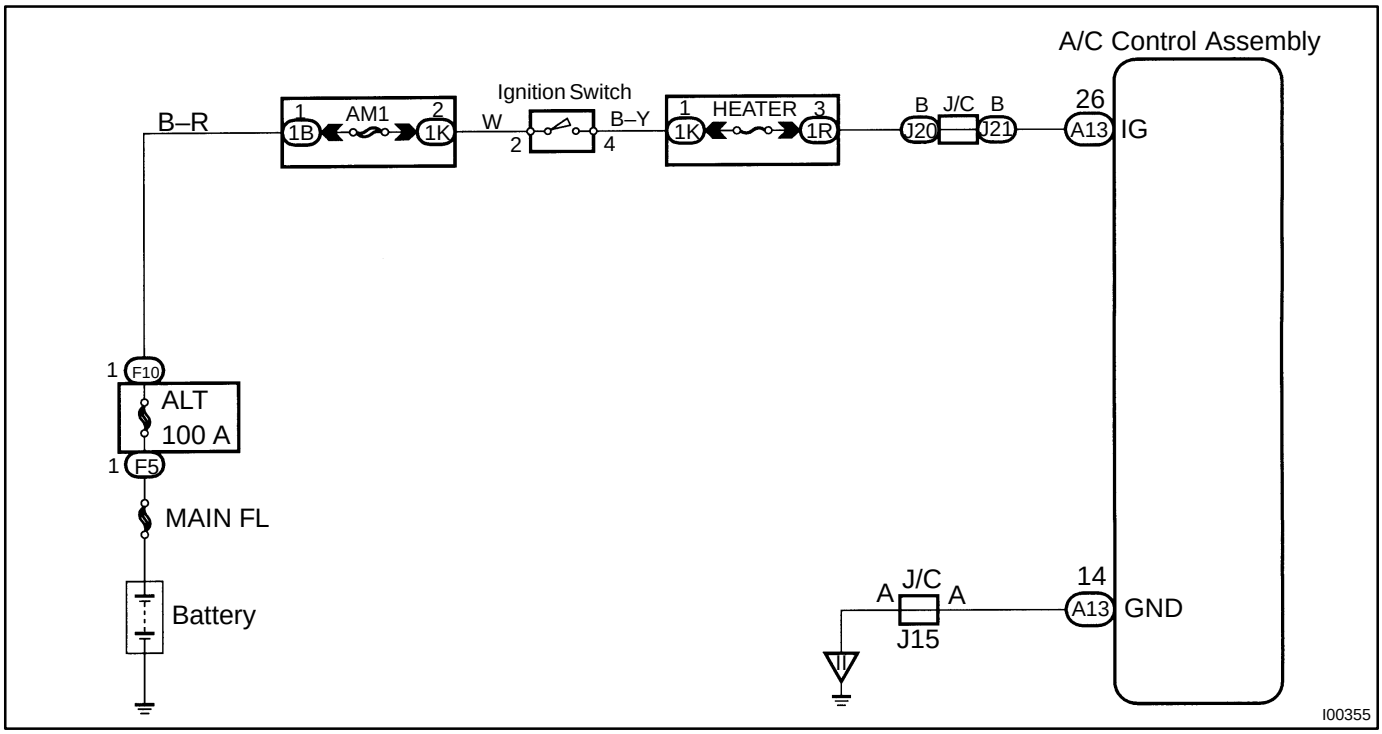
DI0DL–01

IG Power Source Circuit

CIRCUIT DESCRIPTION

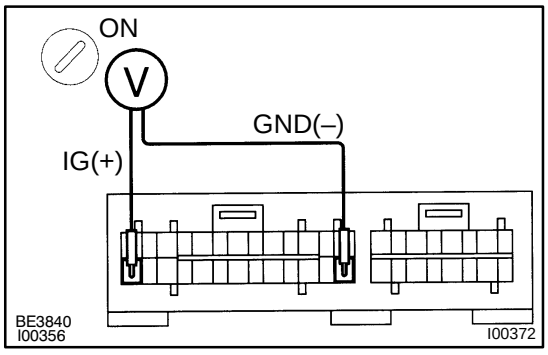
This is the power source for the A/C control assembly (contains the ECU) and servomotors, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals IG and GND of A/C control assembly connector.**



PREPARATION:

(a) Remove fromt ash receptacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminals IG and GND of A/C control assembly.

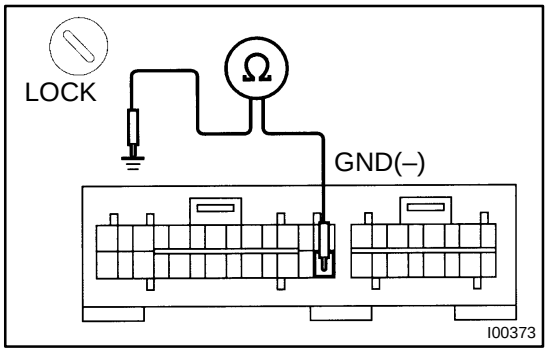
OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–535).**

NG

2	Check continuity between terminal GND of A/C control assembly and body ground.

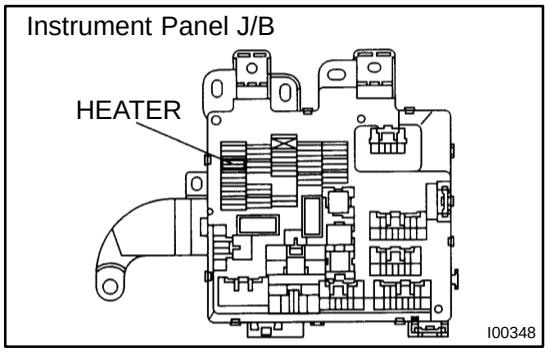


CHECK:
Measure resistance between terminal GND of A/C control assembly and body ground.
OK:
Resistance: Below 1 Ω

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

OK

3	Check HTR fuse.



PREPARATION:
Remove HEATER fuse in instrument panel J/B.
CHECK:
Check continuity of HEATR fuse.
OK:
There is continuity.

OK → **Check for shot in all the harness and components connected to the HEATER fuse (See page DI–576).**

OK

Check and repair harness and connector between A/C control assembly and battery.

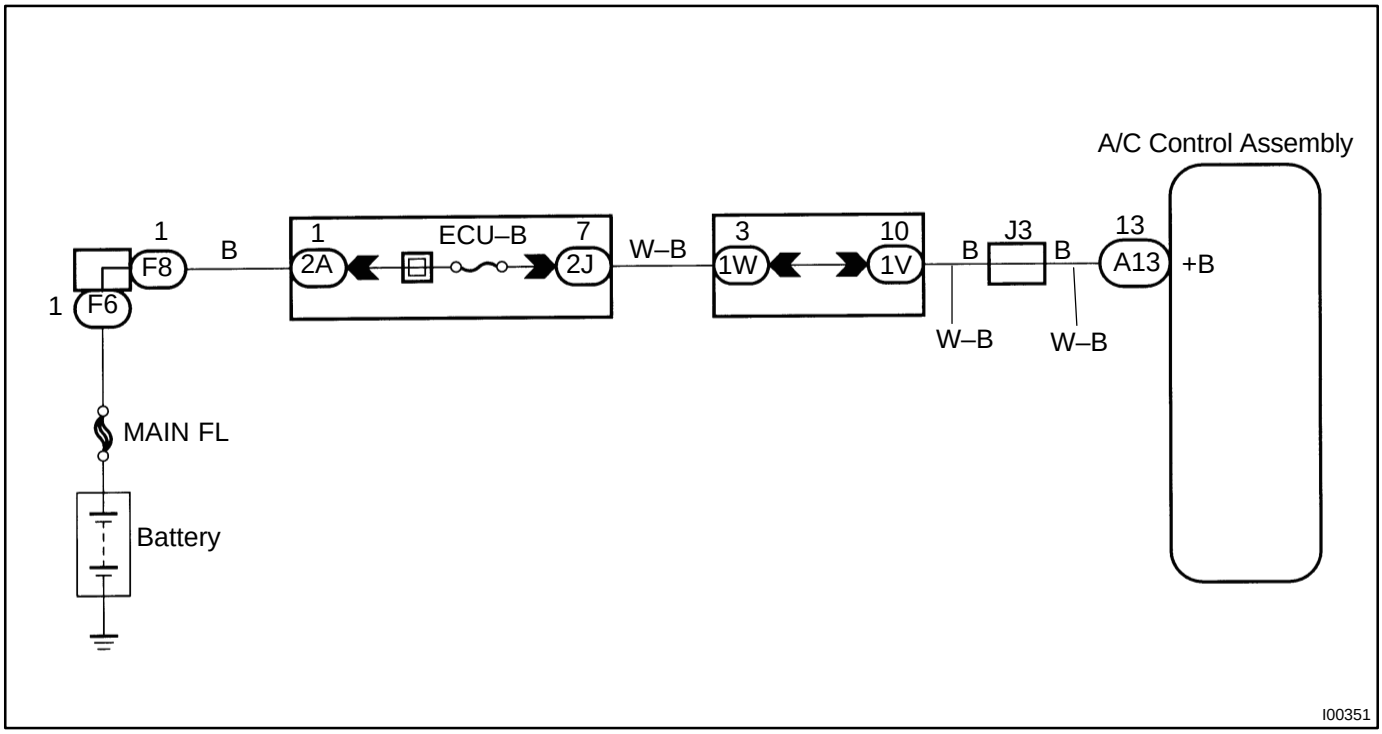
DI0DM–01

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

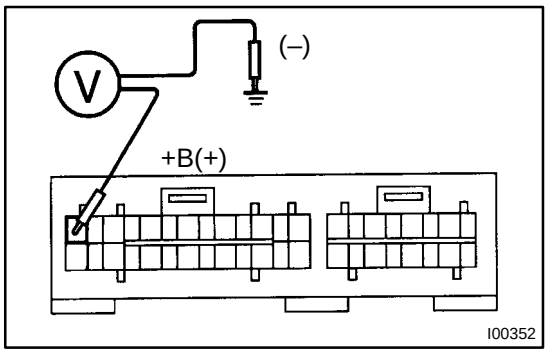
This is the back–up power source for the A/C control assembly. Power is supplied even when the ignition switch is off and is used for DTC memory, etc..

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal +B fo A/C control assembly connector and body ground.**



PREPARATION:

(a) Remove front ash receplacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

CHECK:

Measure voltage between termimal +B of A/C control assembly connector and body ground.

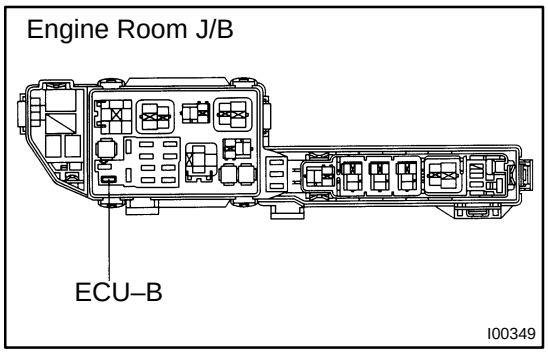
OK:

Voltage: 10 – 14 V

OK	**Proceed to nect circuit inspection shown on matrix chart (See page DI–535).**

NG

2	Check ECU–B fuse.



PREPARATION:

Remove ECU–B fuse from engine room J/B.

CHECK:

Check continuity of ECU–B fuse.

OK:

There is continuity.

NG → **Check for short in all the harness and components connected to the ECU–B fuse (See page DI–578).**

OK

Check and repair harness and connector between A/C control assembly and battery.

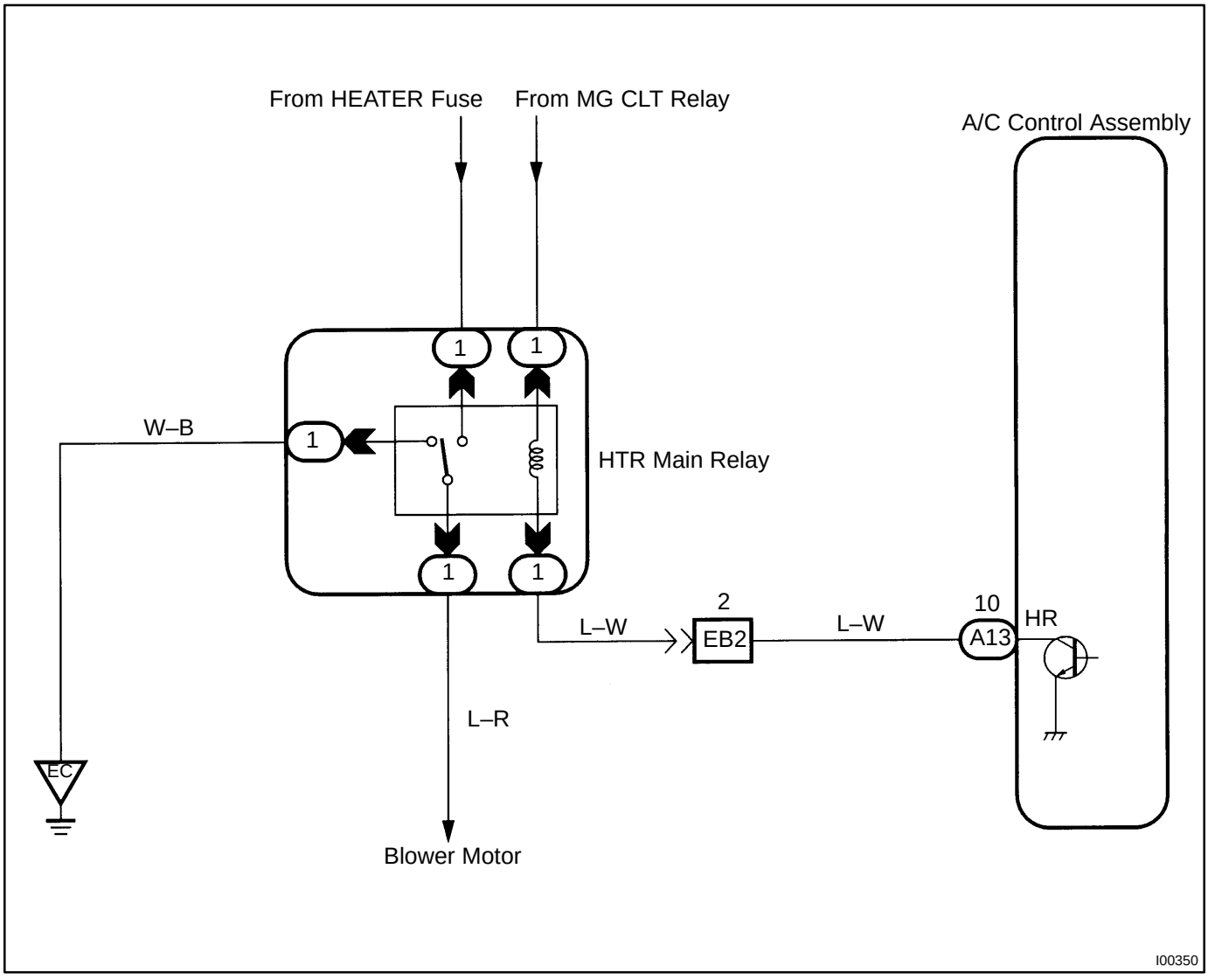
DI0DN–01

Heater Main Relay Circuit

CIRCUIT DESCRIPTION

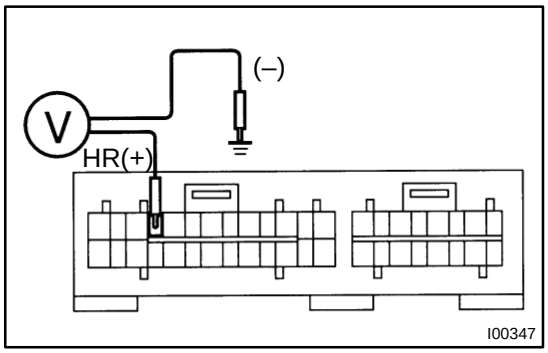
The heater main relay is switched on by signals from the A/C control assembly. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal HR of A/C control assembly connector and body ground.**



PREPARATION:

(a) Remove front ash receptacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

CHECK:

Measure voltage between terminal HR of A/C control assembly and body ground when ignition switch is ON and OFF.

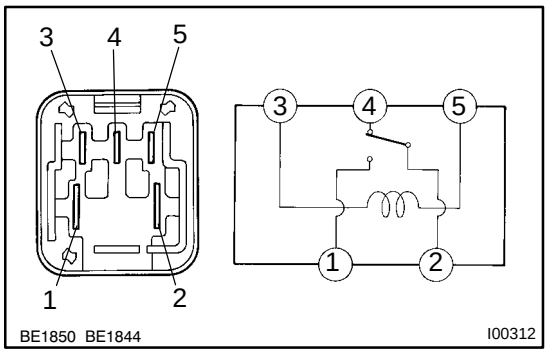
OK:

Ignition Switch	Voltage	
OFF	0V	
ON	Blower ON	0 V
	Blower OFF	10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–535).**

NG

2	Check heater main relay.



PREPARATION:
Remove heater main relay from .
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

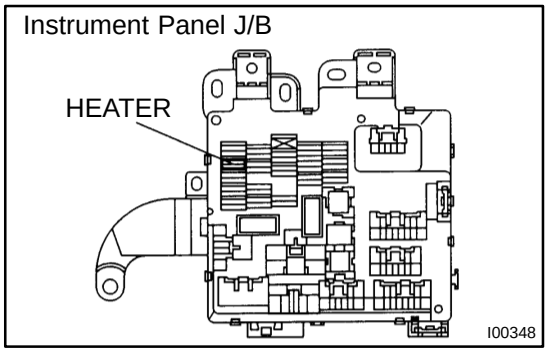
PREPARATION:
Apply battery positive voltage between terminals 3 and 5.
CHECK:
Check continuity between each pair of terminal shown below.
OK:

Tester connection	Specified condition
1 – 2	Continuity
2 – 4	No continuity

NG → **Replace heater main relay.**

OK

3	Check HEATER



PREPARATION:
Remove HEATER fuse from instrument panel J/B.
CHECK:
Check continuity of HEATER fuse.
OK:

There is continuity.

NG → **Check for short in all the harness and components connected to the HEATER fuse (See page DI–583).**

OK

Check and repair harness and connector between A/C control assembly and battery.

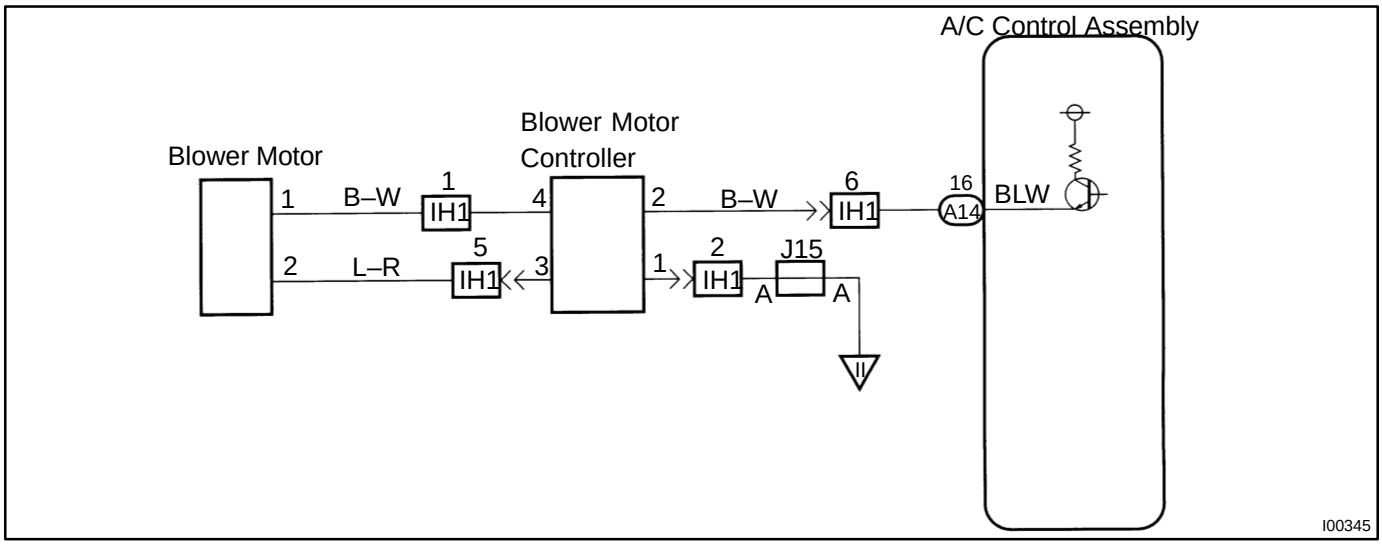
DI0DO–01

Blower Motor Circuit

CIRCUIT DESCRIPTION

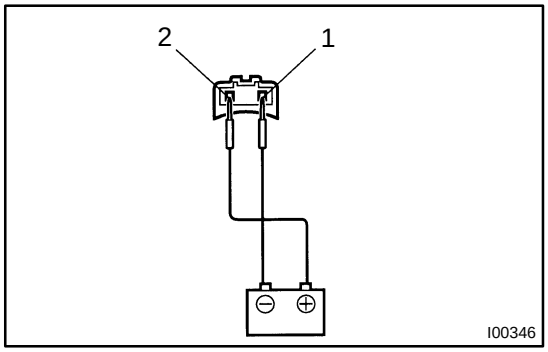
This is the power source for the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check blower motor.**



PREPARATION:

Remove blower motor (See page AC–61).

CHECK:

Connect positive (+) lead connected to terminal 2 of blower motor connector, negative (–) lead to terminal 1.

OK:

Blower motor operates smoothly.

NG → **Replace blower motor.**

OK

2	**Check harness and connector between battery and blower motor, blower motor and body ground. (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535).

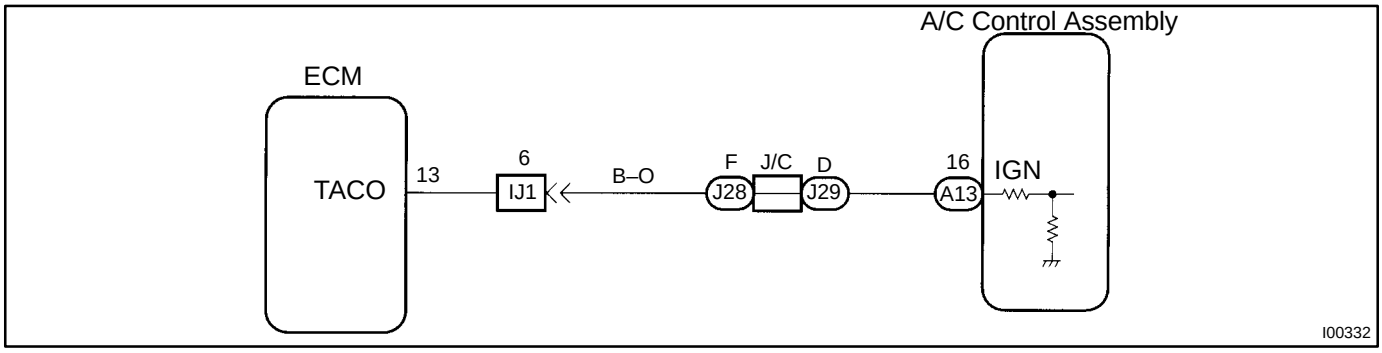
DI0DP–01

Igniter Circuit

CIRCUIT DESCRIPTION

This A/C control assembly monitors the engine speed through signals sent from the igniter. The A/C control assembly uses these signals and compressor speed signals to detect the compressor lock condition.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of tachometer.**

CHECK:

Check that the tachometer operates normally.

NG → **Proceed to combination meter troubleshooting (See page BE–58).**

OK

2	**Check harness and connector between A/C control assembly and igniter (See page IN–27).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–535).